B10

VOLUME B: AIRPORT AND SURROUNDS

Surface Transport

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GLOSSARY OF ABBREVIATIONS

AADT	Average Annual Daily Traffic
AAWT	Average Annual Weekday Traffic
ATCN	Australia TradeCoast North
BAC	Brisbane Airport Corporation
BCC	Brisbane City Council
BLISS	Brisbane Linked Intersection Signalling System
BSD	Brisbane Statistical Division
BSTM	Brisbane Strategic Transport Model
CBD	Central Business District
DFO	Direct Factory Outlet
DMR	Department of Main Roads
DTB	Domestic Terminal Brisbane
EIS	Environmental Impact Study
GUP	Gateway Upgrade Project
IDAS	Integrated Development Assessment System
IPA	Integrated Planing Act
ITB	International Terminal Brisbane
LGA	Local Government Area
LOS	Level of Service
NAR	Northern Access Road
NPR	New Parallel Runway
NSBT	North South Bypass Tunnel
OLC	Open Level Crossing
OUM	Office of Urban Management
SEQ	South East Queensland
SEQTS	South East Queensland Travel Survey (2003-04)
SEQHTS	South East Queensland Household Travel Survey (1992)
SLA	Statistical Local Area
TFI	Tourism Futures International

SUMMARY OF KEY FINDINGS

Base Conditions

- Passenger numbers through the International and Domestic Terminals have been increasing at an average compound rate of 5 percent per annum between 1997 and 2004, with approximately 15 million passengers travelling through the Brisbane Airport in 2004.
- Public transport to and from the Brisbane Airport includes scheduled bus and train services. Taxis, limousines and minibuses are also modes of travel to the Airport terminals.
- In 2005, approximately 67 percent of Airport patrons travelled to and from the terminals via private vehicle, this was followed by 7 percent travelling by Airtrain, 7 percent travelling by bus, 1 percent travelling by limousine and 18 percent travelling by taxi.
- Approximately 90 percent of total vehicles currently travelling in and around the International and Domestic Terminals are light vehicles.
- The key links in and around the study area and their average weekday volumes are in the order of Airport Drive (60,000), Gateway Motorway south of Airport Drive (106,000), East-West Arterial Road (23,000) Nudgee Road (17,000), Kingsford Smith Drive (31,000), Toombul Road (25,000), Sandgate Road (43,000) and Lomandra Drive (12,000).
- The study area network is generally approaching capacity based on current traffic volumes, with the Gateway Motorway currently operating at its mid-block capacity during peak periods.
- Key intersections in the study area were analysed including Kingsford Smith Drive/Nudgee Road, Kingsford Smith Drive/Fison Avenue, Kingsford Smith Drive/Links Avenue, East-West Arterial Road/ Sandgate Road, East-West Arterial Road/Nudgee Road, Airport Drive/Gateway Motorway and Toombul Road/Gateway Motorway.
- All of the these intersections currently operate over capacity during either the morning or evening peak with the exception of the Toombul Road/Gateway Motorway roundabout which currently operates under capacity.
- Development of Greater Brisbane and lands surrounding the Brisbane Airport, including those owned by Brisbane Airport Corporation (BAC), Port of Brisbane Corporation, and Brisbane City Council (BCC) is forecast to result in significant congestion on the road network in both 2015 and 2035 without NPR traffic.

Impacts of NPR

- NPR traffic is distributed predominantly on the Northern Access Road, Gateway Upgrade Project (GUP) and Airport Drive which were designed to operate as the major access points to the Airport terminals.
- The soon to be under construction Northern Access Road is forecast to have an increase in traffic flows of up to 50 percent as a result of NPR traffic generation. Airport Drive, GUP, Nudgee Road, Toombul Road and Sandgate Road are forecast to have traffic flow increases of between 5 and 20 percent. All other critical links within the study area are forecast to have traffic flow increases of less than 5 percent.
- The forecast reduction in peak operating speeds on the study area network as a result of NPR is in the order of 3 km/h on a limited number of roads. The residual effects of the NPR in 2035 are likely to be barely perceptible in terms of vehicle speeds to users of the road network within the study area as it falls well below the broader travel speed variability resulting from seasonal and non-recurrent congestion sources.
- Accident data for the Gateway Motorway and international research indicates little or no link with an increase in aircraft flight paths and road accidents.

10.1 Introduction

This section of the Chapter provides an overview of the analysis undertaken to examine the current conditions of the transport network surrounding and within the Brisbane Airport site.

The following tasks were undertaken to establish baseline conditions of the surrounding transport network:

- A description of the current Airport patron mode share for the International and Domestic Terminals at the Brisbane Airport;
- A description of the current road network, including public transport routes and frequencies and non-motorised facilities such as access for pedestrians and cyclists;
- Analysis of traffic volumes, capacity and baseline performance levels of key road links and intersections;
- A description of the current traffic composition using the road network within the study area;
- Analysis of the historic growth of passengers and road traffic at the Brisbane Airport over the past ten years; and
- A review of current policy documents relating to the future development of Airport land transport infrastructure and surrounding transport network.

10.2 Methodology

10.2.1 Outline Method

The basis of the study is to determine the impact on road network operations within and surrounding the Brisbane Airport site of the NPR at Brisbane Airport. The first task of this assessment is establishing baseline conditions, which included the following:

- Identification of baseline road traffic and public transport network operations, including the operating Level of Service of critical road infrastructure that provides access to the Brisbane Airport; and
- Establishing a robust basis for identifying travel patterns of Airport passengers and a relationship between vehicle trip generation.

10.2.2 Baseline Description

A variety of information sources has been used to describe the baseline road traffic and public transport network operations within the vicinity of the Brisbane Airport. These include:

- Department of Main Roads Traffic Census 2004;
- Traffic data from Brisbane City Council (BCC) BLISS sites;
- Translink public transport timetables;
- BAC Traffic Count Data 2004;
- BAC Airport Terminal Survey 2005;
- Brisbane City Plan 2000 (updated January 2006); and
- Site visits.

10.2.3 Transport Model Development

The Brisbane Strategic Transport Model (BSTM) forms the basis of strategic traffic demand forecasts for the Airport and surrounding road network. It has been used for the majority of major transport modelling projects undertaken within the Brisbane Statistical Division (BSD) since late 2000.

The BSTM uses a traditional four-stage approach to modelling transport. There are four basic stages to this approach incorporating:

- **Trip Generation** – This step involves the estimation of person trip ends for each transport zone and trip purpose. Trips produced in each zone are a function of zonal characteristics such as population. Trips attracted to each zone are a function of zonal characteristics such as employment, enrolments and population;
- **Trip Distribution** – This step involves linking trip productions to trip attractions, using a 'gravity model'. Output is a matrix of trips from each origin zone to each destination zone;

- **Modal Split** – This step involves estimating the percentage of trips made during peak and off-peak periods by private and commercial vehicles. Outputs are peak period and off-peak period vehicles matrices;
- **Trip Assignment** – This step involves developing route choice using a capacity restraint technique, i.e. considering congestion delay. Trip matrices are loaded onto the transport network to determine the amount of traffic on the roads. Users choose routes to minimise the 'generalised' cost of their trip.

The demographics contained in the version of the BSTM used for the NPR Draft EIS/MDP represent the latest population and employment forecasts from BCC. Refinement of the BSTM for studies in and around the Airport has been undertaken over the past three years and included:

- Improvements to better represent the traffic generation and distribution from both the International and Domestic Terminals. This is based upon data collected from a series of mode share and interview surveys conducted at the terminals in May 2005;
- Refining and disaggregating traffic model zones located on-airport land to better represent access to the road network;
- Additional road network representing roads under the jurisdiction of BAC; and
- Additional road infrastructure built between 2001 (BSTM base year) and 2004 (EIS traffic model base year).

The 2004 and forecast 2015 and 2035 base year models reflect a 'Do Minimum' scenario to be used as a baseline for the traffic impact of the new runway. It should be noted that the 2004 Baseline traffic model has been verified against observed traffic data at key locations on the road network surrounding the Brisbane Airport. Further discussion on the 'suitability for purpose' of the traffic model is contained in the forecasting section of this report.

10.2.4 Representing Airport Passenger Demand

The 2004 South East Queensland Travel Survey (SEQTS) contains detailed information on household travel modes, origins and destinations within the South East Queensland region. Interrogation of the 2004 SEQTS revealed a total of approximately 270 trip records with an origin or destination at the Brisbane Airport.

An Airport terminal survey was undertaken by ARUP at the International Terminal on the 10 May 2005 and the Domestic Terminal on the 12 May 2005, each one over a 12 hour period. Airport patrons were surveyed at the arrival and departure areas of both terminals with approximately five times more records being collected than during the SEQTS.

A comparison between the SEQTS and the terminal surveys show that the SEQTS has a much smaller sample size. The SEQTS is likely to have under-represented the number of trips to and from the Brisbane Airport as a result of the smaller sample size. Although the SEQTS data is reasonable for South East Queensland and BCC regional levels, the terminal survey data is the more recent and comprehensive data for the Airport and reflects the Airport mode split and distribution specifically. As a result, the terminal survey data has been used in the base model for determining the modal split, distribution and number of trips within the Airport area.

10.3 Limitations and Assumptions

10.3.1 Base Assumptions

The following base assumptions have been made in the study:

- The use of the latest available demographic data from BCC representing forecasts is generally consistent with the Office of Urban Management South East Queensland Regional Plan;
- Airport patron demand was represented from the detailed BAC Airport Survey undertaken in May 2005;

- Development of lands surrounding the Airport, both on BAC lands and surrounding, is based on information received from Australia TradeCoast in 2004/05 and is generally consistent with the 2003 BAC Master Plan. This has been updated to reflect recent developments in the area; and
- A comparison of the 1992 Household Travel Survey (SEQHTS) and 2004 Travel Survey (SEQTS) indicated a lower number of household trips but higher proportion of these trips by private vehicle in the 2004 SEQTS compared to the 1992 SEQHTS across the entire survey area. The number of private vehicle trips per person differed by less than 2 percent between the 1992 SEQHTS and 2004 SEQTS across the survey area. Given the impact assessment is relative and the Airport patronage and development demand surrounding the Airport has been refined with more detailed information specifically for the purposes of this study, the existing 1992 SEQHTS dataset was used for the remainder of BSTM area.

10.3.2 Limitations

In addition to the above, the following limitations are applicable to the traffic component of the NPR EIS:

- The forecast traffic generation from the NPR compared to the current runway arrangement is based upon detailed hourly airline movement forecasts from Tourism Futures International (TFI).
- Average weekday traffic volumes in the baseline report are derived from tube or loop counters. For certain sections of road, tube or loop counts were unavailable. In these instances, observed data from adjacent intersections is used as the nearest representative location. This data is factored where sufficient seasonal, weekly or daily data is available from nearby count sites.
- Traffic count data at an all day level broken down to hourly volumes is limited to a small number of locations.

10.4 Baseline Operation of the Transport Network

10.4.1 Origin – Destination of Airport Patrons

Data from the Airport terminal surveys was analysed to determine the number of Airport patrons using either public transport, defined as trips by bus, coach or Airtrain, or private vehicles. The analysis was undertaken for both the Domestic Terminal (DTB) and International Terminal (ITB). Results of the analysis are illustrated as percentages of the total number of trips to each respective terminal, including trips taken by private vehicle, taxis, limousines and public transport.

Figure 10.4a shows the locations of highest private vehicle use to travel to and from the DTB. The figure shows that the highest percentage of Airport patrons travelling to and from the DTB using private vehicles is from the outer north-west district of the Brisbane Metropolitan region. Following this is the Sunshine Coast, inner south-east, inner south-west and outer south-east districts.

Figure 10.4b shows the locations of highest public transport use to and from the DTB. The values represent the percentage of total passenger trips undertaken on public transport to and from each district. The figure shows the Inner City north and the Gold Coast districts to have the highest percentage of Airport patrons using public transport to travel to and from the DTB. Other districts also showing significant public transport use are the Sunshine Coast, outer north, inner west and outer south-west districts of the Brisbane Metropolitan region. Each of these areas are located close to train and bus stations which have a high frequency of services.

Figure 10.4a: *Location of Highest Private Vehicle Use to Travel to and from the DTB.*

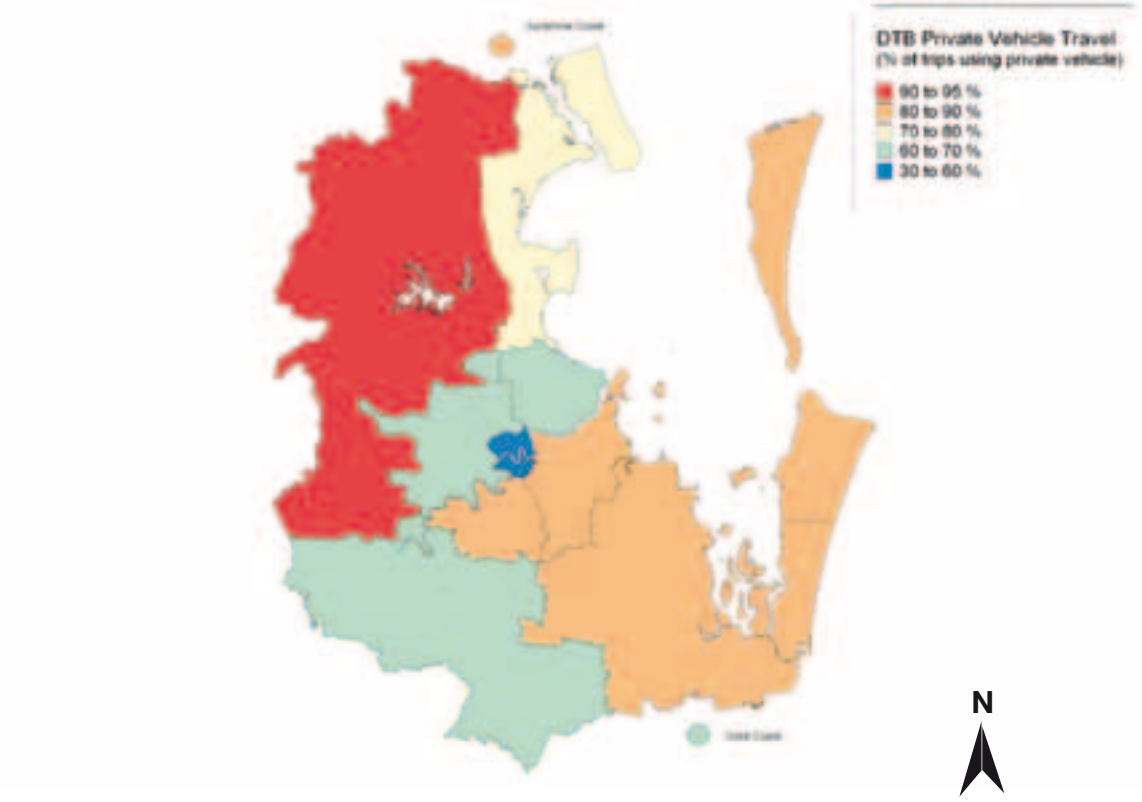


Figure 10.4c shows the locations of highest private vehicle use to travel to and from the ITB. The figure shows the highest percentage of Airport patrons using private vehicles to and from the ITB are travelling from the outer north-west district of the Brisbane Metropolitan region. The inner south-east and outer south-east districts also showed high percentages of private vehicle use.

Figure 10.4d shows the locations of highest public transport use to and from the ITB. The values represent the percentage of total passenger trips undertaken on public transport to and from each district. The figure shows the Inner City south district to have the highest percentage of Airport patrons using public transport to travel to and from the ITB. Other districts of high public transport use include the Inner City north and the Gold Coast districts. These locations are close to a combination of train and bus stations which have a high frequency of services.

Figure 10.4b: *Location of Highest Public Transport Use to Travel to and from the DTB.*

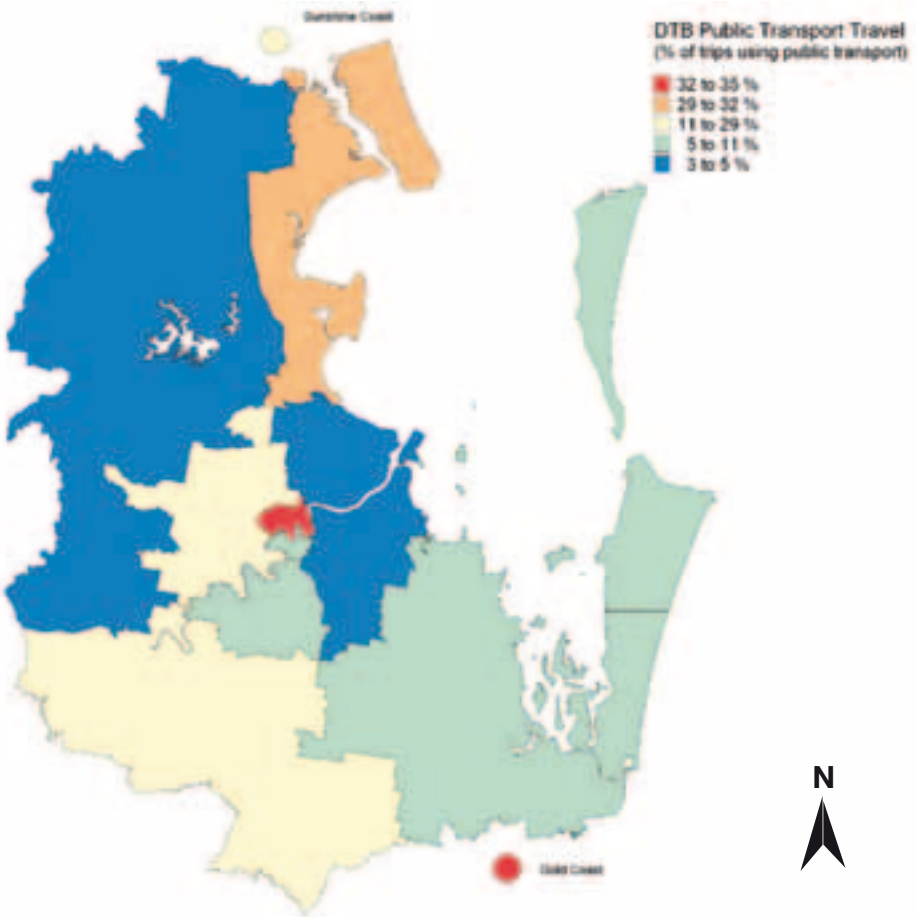


Figure 10.4c: *Location of Highest Private Vehicle Use to Travel to and from the ITB.*

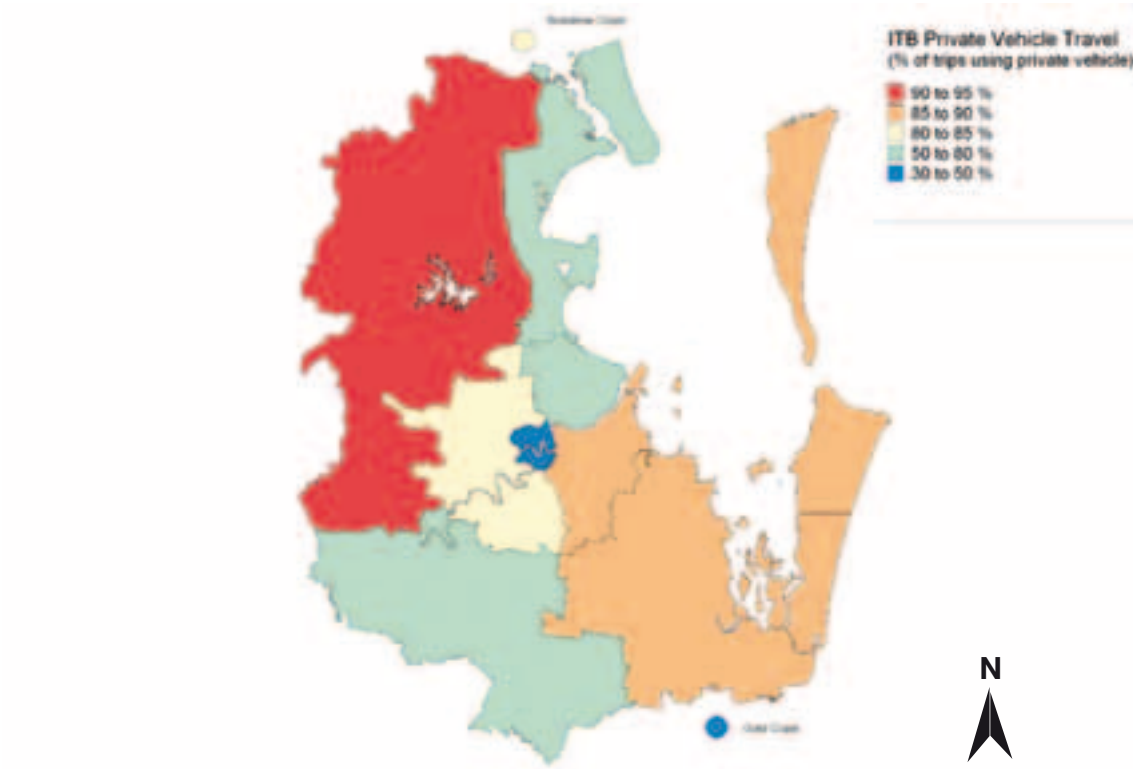
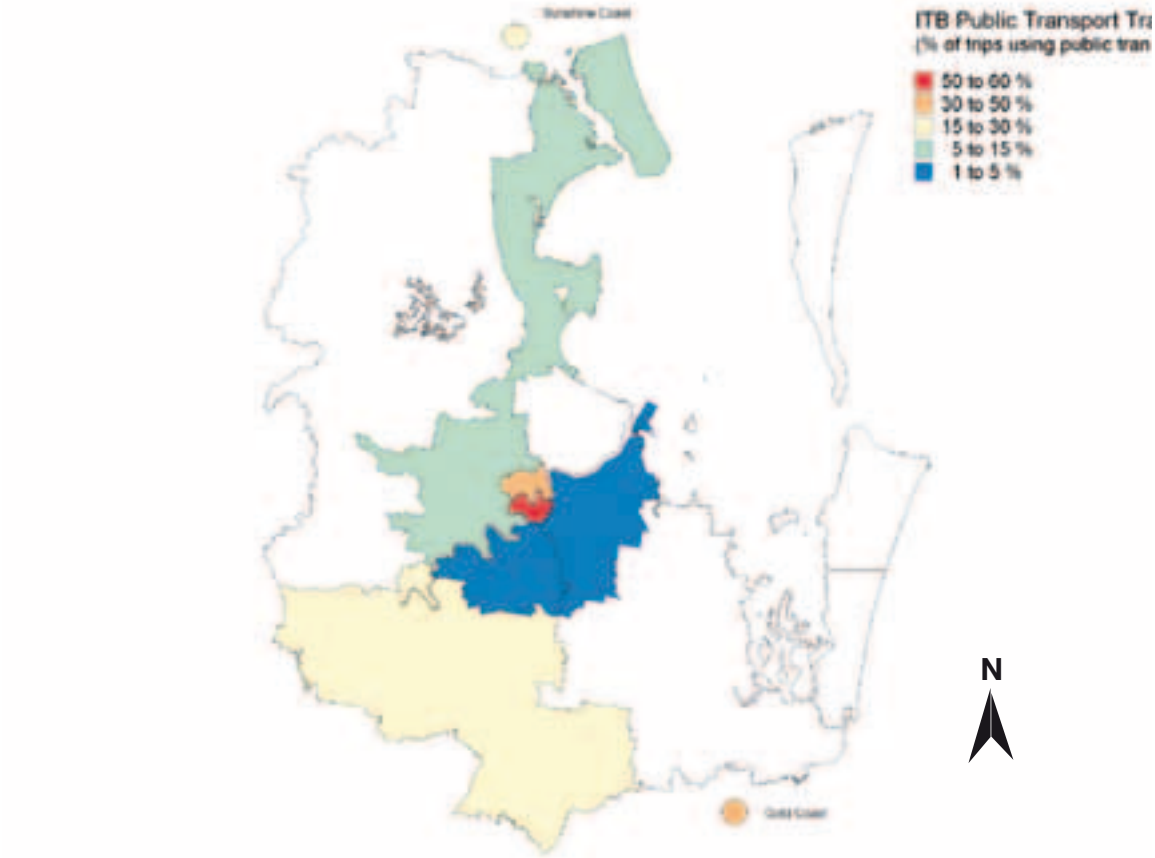


Figure 10.4d: *Location of Highest Public Transport Use to Travel to and from the ITB.*



10.4.2 Airport Patrons Mode Share

Analysis was undertaken to determine the percentage of patrons using selected transport modes including the Airtrain, bus/coach services, limousines, taxis and private vehicles. Surveys were undertaken in May 2005 at both the ITB and DTB, with patrons at both terminals being asked to respond to questions relating to the transportation they had used to travel to/from the Airport site. Mode share proportions were derived for the 12 hour values, as well as both AM and PM two hour peaks.

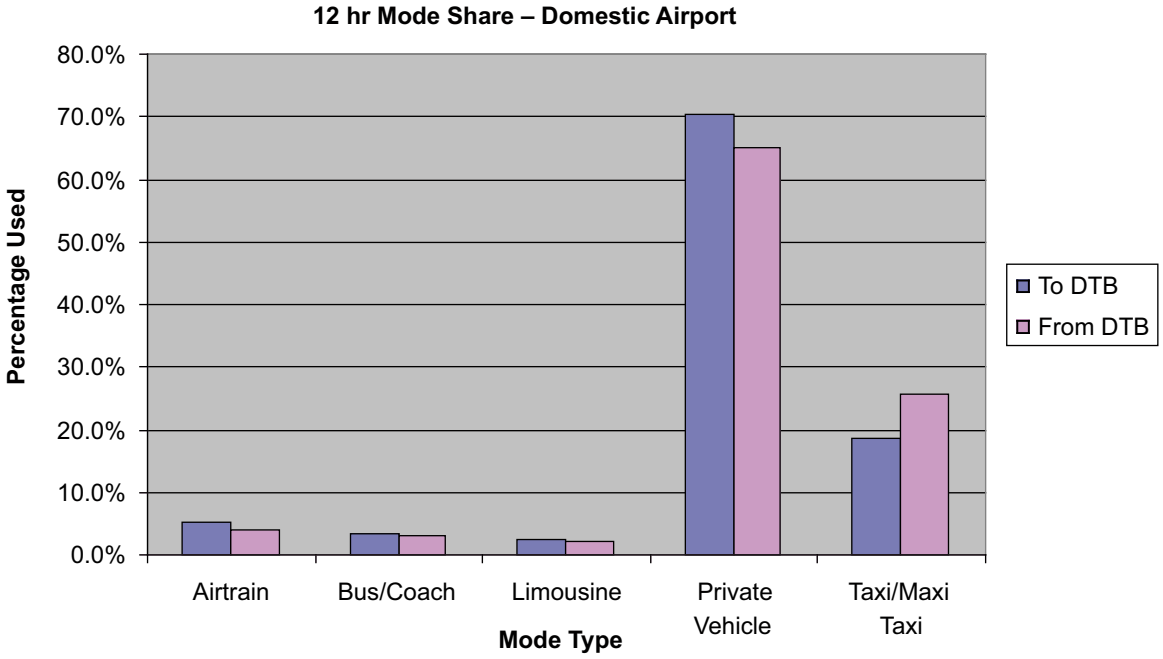
Table 10.4a and **Figure 10.4e** show the percentages of Airport patrons using each transport mode during a 12 hour period to and from the DTB.

Table 10.4a: Airport Patron Mode Share, DTB, 12 Hours.

Mode	To DTB	From DTB
Airtrain	5%	4%
Bus/Coach	4%	3%
Limousine	2%	2%
Private Vehicle	70%	65%
Taxi/Maxi Taxi	19%	26%

Source: BAC Terminal Survey, May 2005

Figure 10.4e: *Airport Patron Mode Share, DTB, 12 Hours.*



The data shows that the majority, approximately 65–70 percent, of Airport patrons use private vehicles to travel to and from the DTB. Use of taxis is more common for people leaving the DTB than those travelling to the DTB. The Airtrain, bus/coach and limousine services, in total, are used for only approximately 10 percent of trips made to and from the DTB.

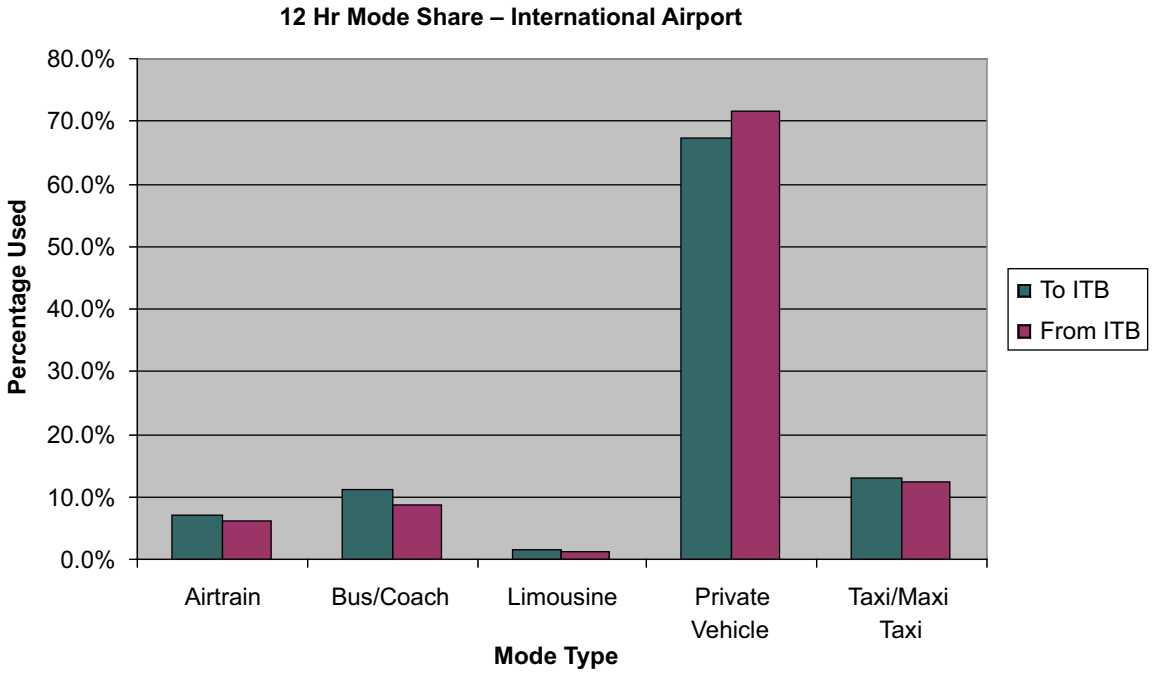
Table 10.4b and **Figure 10.4f** show the percentages of Airport patrons using each transport mode during a 12 hour period to and from the ITB.

Table 10.4b: Airport Patron Mode Share, ITB, 12 Hours.

Mode	To ITB	From ITB
Airtrain	7%	6%
Bus/Coach	11%	9%
Limousine	2%	1%
Private Vehicle	67%	72%
Taxi/Maxi Taxi	13%	12%

Source: BAC Terminal Survey, May 2005

Figure 10.4f: *Airport Patron Mode Share, ITB, 12 Hours.*



The data shows that the majority, approximately 70 percent, of Airport patrons use private vehicles to travel to and from the ITB. When compared to the DTB, the percentage of people, leaving the ITB and being collected by private vehicles is slightly higher than those driving to the ITB. The Airtrain and bus/coach services have a higher percentage of use at the ITB than those at the DTB, while taxi use is almost half that of the DTB.

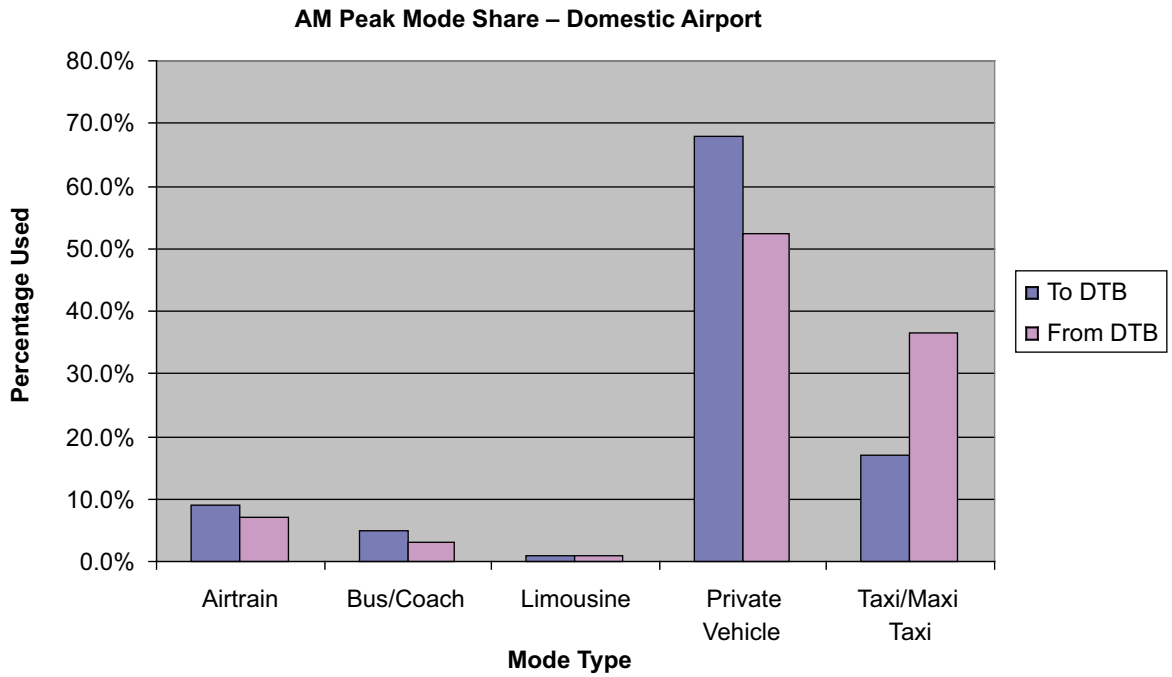
Table 10.4c and **Figure 10.4g** show the percentages of Airport patrons using each transport mode during an AM peak two hour period to and from the DTB.

Table 10.4c: Airport Patron Mode Share, DTB, AM Peak (7am-9am).

Mode	To DTB	From DTB
Airtrain	9%	7%
Bus/Coach	5%	3%
Limousine	1%	1%
Private Vehicle	68%	52%
Taxi/Maxi Taxi	17%	37%

Source: BAC Terminal Survey, May 2005

Figure 10.4g: *Airport Patron Mode Share, DTB, AM Peak (7am-9am).*



The majority of Airport patrons travelling to the DTB during the AM peak period (68 percent) choose to travel by private vehicle, only about 52 percent of people driving from the DTB travel by private vehicle. Taxis have a much higher percentage of use during the AM peak period, particularly for trips from the DTB. The Airtrain, bus/coaches and limousines make up approximately 15 percent of trips to the DTB and only about 11 percent travelling from the DTB.

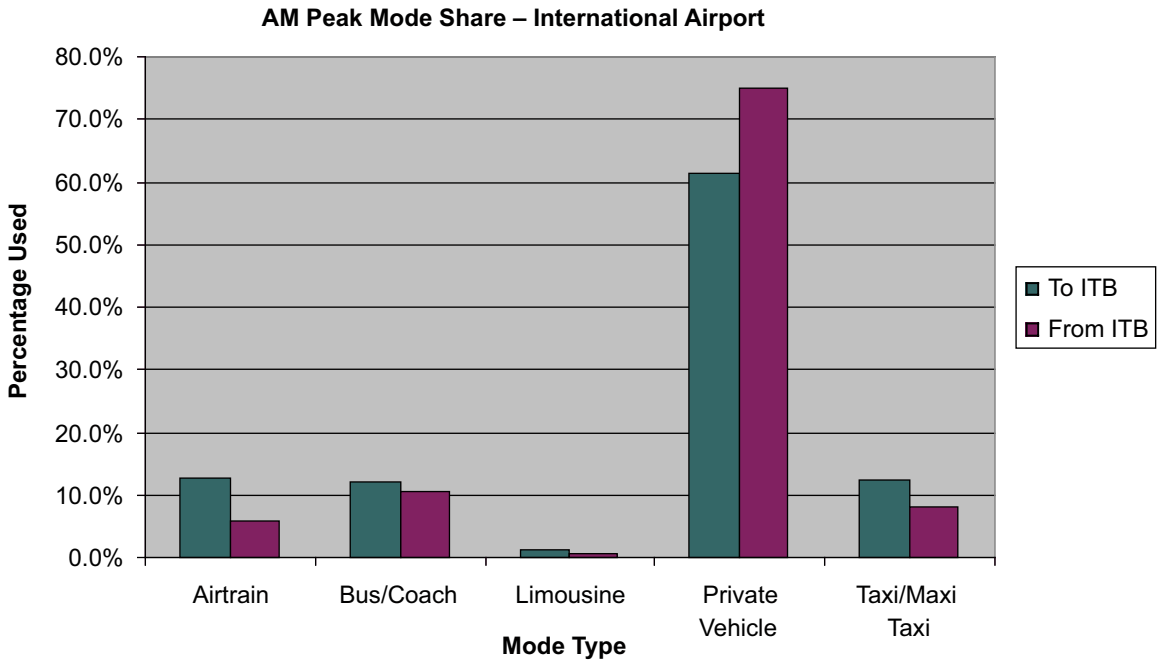
Table 10.4d and **Figure 10.4h** show the percentages of Airport patrons using each transport mode during an AM peak two hour period to and from the ITB.

Table 10.4d: Airport Patron Mode Share, ITB, AM Peak (7am-9am).

Mode	To ITB	From ITB
Airtrain	13%	6%
Bus/Coach	12%	10%
Limousine	1%	1%
Private Vehicle	62%	75%
Taxi/Maxi Taxi	12%	8%

Source: BAC Terminal Survey, May 2005

Figure 10.4h: *Airport Patron Mode Share, ITB, AM Peak (7am–9am).*



From **Figure 10.4h**, approximately 60 percent of trips made to the ITB during the AM peak period are by private vehicle, compared with about 75 percent being made from the ITB. In comparison, taxis, Airtrain, bus/coaches take a similar percentage of people, around 12 percent each, travelling to the ITB and slightly less on the trip from the ITB.

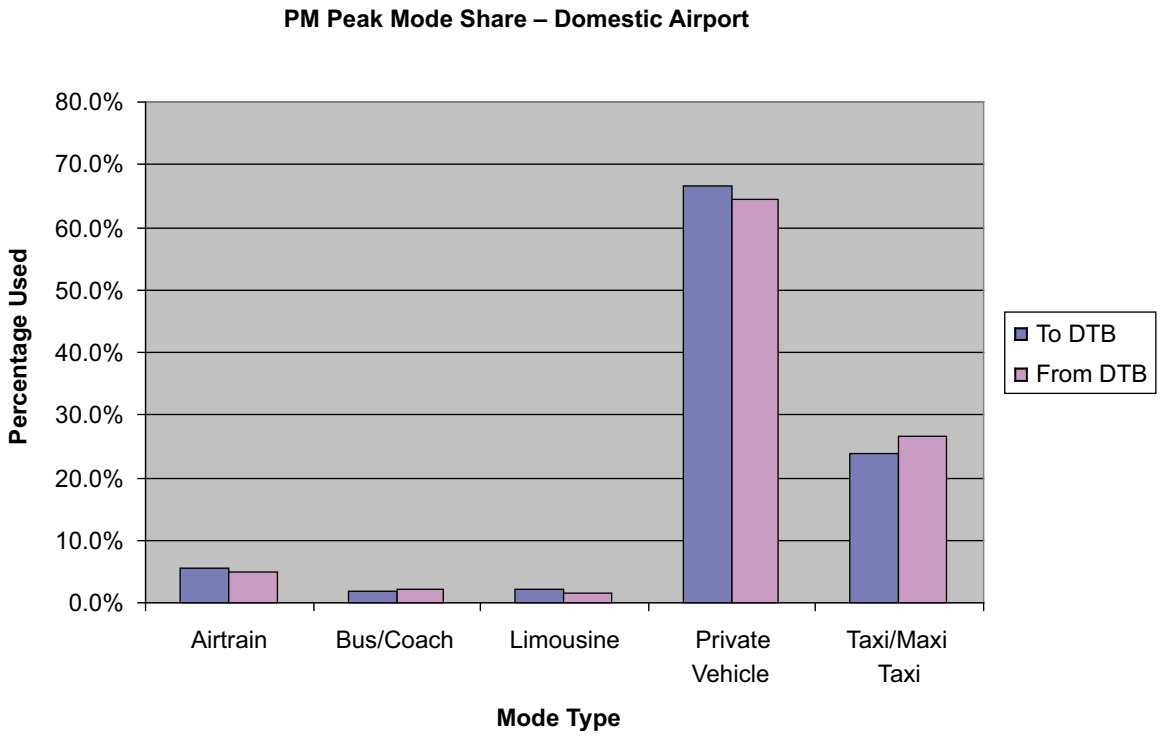
Table 10.4e and **Figure 10.4i** show the percentages of Airport patrons using each transport mode during a PM peak two hour period to and from the DTB.

Table 10.4e: Airport Patron Mode Share, DTB, PM Peak (4pm-6pm).

Mode	To DTB	From DTB
Airtrain	5%	5%
Bus/Coach	2%	2%
Limousine	2%	2%
Private Vehicle	67%	64%
Taxi/Maxi Taxi	24%	27%

Source: BAC Terminal Survey, May 2005

Figure 10.4i: *Airport Patron Mode Share, DTB, PM Peak (4pm-6pm).*



The data shows that the majority, approximately 65 percent, of Airport patrons use private vehicles to travel to and from the DTB during the PM peak period. Use of taxis is about 25 percent in both directions, to and from the DTB. The use of the Airtrain, bus/coach and limousines is approximately 10 percent in total, for both directions of travel.

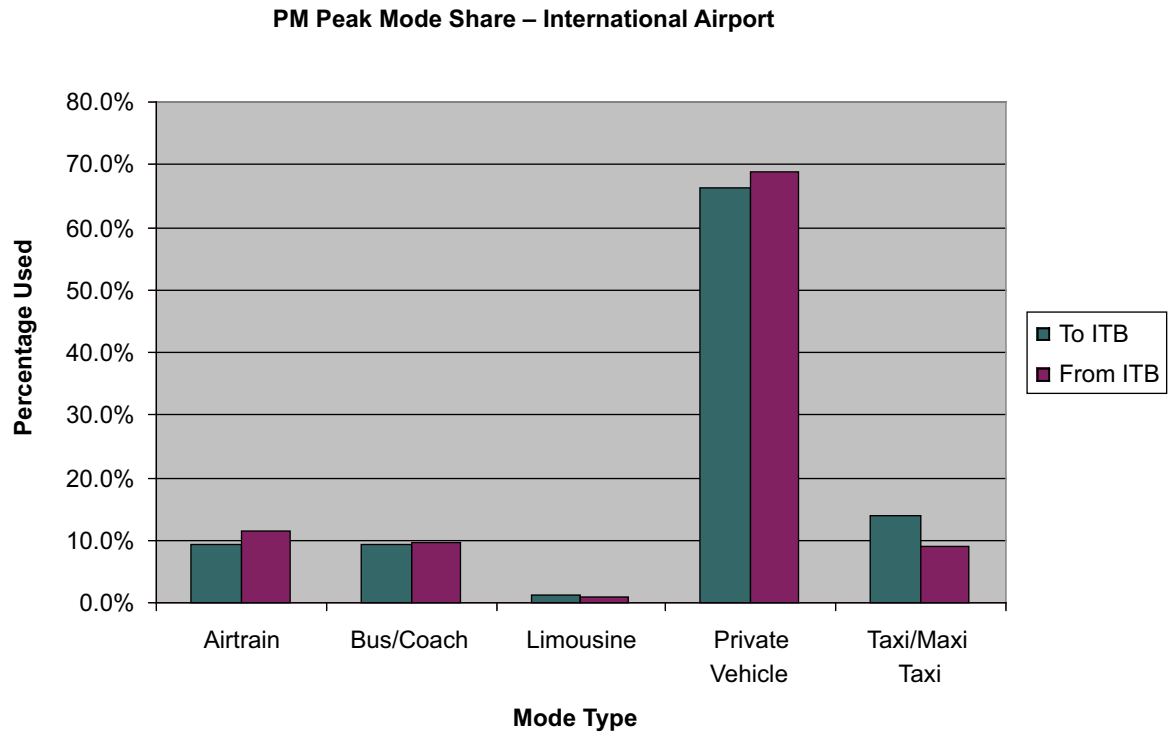
Table 10.4f and **Figure 10.4j** show the percentages of Airport patrons using each transport mode during a PM peak two hour period to and from the ITB.

Table 10.4f: Passenger Mode Share, ITB, PM Peak (4pm-6pm).

Mode	To ITB	From ITB
Airtrain	9%	11%
Bus/Coach	9%	10%
Limousine	1%	1%
Private Vehicle	67%	69%
Taxi/Maxi Taxi	14%	9%

Source: BAC Terminal Survey, May 2005

Figure 10.4j: *Airport Patron Mode Share, ITB, PM Peak (4pm-6pm).*



From the data, approximately 65 percent of Airport patrons use private vehicles to get to and from the ITB during the PM peak period. Taxis make up about 15 percent of trips to the ITB and only about 10 percent of trips from the ITB. Both the Airtrain and bus/coach services make up around 10 percent each of trips to and from the ITB; this is almost twice as much as those taken to/from the DTB for the same period.

10.4.3 Road Network Objectives

The objective of the study is to assess the performance of key roads providing access to the Brisbane Airport through to 2035. The assessment will allow the future transport demand to be determined for the study area based on the two scenarios, with the construction of the NPR and without the NPR.

The basis of the assessment is a desired level of service set at the current capacity of the road network i.e. roads were identified as deficient when the traffic volume to road capacity ratio reached 100 percent. The existing road network is assessed in terms of the road capacity deficiency, both now and in the future. Analysis was undertaken for both mid-block sections and key intersections within the study area.

10.4.4 Deficiency Indicators

For the purposes of the assessment, Level of Service (LOS) was used as a measure of the performance of the road network. The values ascribed to this performance indicator range from 'A', relating to congestion free operation, to 'F' that relates to total flow breakdown with the road link being over capacity. **Table 10.4g** shows the criteria used for both links and intersections.

The level of service adopted is necessarily a compromise representing a trade-off between free flow and congested conditions recognising the cost implications and effects on potential use of public transport of maintaining a higher level of service.

For the purposes of this assessment, links that have a volume to capacity ratio (v/c) representing LOS 'F' (greater than 1.0) are deemed as deficient. For intersections, a LOS of 'F' is also deemed as deficient.

10.4.5 Current Road Network and Hierarchy

The Brisbane Airport is located approximately 8 km from the Brisbane CBD and encompasses a total area of 2,700 hectares. The Airport site has its boundaries marked by the Kingsford Smith Drive to the south-east, the Gateway Motorway to the south and west, Kedron Brook Floodway to the west and lastly by Moreton Bay on the north-east coast (refer to **Figure 10.4k**).

The current road network leading into the Brisbane Airport site is dominated by the Gateway Motorway which provides links between the Bruce Highway, the Ipswich Motorway and the Pacific Motorway. The Gateway Motorway provides a link for traffic to travel between the northern and southern suburbs of Brisbane and both the Gold and Sunshine Coasts. It also facilitates traffic movements from the west of Brisbane via connections with major arterial roads.

Due to the restrictions imposed on the site by its location being adjacent to Moreton Bay and the Brisbane River, access to the surface road network is concentrated in an Airport-City direction. This is supported in the northern Brisbane suburbs-southern Brisbane suburbs direction by only the Gateway Motorway and Nudgee Road. The current road network also suffers from capacity constraints causing limitations at several major interchanges

Table 10.4g: Level of Service Performance Indicators.

Level of Service	Links (Volume to Capacity Ratio)*	Intersections (Average Delay per Vehicle min/veh)	
		Traffic Signals, Roundabouts	Give Way and Stop Signs
A	0 to 0.33	0 to 0.16	0 to 0.16
B	0.34 to 0.50	0.17 to 0.33	0.17 to 0.25
C	0.51 to 0.65	0.34 to 0.58	0.26 to 0.41
D	0.66 to 0.80	0.59 to 0.91	0.42 to 0.58
E	0.81 to 1.00	0.92 to 1.33	0.59 to 0.83
F	>1.00	>1.33	>0.83

Source: Austroads Part 2, Highway Capacity Manual 2000
** 100 km/h – Uninterrupted multi-lane road*

Figure 10.4k: *Study Area for the New Parallel Runway.*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

particularly the Airport Drive/East-West Arterial Road/Gateway Motorway roundabout.

For the purposes of this study and to allow consistency with the surrounding metropolitan network, the road hierarchy classification used in Council's planning document, 'Brisbane City Plan 2000' are used. A similar classification system is also included in the Transport Plan for Brisbane. The classifications for road hierarchy are described below:

- Motorways serving inter- and intra-regional connections for high volumes of people and goods, directing longer distance traffic away from heavily developed areas. They are always access limited.
- Arterial routes providing connections for high volumes of people and goods between major activity centres and residential areas of the city.
- Suburban routes providing connections between arterial routes for moderate to high volumes of people and goods.
- District access routes providing transitional function between the movement of people and goods and local access functions. They are ideal bus routes and provide pedestrian and bike facilities.
- Neighbourhood, local and industrial accesses provide access to properties in a safe environment for pedestrians and cyclists.

The location and hierarchy of the existing road network leading into the Brisbane Airport is shown in **Figure 10.4l** and is based upon BCC's road hierarchy contained within 'City Plan 2000'. For BAC roads, including Airport Drive and Lomandra Drive, logical extensions of BCC's road hierarchy have been applied. A description of each of the roads within and surrounding the study area is found in the following sections.

Figure 10.4I: *Hierarchy of Roads Surrounding the Brisbane Airport Site.*

10.4.5.1 Airport Drive

Airport Drive is the major road leading into the Brisbane Airport passenger terminals and is controlled by BAC. It is an arterial standard road and an important route in carrying traffic from the Gateway Motorway, East-West Arterial Road and Nudgee Road through to the Brisbane Airport Precinct. Currently, Airport Drive is a six lane divided road between the Gateway Motorway and Lomandra Drive and a four lane divided road between Lomandra Drive and the DTB. The speed limit changes a number of times along its length, varying between 60 km/h, 70 km/h, 80 km/h and 100 km/h.

There are a total of three roundabouts on Airport Drive, with a fourth joining Airport Drive off the Gateway Motorway. The others are located at the intersection of Lomandra Drive as well as the intersection of Correa Street and the International Terminal access. The third roundabout is located at the entrance to the Domestic Terminals where Dryandra Road and Alpina Drive intersect Airport Drive.

An overpass allows entry and exit for eastbound traffic to the Number 1 Airport Drive Precinct from Airport Drive. There are also several other local roads connecting to Airport Drive which service the general Airport areas, terminals, maintenance and parking areas.

10.4.5.2 Gateway Motorway

The Gateway Motorway is a motorway standard road linking the Logan Motorway to the Pacific Motorway and finally to the Bruce Highway. The Gateway Motorway is the responsibility of the Department of Main Roads. It crosses the Brisbane River at the Gateway Bridge where it is a tolled facility.

The Gateway Motorway is a four lane divided road for the majority with the Gateway Bridge crossing and toll area being a six lane divided section. Exits to all major roads and suburban areas are located along the Gateway Motorway, allowing traffic to travel from north to south without passing through the Brisbane CBD. The Gateway Motorway provides access to the Airport via a roundabout where Airport Drive meets the East-West Arterial Road. The speed limit along the Gateway Bridge in the vicinity of the Airport is 90 km/h.

10.4.5.3 East-West Arterial Road

The East-West Arterial Road is classified as a motorway in Council's road hierarchy and is the responsibility of the Department of Main Roads. It links Sandgate Road to Nudgee Road and the Gateway Motorway, flowing to Airport Drive through a signalised intersection and roundabout. The East-West Arterial Road is a four lane divided road with traffic lights located where it intersects Sandgate Road and Nudgee Road. It ends at the roundabout to the entrance of Airport Drive and the Gateway Motorway. The speed limit along the East-West Arterial Road is 60 km/h between Nudgee Road and the Gateway Motorway and 80 km/h between Nudgee and Sandgate Roads.

10.4.5.4 Nudgee Road

Nudgee Road is the responsibility of BCC and is classified as an arterial road and links Kingsford Smith Drive and Toombul Road, travelling northwards to Nudgee Beach. Nudgee Road has a speed limit of 60 km/h and provides an alternative route to using the Gateway Motorway to access Airport Drive. It is a two lane, two-way undivided road with an Open Level Crossing (OLC) near its southern end. Additional turning lanes are present at the intersections of Kingsford Smith Drive, Lancaster Road, Gerler Road, The East-West Arterial Road and Toombul Road.

10.4.5.5 Kingsford Smith Drive

Kingsford Smith Drive is classified as an arterial road and is the responsibility of BCC. It links the Inner City Bypass – Breakfast Creek Road Intersection to Eagle Farm Road. Kingsford Smith Drive is a four lane divided road with additional turning lanes at major intersections and an entry to the Gateway Motorway. It has a speed limit of 60 km/h.

10.4.5.6 Toombul Road

Toombul Road is the responsibility of BCC and is classified as an arterial road. It links Sandgate Road at Virginia and the Gateway Motorway. Toombul Road is a four lane divided road with additional turning lanes at major intersections. It has a speed limit of 60 km/h.

10.4.5.7 Sandgate Road

Sandgate Road is classified as an arterial road and is the responsibility of the Department of Main Roads north of Junction Road. It provides a north-south arterial route from the Albion five ways intersection before ending at the northbound ramp of the Gateway Motorway at Boondall. The route continues into Deagon as Braun Street. Sandgate Road is a four lane, two-way undivided road. Additional turning lanes are found at major intersections along its length. The speed limit on Sandgate Road ranges between 60 km/h and 70 km/h.

10.4.5.8 Lomandra Drive

Lomandra Drive is classified as a suburban road running from Airport Drive to Main Myrtletown Road, providing access to the back of the Airport area. Lomandra Drive is controlled by BAC. It is a two lane, two-way undivided road, with additional lanes being present at major intersections. Lomandra Drive has a speed limit of 60 km/h with an 80 km/h speed limit on the eastern section.

10.4.5.9 Local Roads

There are a number of district access roads running off Airport Drive providing access to parts of the Airport area, terminals, maintenance and parking. These are all within the Brisbane Airport boundaries and so are controlled by BAC. These include Correa Street, Banksia Place, Hakea St, Toona Lane, Chloris St, Hibiscus St, Dryandra Road and Alpina Drive. All but Alpina Drive are two lane, two-way roads with speed limits of 60 km/h. Alpina Drive is a one-way road with a posted speed limit of less than 60 km/h.

10.4.6 Existing Traffic Conditions

10.4.6.1 Road Links

The following section provides an estimation of the performance of the critical links in the road network within and surrounding the Brisbane Airport in the 2004 Baseline year. **Table 10.4h** shows a summary of the current road link mid-block traffic volumes and LOS values.

Airport Drive

Airport Drive is estimated to carry in the order of 60,000 vehicles per day during an average weekday. These traffic volumes indicate there is currently spare capacity along Airport Drive, particularly to the east of Lomandra Drive.

Gateway Motorway

Currently traffic volumes on the Gateway Motorway just south of the East-West Arterial Road are in the order of 106,000 vehicles per day for an average weekday. North of the East-West Arterial Road, the existing Gateway Motorway carries an estimated 68,000 vehicles per average weekday.

These traffic volumes mean the existing Gateway Motorway operates at or over capacity during peak periods, particularly on the section between the Kingsford Smith Drive and the East-West Arterial Road.

East-West Arterial Road

The East-West Arterial Road is estimated to currently carry in the order of 23,000 vehicles per average weekday. These traffic volumes indicate there is currently spare capacity along the East-West Arterial Road route.

Nudgee Road

Nudgee Road currently carries between 17,000 vehicles per average weekday on its southern section and 13,000 vehicles per average weekday on the section between Toombul Road and the East-West Arterial Road. These traffic volumes indicate there is currently a small amount of spare capacity in both sections of Nudgee Road.

Kingsford Smith Drive

Kingsford Smith Drive is estimated to currently carry between 49,000 vehicles per average weekday west of Nudgee Road decreasing to approximately 31,000 between the Gateway Motorway On-Ramp and Schneider Road.

This level of traffic would mean that Kingsford Smith Drive, in the section to the east of Nudgee Road, currently operates with spare capacity during peak periods.

Toombul Road

Toombul Road is currently estimated to carry 25,000 vehicles per average weekday along its eastern section. These traffic volumes indicate that Toombul Road currently has spare capacity.

Sandgate Road

Sandgate Road is estimated to currently carry 43,000 vehicles per average weekday along its southern section, south of its intersection with the East-West Arterial Road. This level of traffic means that Sandgate Road currently operates at or near capacity.

Lomandra Drive

Lomandra Drive is estimated to currently carry 12,000 vehicles per day at the western end between Airport Drive and Viola Place.

These traffic volumes indicate there is spare capacity along Lomandra Drive.

Other Roads

These roads, as designated in section 10.4.5.9, currently carry less traffic than the roads stated above and operate well below their capacity although adjacent intersections with major roads may not operate satisfactorily.

The values in **Table 10.4h** represent observed data, typically over one to two week durations, estimated to 2004 Annual Average Weekday Traffic (AAWT) conditions from available annual datasets in the study area. **Table 10.4h** shows a summary of the estimated 2004 road mid-block traffic volumes and LOS. Refer **Table 10.4g** for Level of Service descriptors.

Table 10.4h: Estimated 2004 Two-Way Traffic Volumes.

Location	AAWT (vpd)	Capacity 2 Hour (vph)	AM Peak 2 Hour Volume	AM Peak 2 Hour V/C	PM Peak 2 Hour Volume	PM Peak 2 Hour V/C
Kingsford Smith Drive (Gateway Motorway to Schneider Road)	37,000	11,200	5,500	0.49 (B)	4,600	0.41 (B)
Kingsford Smith Drive (West of Nudgee Road)	49,000	11,200	7,300	0.65 (C)	6,700	0.60 (C)
Nudgee Road (North of Kingsford Smith Drive)	17,000	5,200	2,100	0.40 (B)	2,800	0.54 (C)
Gateway Motorway (Kingsford Smith Drive to East-West Arterial Road)	106,000	16,000	15,700	0.98 (E)	15,500	0.97 (E)
Lomandra Drive (West of Viola Place)	12,000	4,000	2,100	0.53 (C)	2,000	0.50 (B)
East-West Arterial Road (West of Nudgee Road)	24,000	10,400	3,700	0.36 (B)	3,800	0.37 (B)
Airport Drive (Gateway Motorway to Lomandra Drive)	60,000	16,800*	8,200	0.49 (B)	7,400	0.44 (B)
Nudgee Road (North of East-West Arterial Road)	13,000	4,800	1,800	0.38 (B)	1,900	0.40 (B)
Gateway Motorway (East-West Arterial Road to Toombul Road)	69,000#	16,000	12,200	0.76 (D)	12,100	0.76 (D)
Toombul Road (Nudgee Road to Gateway Motorway)	25,000#	8,000	4,500	0.56 (C)	4,400	0.55 (C)
Sandgate Road (South of East-West Arterial Road)	43,000	8,800	7,000	0.80 (D)	6,900	0.78 (D)

 # Estimated values calculated from traffic model and observed data.
** Capacity is based on the upgraded six lane cross-section between the Gateway Motorway and Lomandra Drive.*

Peak traffic volumes represent traffic volumes over a two hour period based on the output from the BSTM.

It should be noted that some of the above traffic volumes were derived from observed intersection turning data. The two-way volume to capacity ratios (V/C) and LOS are intended as a guide only and may differ from those obtained from a directional analysis.

10.4.6.2 Intersections

Analysis was undertaken on the key intersections that can potentially provide access to the Airport terminals. The analysis provides an indication of the traffic performance of the road network based on the latest traffic count data available for both AM and PM Peaks. The AM and PM peak periods differ for each of the intersections according to the times of the peak volumes. Intersections analysed include the following locations:

- Airport Drive/Dryandra Road/Alpina Drive;
- Airport Drive/Correa Street/International Terminal Access;
- Airport Drive/Lomandra Drive;
- Kingsford Smith Drive/Nudgee Road/Remora Road;
- Kingsford Smith Drive/Fison Avenue/Gateway Motorway on-ramp;
- Kingsford Smith Drive/Schneider Road/Links Avenue North;
- East-West Arterial Road/Sandgate Road;
- East-West Arterial Road/Nudgee Road;
- East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout; and
- Toombul Road/Gateway Motorway Roundabout.

These ten intersections provide the majority of access between the surface road network to the west, the Brisbane Airport and the Gateway Motorway. Each intersection has a significant influence on the capacity of the road network providing access to the Airport terminals. The operational assessment of these intersections uses the following traffic data:

- Observed 2005 traffic counts for the East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout;
- Observed 1999 traffic counts factored to 2004 for Toombul Road/Gateway Motorway Roundabout;
- Observed 2004 and 2005 traffic counts for all intersections on Airport Drive;
- Observed 2004 traffic counts for all other intersections; and
- Information on traffic signal operation and intersection layouts was supplied by BCC.

The analysis uses aaSIDRA 2.1. However, it should be noted that aaSIDRA analyses intersections in isolation and therefore has limited scope for examining interaction between intersections. Where possible, comment has been provided on the possible effects on adjacent intersections.

Following is a summary of the intersection performance of the ten key intersections with 2004 intersection geometries and signal timings. Operational parameters for the most congested time period at the worst performing approach are included in the following analysis.

Airport Drive/Dryandra Road/Alpina Drive

This intersection showed poor performance during the PM peak period, particularly the Domestic Terminal exit. **Table 10.4i** illustrates conditions during the PM peak. Refer **Table 10.4g** for Level of Service descriptors.

Table 10.4i: Airport Drive/Dryandra Road 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	11	>500	Domestic Terminal Exit	F

The analysis for this intersection is based on the layout prior to the recent upgrade at the DTB. The approach marking the Domestic Terminal exit, showed high congestion and delays in the PM peak period and was significantly worse than the other approaches. All other approaches are performing well under capacity with some small delays noted at the Dryandra Road approach during both peak periods.

Airport Drive/Correa Street/International Terminal

The performance of this intersection indicates that the intersection is performing well below its capacity. **Table 10.4j** illustrates conditions during the critical time period.

Table 10.4j: Airport Drive/Correa Street 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	0.3	15	International Terminal Exit	B

All approaches are performing well with spare capacity available. The Airport Drive approaches, both northern and southern, experienced queuing during both peak periods though it was slightly higher in the AM peak period.

Airport Drive/Lomandra Drive

The operation of the Airport Drive/Lomandra Drive intersection is indicated below. **Table 10.4k** illustrates conditions during the PM peak.

Table 10.4k: Airport Drive/Lomandra Drive 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	0.4	100	Lomandra Drive	C

All approaches are performing within capacity. Lomandra Drive experienced its worst queuing during the PM peak with a large number of vehicles turning left from Lomandra Drive onto Airport Drive. The eastern approach of Airport Drive also experiences significant queuing during the AM peak, with queue lengths in the order of 100 m.

Kingsford Smith Drive/Nudgee Road/Remora Road

The performance of this intersection indicates significant congestion during both the AM and PM peak periods. **Table 10.4l** illustrates conditions during the critical time period.

Table 10.4l: Kingsford Smith Drive/Nudgee Road 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	2	220	Nudgee Road	F

Whilst the Nudgee Road approach performed the worst comparatively, all but the Remora Road approach operated in excess of capacity.

Kingsford Smith Drive/Fison Avene/Gateway Motorway on-ramp

This intersection showed poor performance during the PM peak period, particularly the west approach of Kingsford Smith Drive. **Table 10.4m** illustrates conditions during the PM peak.

Table 10.4m: Kingsford Smith Drive/Fison Avenue 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	2	> 500	Kingsford Smith Drive (West)	F

The Kingsford Smith Drive west approach was substantially worse than any of the other approaches in either of the peak periods. Some congestion was noted to occur in the AM peak period caused by the right turn movement at both the Fison Road and Kingsford Smith Drive east approaches.

Kingsford Smith Drive/Schneider Road/Links Avenue North

The performance of this intersection shows the congestion currently associated with intersections near the Gateway Motorway. **Table 10.4n** illustrates conditions during the AM peak.

Table 10.4n: Kingsford Smith Drive/Links Avenue 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
AM Peak	1	150	Kingsford Smith Drive (East)	E

The analysis showed the eastern Kingsford Smith Drive approach to be the worst performing approach. The left turn movements from the Links Avenue North approach showed significant delay. Queues from this approach indicated a potential impact on the mainline operations of the Gateway Motorway.

East-West Arterial Road/Sandgate Road

This intersection showed poor performance in both the AM and PM peak periods particularly for the northern Sandgate Road approach. **Table 10.4o** illustrates conditions during the AM peak.

Table 10.4o: East-West Arterial Road/Sandgate Road 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
AM Peak	2	> 500	Sandgate Road (North)	F

The analysis showed the northern Sandgate Road approach to be in excess of its current capacity, in particular the through movement during the AM peak period. The East-West Arterial Road also approaches capacity in both the AM and PM peak periods.

East-West Arterial Road/Nudgee Road

The performance of this intersection indicates a high level of congestion during both the AM and PM peak periods for the southern Nudgee Road approach. **Table 10.4p** illustrates conditions during the AM peak.

Table 10.4p: East-West Arterial Road/Nudgee Road 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
AM Peak	7	> 500	Nudgee Road (South)	F

The approach with the worst performance was the Nudgee Road (south) approach, in particular the right turning movement. This approach was well in excess of its current capacity. The western approach of the East-West Arterial Road also showed significant congestion and was in excess of its capacity, particularly in the AM peak period.

East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout

The operation of this intersection, as shown below, was well in excess of its capacities during the PM peak period, particularly on the Gateway Motorway off-ramp southern approach. **Table 10.4q** illustrates conditions during the PM peak.

Table 10.4q: East-West Arterial Road/Airport Drive/Gateway Motorway 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
PM Peak	13	> 500	Gateway Motorway off-ramp (south)	F

The worst performing approach was the Gateway Motorway off-ramp southern approach, particularly the through and right movements. The East-West Arterial Road approach also suffered from large queues and delays during both the AM and PM peak periods. It is understood that the Department of Main Roads are currently undertaking a study to signalise this roundabout, which should provide an increase in its operational capacity.

Toombul Road/Gateway Motorway Roundabout

The operation of this intersection, as indicated below, is well below its current capacity. **Table 10.4r** illustrates conditions during the AM peak.

Table 10.4r: Toombul Road/Gateway Motorway 2004 Performance.

Critical Time Period	Largest Average Movement Delay (min/veh)	Largest 95%ile Back of Queue (m)	Worst Performing Approach	Approach LOS
AM Peak	0.2	10	Gateway Motorway (north)	B

All approaches are performing well with spare capacity available. The Gateway Motorway northern approach experienced its worst queuing during the AM peak period, though some queuing was also experienced during the PM peak period. This queuing results from right turning vehicles from Toombul Road to the Gateway Motorway southbound due to the merge. It should be noted that the intersection analysis does not account for queuing back though the roundabout as a result of Gateway Motorway southbound merge.

Intersection Summary

A summary of intersection performance indicates that all but the Airport Drive locations operate at or above capacity during peak periods. **Table 10.4s** shows the LOS at each of the key intersections.

Table 10.4s: Intersection Deficiencies (Existing).

Location	LOS 2004 Base
Airport Drive/Dryandra Road/Alpina Drive	F
Airport Drive/Correa Street/International Terminal	B
Airport Drive/Lomandra Drive	C
Kingsford Smith Drive/Nudgee Road/Remora Road	F
Kingsford Smith Drive/Fison Avenue/Gateway Motorway On-ramp	F[1]
Kingsford Smith Drive/Schneider Road/Links Avenue North	E
East-West Arterial Road/Sandgate Road	F
East-West Arterial Road/Nudgee Road	F
East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout	F[1]
Toombul Road/Gateway Motorway Roundabout	B[1]

[1] *Does not allow for queuing back through intersection from Gateway Motorway on-ramp merge.*

10.4.7 Composition of Traffic

The composition of current traffic levels were derived using data from a variety of sites within the Brisbane Airport (Airport Survey Traffic Counts, May 2005). Sites were located around both the International and Domestic Terminals. Data is disaggregated into two specific groups; small vehicles (AUSTROADS Vehicle Classification, Classes 1 and 2) and trucks (AUSTROADS Vehicle Classification, Classes 3-12). **Figure 10.4.m** shows a map displaying the count sites around the ITB.

Figure 10.4m: *Count Sites Located Around the ITB.*

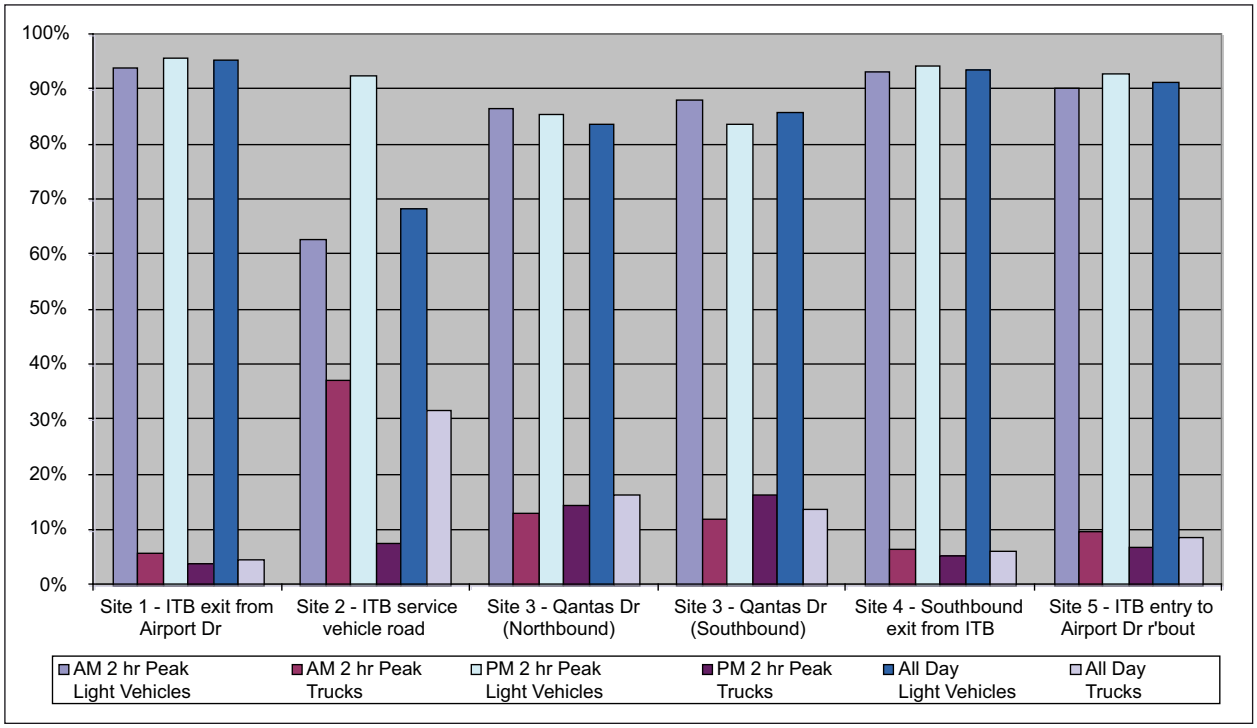
Table 10.4t and **Figure 10.4n** show the composition of traffic surrounding the International Terminal for both the AM and PM two hour peaks and the all day counts.

Table 10.4t: Baseline International Terminal Traffic Composition.

Location (International Terminal)	AM Two Hour Peak			PM Two Hour Peak			All Day		
	Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total
Site 1 – ITB exit from Airport Drive	94%	6%	742	96%	4%	397	95%	5%	4599
Site 2 – ITB service vehicle road	63%	37%	24	93%	8%	16	68%	32%	175
Site 3 – Qantas Drive (northbound)	87%	13%	84	85%	15%	67	84%	16%	565
Site 3 – Qantas Drive (southbound)	88%	12%	115	84%	16%	47	86%	14%	519
Site 4 – southbound exit from ITB	93%	7%	1077	95%	5%	553	94%	6%	6180
Site 5 – ITB entry to Airport Drive roundabout	90%	10%	278	93%	7%	210	91%	9%	2012

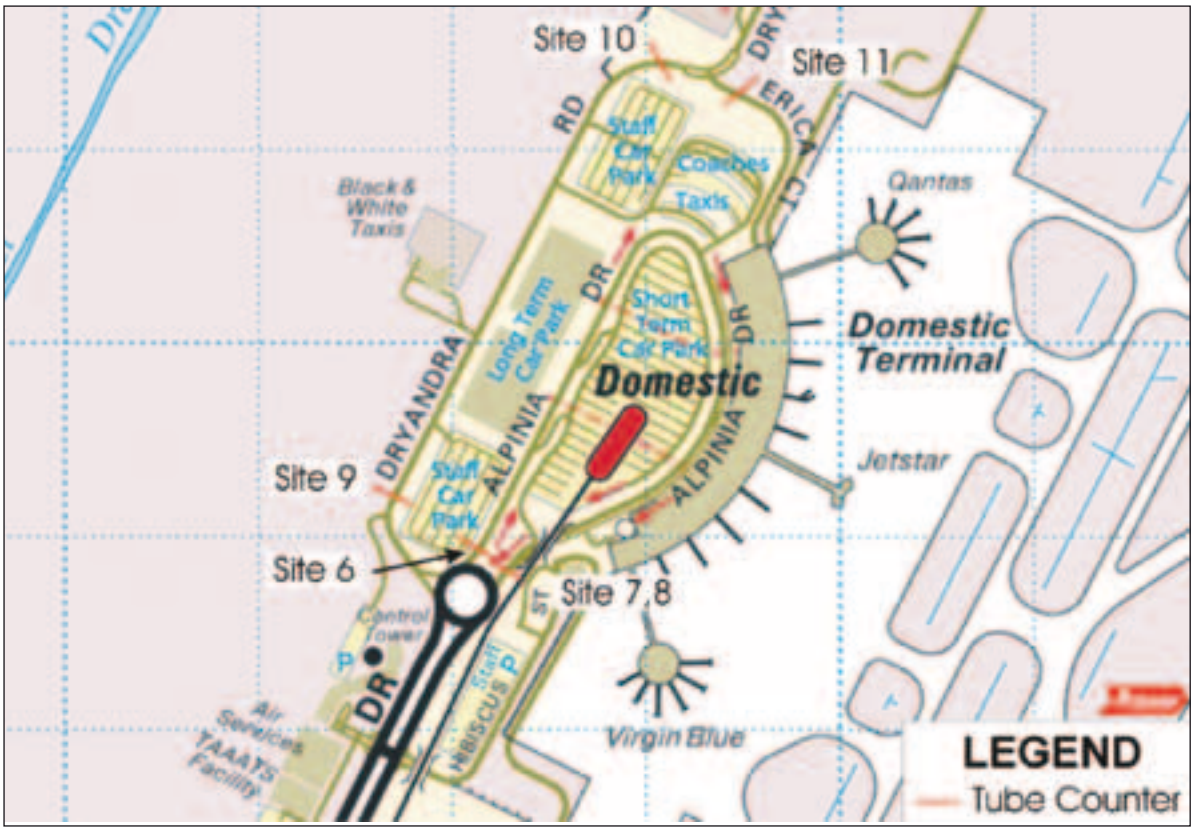
Source: Airport Survey Traffic Counts, May 2005

Figure 10.4n: *Composition of Traffic at the ITB for AM and PM Peaks and All Day Counts.*



The large majority, approximately 90 percent, of vehicles passing in and around the International Terminal appears to be light vehicles. This relationship is consistent for peak periods and across the entire day. The exception to this is Site 2 – ITB service vehicle road during the AM peak period. At this time, of the total vehicles passing the site, 40 percent of them are trucks, likely to be vehicles servicing the terminal.

Figure 10.4o: *Count Sites Located Around the DTB.*



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Note: Site 7 represents traffic turning into Dryandra Road and Alpina Drive at the roundabout and site 8 represents traffic travelling westbound along Airport Drive.

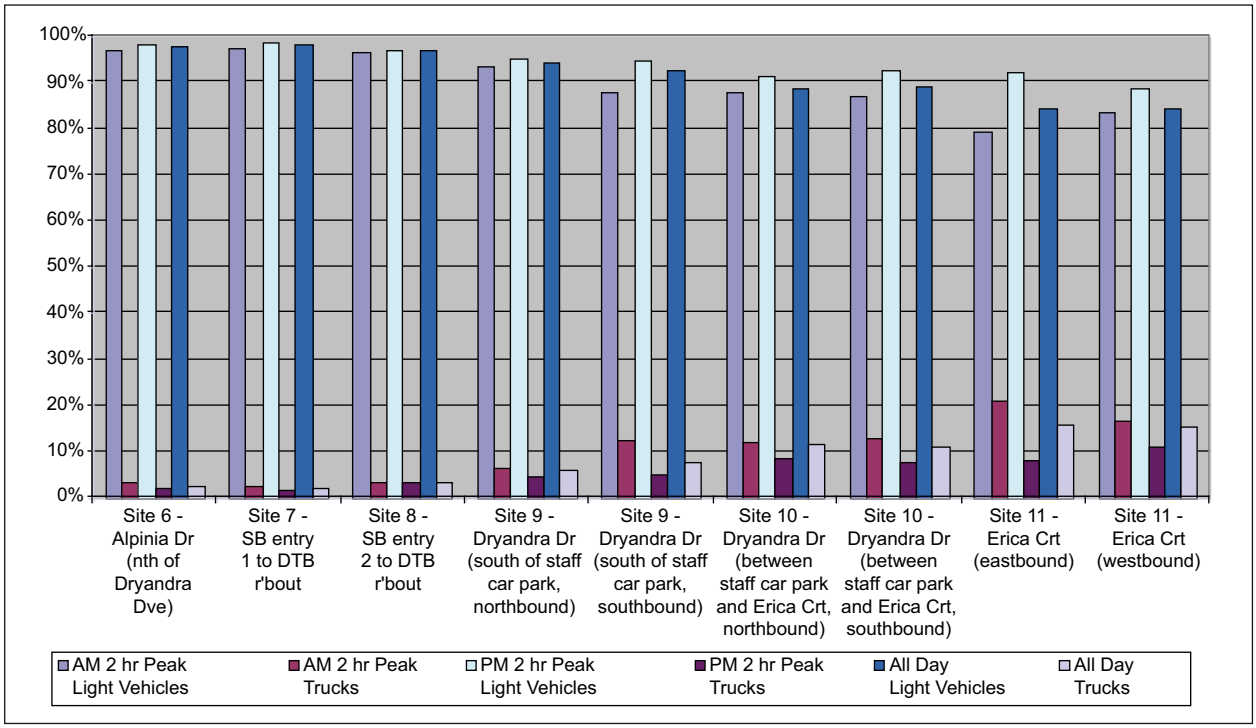
Table 10.4u and **Figure 10.4p** show the composition of traffic surrounding the Domestic Terminal for both the AM and PM two hour peaks and the all day counts.

Table 10.4u: Domestic Terminal Traffic Composition.

Location (Domestic Terminal)	AM Two Hour Peak			PM Two Hour Peak			All Day		
	Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total
Site 6 – Alpina Drive (north of Dryandra Road)	97%	3%	2,292	98%	2%	2,213	97%	3%	16,936
Site 7 – southbound entry 1 to DTB roundabout	97%	3%	1,647	98%	2%	1,512	98%	2%	12,737
Site 8 – southbound entry 2 to DTB roundabout	96%	4%	552	97%	3%	677	97%	3%	4,780
Site 9 – Dryandra Road (south of staff car park, northbound)	94%	6%	1,072	95%	5%	930	94%	6%	8,337
Site 9 – Dryandra Road (south of staff car park, southbound)	88%	12%	535	95%	5%	794	92%	8%	6,549
Site 10 – Dryandra Road (between staff car park and Erica Court northbound)	88%	12%	568	91%	9%	505	89%	11%	4,187
Site 10 – Dryandra Road (between staff car park and Erica Court southbound)	87%	13%	497	92%	8%	539	89%	11%	4,342
Site 11 – Erica Court (eastbound)	79%	21%	94	92%	8%	68	84%	16%	573
Site 11 – Erica Court (westbound)	83%	17%	101	89%	11%	54	84%	16%	594

Source: Airport Survey Traffic Counts, May 2005.

Figure 10.4p: *Composition of Traffic at the DTB for AM and PM Peaks and All Day Counts.*



The large majority, approximately 90 percent, of vehicles passing in and around the Domestic Terminal appears to be light vehicles. This relationship is consistent for peak periods and across the entire day. The AM peak for Site 11 – Erica Court (both east and westbound) shows that a larger proportion of trucks pass through during that period than the remainder of the day. At this time, approximately 20 percent of all traffic passing the site is trucks.

10.4.8 History of Traffic and Passenger Growth

Passenger growth at the Brisbane Airport has been increasing at an average compound rate of 5 percent per annum between 1997 and 2004. In 2004 approximately 15 million passengers travelled through Brisbane Airport, both international and domestic and this is forecast to increase to approximately 50 million by 2035. With the increase in passenger numbers, comes increased demand on the transport network.

Information supplied by BAC on traffic volumes on Airport Drive between Lomandra Drive and the Gateway Motorway (BAC Annual Counts 2004) over the last ten years enabled a comparison to passenger growth. The amount of both vehicles and passengers has been steadily increasing over the last decade.

Vehicle and passenger numbers for the last ten years are shown in **Table 10.4v**.

Table 10.4v: Vehicle and Passenger Counts for the Last 10 years.

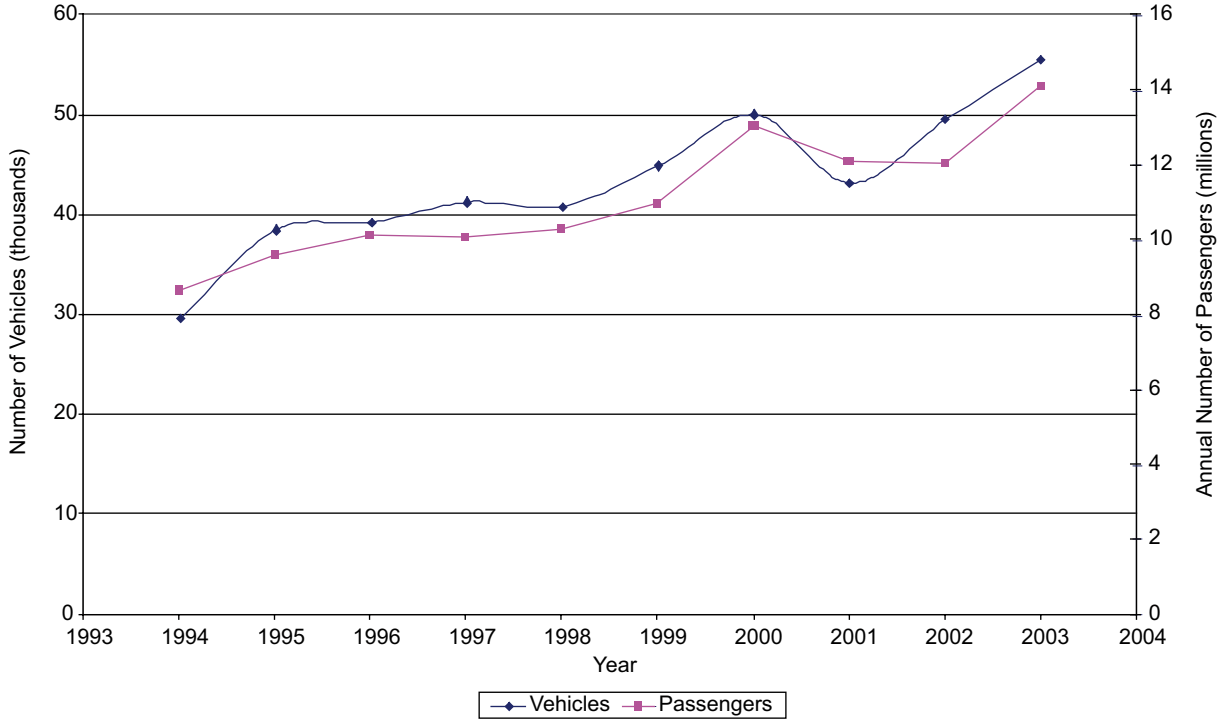
Traffic Count Year [1]	Number of Vehicles	Growth per annum	Financial Year [2]	Total Annual Passengers (International and Domestic)	Growth per annum
1994	29,744	-	1993/94	7,754,000	-
1995	38,552	30%	1994/95	8,659,000	12%
1996	39,312	2%	1995/96	9,577,000	11%
1997	41,333	5%	1996/97	10,101,000	5%
1998	40,924	-1%	1997/98	10,092,000	0%
1999	44,942	10%	1998/99	10,270,000	2%
2000	50,108	11%	1999/00	10,948,000	7%
2001	43,274	-14%	2000/01	13,051,000	19%
2002	49,548	14%	2001/02	12,083,000	-7%
2003	55,658	12%	2002/03	12,040,000	0%
2004	60,076	8%	2003/04	14,122,000	17%

Source: BAC Annual Counts 2004

[1] Vehicle counts represent an average week, collected annually by BAC in December.

[2] Total passenger numbers are collected over a typical financial year (1 July to 30 June).

Figure 10.4q: *Historical Growth of Vehicles and Passengers to and from the Brisbane Airport Site.*



From **Table 10.4v** it can be noted that major increases in the number of passengers using air travel were evident between 2000–2001 and 2003–2004. Between 1997 and 2000, a consistent number of passengers passed through the terminals. During the 2001 to 2002 period, both the number of vehicles and number of passengers decreased. This is likely to have been a result of the collapse of Ansett Airlines and the September 11 terrorist attacks. A drop in the number of vehicles during 2001 could also be attributed to the introduction of the Airtrain in June 2001.

Figure 10.4q shows the historical number of vehicles plotted against time and the historical number of passengers (shown in millions of annual passengers) plotted against time. It should be noted that the annual number of passengers are for the respective financial year and the number of vehicles correspond to average daily traffic volumes in December. The graph is intended as a guide only.

Historically, the number of vehicles has increased steadily over the last ten years. At the current growth rate, approximately 105,000 vehicles can be expected to pass over the same section of road by the year 2015 should existing trends continue.

Historically, the number of passengers flying has also been increasing steadily over the last ten years. Based on detailed passenger forecasts produced by TFI, approximately 25.6 million passengers can be expected to pass through the Brisbane Airport during the year 2015.

10.4.9 Public and Non-Motorised Transport

Currently there are a variety of transport modes, other than private vehicle, available to people wanting to travel to and from the Brisbane Airport. Included in the available modes is the Airtrain, buses and coaches, limousines and taxis. There is some anecdotal evidence showing some pedestrians and cyclists may also use the Airport roadways.

Public transport to and from the area is quite frequent, particularly during daylight hours. This is due to the Domestic and International Terminals providing concentrated areas of employment and trip generating activities allowing for more viable public transport operation.

An important factor in the attractiveness of travel to the area by public transport is its availability during the employees working hours. Due to the hours of operation of the Brisbane Airport, there are a significant number of shift work employees with working hours outside typical business hours. Public transport servicing the Brisbane Airport is not frequent during these periods, resulting in a small proportion of Airport employees using it. In addition, late night and early morning arriving and departing Airport passengers are also not able to make use of this service.

10.4.9.1 Airtrain

Airtrain is a rail link which runs between the Brisbane Airport and Robina via Central and Eagle Junction Stations. It is a privately owned and operated service with BAC having no responsibility for its operation, fares or timetables. Airtrain provides passengers with direct access between the Domestic and International Terminals, Brisbane City and the Gold Coast. From Central Station, passengers are able to access suburban and long distance train services. Both the International and Domestic Airtrain Stations are covered stations with all weather bridge links between the station and arrival and departure levels.

The trip between the Gold Coast and the Brisbane Airport takes approximately 90 minutes and between the City and the Brisbane Airport takes approximately 22 minutes. The following points outline the Airtrain hours of service:

- The Airtrain runs approximately every 30 minutes from Robina to the Brisbane Airport, between 5:20am and 5:50pm throughout the week;
- The Airtrain runs approximately every 30 minutes from the City to Brisbane Airport between the hours of 5:30am and 7:00pm throughout the week; and
- Services from the Brisbane Airport to the City and onto Robina run between 6:00am and 7:30pm throughout the week. The frequency is increased to approximately every 15 minutes during peak periods.

10.4.9.2 Bus

Private coach services are available between Roma Street Transit Centre and Brisbane Airport daily at an appropriate frequency of 30 minutes between 5:00am and 11:00pm. Coaches collect passengers from the Roma Street Transit Centre as well as providing a door-to-door service to CBD hotels on their way to/from Brisbane Airport.

Private coach services are also available connecting the Gold and Sunshine Coasts and Toowoomba to the Brisbane Airport.

Direct travel between the Gold Coast and the Brisbane Airport is available through Coachtrans. Services from Brisbane Airport to the Gold Coast leave approximately every hour between 6:15am and 11:00pm and pick up passengers from both the Domestic and International Terminals. Coaches leaving from the Gold Coast to Brisbane Airport depart from Surfers Paradise area and provide a door-to-door pick up for passengers staying in hotels. These services run between 2:55am and 8:55pm.

Travel from the Airport to the Sunshine Coast is available direct between the two locations through SunAir coaches and SunCoast Pacific coaches. SunAir has services arriving at the Brisbane Airport from the Sunshine Coast between 5:15am and 8:45pm, the reverse services leave Brisbane Airport between 5:50am and 8:50pm. SunCoast Pacific has services running from the Brisbane Airport to the Sunshine Coast between 8:30am and 5:30pm and running to the Brisbane Airport between 6:30am and 12:00pm. Both companies have services departing approximately every hour between their hours of operation.

Coaches between Toowoomba and the Brisbane Airport are available through The Airport Flyer coaches. Services are available everyday except Saturdays travelling in both directions. The Airport Flyer has services leaving from Toowoomba to Brisbane Airport approximately every two hours between 5am and 3pm. Return services are available approximately every two hours between 8:30am and 6:30pm.

Other services from the Brisbane Airport to Roma Street and onto the Sunshine Coast are also available. These services leave the Roma Street Transit Centre approximately every hour between 6:00am and 9:00pm. Passengers are dropped off and picked up at the departures entrance of both Terminals.

Brisbane Transport Bus services currently run to the DFO centre located at Number 1 Airport Drive from two locations. The number 308 bus service runs from Toombul Centro Bus Interchange through to DFO every half hour between 9:00am and 2:30pm. Returns trips are available from DFO to the Toombul Interchange every half hour between 9:20am and 2:50pm. An additional service is available from DFO to Toombul Interchange at 6:20pm. The number 304 bus service runs from the Doomben Train Station to Number 1 Airport Drive every half hour from 6:20am to 7:20am and then again at 8:10am. Return trips are available from DFO to Doomben Train Station every half hour between 3:40pm and 5:00pm.

10.4.9.3 Taxis, Limousines, Buses and Minivans

Taxis carry a significant number of passengers to and from Brisbane Airport. Taxi ranks are located at both the Domestic and International Terminals including at the departures entrance of both Terminals. Limousines, coaches and minivans also make up a small percentage of passenger travel to and from the Brisbane Airport.

10.4.9.4 Pedestrians and Cyclists

Currently there is a limited footpath network located within the Brisbane Airport site. Suitable footpaths are located within each of the Airport precincts but no suitable pedestrian facilities currently provide safe access between these areas. There are a very low number of cyclists that traffic the roads to and from the Brisbane Airport area. Current provisions for cyclists are limited within the Brisbane Airport site, with suitable bikeways available along Schultz Canal and Kedron Brook and some anecdotal evidence of cyclists using the hard shoulder of the East-West Arterial Road and Airport Drive to access the terminal precinct.

10.4.10 Road Freight and Hazardous Goods Vehicles

Heavy vehicles use several of the critical links in the road network surrounding Brisbane Airport. The main travel corridors for heavy vehicles are the Gateway Motorway, East-West Arterial Road, Nudgee Road, Kingsford Smith Drive and Toombul Road. Parts of these links are designated by Queensland Transport as the safe routes to be used by 23 and 25 m B-doubles.

There is no legislation which currently specifies and enforces routes designated for hazardous goods movements. Presently vehicles carrying hazardous goods are advised to use the B-double safe routes, with the Gateway Motorway being the preferred route.

10.4.11 Emergency Services Access

The Brisbane Airport Emergency Plan outlines the actions required to provide an effective response to an emergency at the Airport. It provides a detailed plan of the requirements of each agency to ensure the efficient access to the Airport after the emergency.

Due to the location of the Airport terminals, the one main access available is Airport Drive. It provides access along the front of both the International and Domestic Terminal Buildings. Pandanus Avenue can be used to access the back of the Airport areas and Lomandra Drive can be used to access Airport Drive as an alternative to using the East-West Arterial Road and the Gateway Motorway.

The primary emergency access to the airside of Brisbane Airport is a gate located approximately 1.5 km north of the Domestic Terminal. The designated route to access the primary point is via Airport Drive, turning into Dryandra Road and then right into Vitex Street. Secondary emergency access points are located off Lomandra Drive and Pandanus Avenue should the Primary access point be inaccessible or a more direct route is necessary. **Figure 10.4r** displays the primary and secondary emergency services access routes to and from the Brisbane Airport.

Figure 10.4r: *Emergency Access Routes To and From the Brisbane Airport Site.*

10.5 Consultation

The following agencies and stakeholders were consulted during the impact assessment of the NPR and throughout the implementation:

- Brisbane City Council – Traffic and Transport;
- Brisbane City Council – Economic Development;
- Brisbane City Council – Major Infrastructure Projects Office; and
- Department of Main Roads Metro-District.

Recent studies in the area have included consultation with Airtrain and this information is incorporated into this document. Emergency service plans were provided by BAC which is understood to be formulated in consultation with emergency service providers.

10.6 Policies and Guidelines

The following policies and guidelines have been used for reference throughout the transportation study of the NPR:

- *Airports Act 1996;*
- South East Queensland Regional Plan;
- South East Queensland Infrastructure Plan and Program;
- *Integrated Planning Act 1997;*
- Department of Main Roads Implementation Program;
- Draft Translink Plan;
- BCC Transport Plan 2002–2016; and
- BAC 2003 Master Plan.

The following sections provide a brief description of each of the reference policies.

10.6.1 Commonwealth *Airports Act 1996*

The object of this act, as defined in Part 1 of the Act, is to:

- To promote the sound development of civil aviation in Australia;
- To establish a system for the regulation of airports that has due regard to the interests of airport users and the general community;
- To promote the efficient and economic development and operation of airports;
- To facilitate the comparison of airport performance in a transparent manner;
- To ensure majority Australian ownership of airports;
- To limit the ownership of airports by airlines;
- To ensure diversity of ownership and control of certain major airports; and
- To implement international obligations relating to airports.

10.6.2 South East Queensland Regional Plan

This document produced by the Office of Urban Management (OUM) has statutory effect and outlines guidelines for future development patterns between 2004 and 2026. In the traffic context, the regional plan states in the Desired Regional Outcome 12:

“A connected and accessible region based on an integrated transport system that supports more compact urban growth and efficient travel; connects people, places, goods and services; and promotes public transport use, walking and cycling.”

Access to the Australia TradeCoast area, consisting of the Brisbane Airport and the Port of Brisbane Corporation, is identified as high growth areas and therefore being relative priorities for providing efficient transport connections to the rest of the South East Queensland transport network.

10.6.3 South East Queensland Infrastructure Plan and Program

The South East Queensland Infrastructure Plan and Program seeks to provide certainty on infrastructure development for the whole of South East Queensland. It is based on the principle that strategically focused infrastructure investment will help to lead and support the preferred pattern of development and achieve key policy outcomes. In some instances, this means implementation ahead of existing need.

Key road infrastructure upgrades planned in the vicinity of the Brisbane Airport include the Gateway Upgrade Project (GUP), Northern Access Road and Airport Link (including linkages to the North-South Bypass Tunnel (NSBT)).

10.6.4 *Integrated Planning Act*

The *Integrated Planning Act* (IPA) is the state planning legislation and came into force in 1998. It introduced the Integrated Development Assessment System (IDAS) including the identification of concurrence agencies. The IPA however does not regulate development on BAC lands – this is provided for under the *Commonwealth Airports Act* and other Commonwealth legislation such as the *Environment Protection and Biodiversity Conservation Act.*

10.6.5 Department of Main Roads Implementation Program 2005/06 to 2009/10

The Department of Main Roads funding priorities from the 2005/06 financial year to 2009/10 are contained in the Roads Implementation Plan. Projects within close proximity to the Brisbane Airport include the following:

- Project 140/U13B/4 – Gateway Upgrade Project.

10.6.6 Draft Translink Network Plan

The draft Translink Network Plan aims to guide the delivery of public transport services and infrastructure across South East Queensland. It provides a ten year plan for developing the public transport network (2004 to 2014) as well as a rolling program of public transport improvements and infrastructure upgrades.

As part of the ten year plan, the network plan includes the construction of a railway station at Number 1 Airport Drive. In addition, it is understood there is potential for bus lanes along Sandgate Road as part of the Airport Link upgrade.

10.6.7 BCC Transport Plan 2002–2016

The Transport Plan for Brisbane presents transport solutions Council has identified to 2016 on the entire Brisbane road network, including those under the jurisdiction of the Department of Main Roads.

Road network upgrades by 2016 in the vicinity of the Brisbane Airport include:

- 4.11 – Minor corridor improvements along Nudgee Road south of the East-West Arterial Road;
- 4.66 – Toombul Road, minor corridor improvements;
- 4.88 – Gateway Northern Deviation – new motorway corridor; and
- 4.79, 4.80, 4.82 – North South Bypass Tunnel (stages 1,2, and 3) including Airport Link.

10.6.8 BAC 2003 Master Plan

The BAC Master Plan 2003 sets out the framework for development of the Brisbane Airport to meet demand, and create business and industry opportunity, for the next 20 years and beyond. The Master Plan identifies an effective surface transport system as being necessary to ensure the regional economic benefits of the continued growth of Brisbane Airport is not constrained.

The Master Plan included reference to the following regional transport enhancements that were either planned or under consideration:

- The Gateway Motorway deviation including a northern interchange into the Airport (delivered by the State);
- Delivery of a secondary road connecting the terminals from the Gateway Motorway deviation and Northern Interchange;
- Development of an underpass to provide access to the General Aviation area;

- Suburban bus service extensions into the Brisbane Airport;
- A third railway station to service Number 1 Airport Drive and surrounds;
- Realignment of Dryandra Road and downgrading of Airport Drive;
- Provision of an elevated Departures ramp at the Domestic Terminal; and
- Transit system for passengers transferring between the International and Domestic Terminals.

10.7 Forecasting Methodology

The assessment of road traffic impacts resulting from the proposed NPR was assisted by the application of a sophisticated traffic model.

The Brisbane Strategic Model (BSTM) forms the basis of the forecasting process. The most current version of the BSTM was unable to be supplied to BAC for this project, due to it containing commercially sensitive information. However a recent version that was applied in the development of the Australia TradeCoast North (ATCN) Road Network Strategy was selected as an appropriate base model. This was then improved to take into account the latest demographic and air passenger movement forecasts.

The BSTM was then used to produce road traffic forecasts for 2015 and 2035.

A capacity analysis was then undertaken to assess the performance of the road network without and with the NPR. The capacity analysis represents two distinct elements of the road network:

- Mid-Block analysis which typically represents the section of road between major intersections; and
- Intersection analysis which typically represents the operation and interaction of individual movements at intersections.

Intersection capacity will normally be the limiting element on an urban arterial road network containing traffic signals. Mid-block capacity typically influences capacity on motorway and highway standard roads. Given the study area contains both arterial (with traffic signals) and motorway standard routes, the impact analysis addresses both mid-block and intersection analysis.

10.7.1 Demographics

Demographic data was supplied by BCC's Economic Development Section in March 2006. The data chosen to update the BSTM was based on advice from BCC and represents the multi-centred land use planning scenario. Recent public consultation undertaken by BCC indicated this scenario as the publicly preferred urban form for the future development of Brisbane.

The following data was supplied to update the demographics in BSTM:

- Total employment at the traffic zone level;
- Employment by category at the Statistical Local Area (SLA) level;
- Resident population and households at a traffic zone level;
- Growth indices for blue and white collar workers at the SLA level; and
- Age structure at the SLA level.

Where appropriate, the inputs into the BSTM reflect the data supplied by BCC. However, further refinement of the BCC supplied demographic data was undertaken to ensure consistency with required inputs into the BSTM and this resulted in some adjustments to the demographics. In addition, the BCC demographic data has a forecast horizon of 2031 so extrapolation was undertaken to create the 2035 demographic inputs into the BSTM.

At the Local Government Area (LGA) level, the existing and forecast populations used for the NPR traffic impact assessment are contained in **Table 10.7a**.

The population data generally corresponds to existing medium series PIFU forecasts, however there are some minor differences when this data is disaggregated to the traffic zone level of the BSTM.

Table 10.7a: Population in Model LGAs.

LGA	2004	2006	2015	2035
Brisbane City	951,339	977,050	1,054,377	1,221,055
Pine Rivers Shire	139,228	143,345	178,205	224,891
Redcliffe City	52,303	53,224	55,573	58,735
Redland Shire	127,842	132,131	157,754	188,337
Ipswich City (part)	128,656	133,673	170,337	278,838

Table 10.7b: Employment within the Pinkenba-Eagle Farm SLA.

SLA	2004		2006		2015		2035	
	Total Employment		Total Employment		Total Employment		Total Employment	
	BCC	NPR	BCC	NPR[1]	BCC	NPR	BCC[2]	NPR
Pinkenba-Eagle Farm	20,384	20,384	21,810	22,920	30,114	34,330	35,565	53,703

[1] *Interpolated value between 2004 and 2015 BSTM forecast years.*
[2] *Extrapolated from BCC Data.*

The strongest forecast LGA growth contained in **Table 10.7a** is within the Ipswich LGA, in all periods from 2004 to 2035. Pine Rivers Shire is generally the second fastest growing LGA of those listed in **Table 10.7a**.

The employment forecasts for the Airport and surrounding industrial areas are based on a combination of BAC land use planning forecasts, consistent with the BAC 2003 Master Plan, and BCC forecasts. A comparison of total employment for the Statistical Local Area (SLA) surrounding BAC land is contained in **Table 10.7b**.

Employment forecasts indicate significant growth between 2004 and 2015 with the growth rate declining between 2015 and 2035. The strong growth is a combination of land development within the entire ATC North area, including BAC, BCC and Port of Brisbane Corporation lands.

The certainty in forecasting future employment within the SLA, and indeed the region, is difficult, particularly considering the amount of land available for employment generating uses within ATC North; the type of future industrial development; and the impact of the regional, state and national economies.

Two methods are typically used to forecast employment growth:

- 'Macro' forecasts examining economic, population and potential workforce growth of the region and the ability of the development area to cater for these 'market' variables; and
- 'Micro' forecasts examining the physical ability to develop lands, including timeframes for construction, financial and geographic constraints.

These two approaches can lead to differing forecasts, particularly when the forecast year is significantly into the future, such as 2035. The 2003 BAC Master Plan uses a 'micro' methodology whilst it is understood the BCC dataset uses a combination of the two methods. As both the BAC Master Plan and BCC data represent the current forecasts for each respective agency, this NPR traffic impact assessment adopts a compromise approach.

The traffic assessment of the impact of NPR on road network within the study area uses a BAC representative medium series forecast for the Pinkenba-Eagle Farm SLA. This approach is seen as being consistent with surrounding demographics supplied by BCC which typically represent a medium series. In addition, other parameters in the BSTM also typically represent median or average values.

10.7.2 Suitability of Model for Forecasting within Study Area

To confirm the suitability of the revised BSTM for forecasting traffic volumes within the study area, analysis and comparison against observed data for the 2004 base year was undertaken for AAWT, AM peak and PM peak traffic flows. The locations were limited to where observed data was available and are listed here:

- Gateway Motorway at two locations;
- Kingsford Smith Drive at two locations;
- Nudgee Road at two locations;
- The East-West Arterial Road;
- Sandgate Road; and
- Toombul Road.

These locations are illustrated in **Figure 10.7a**.

Figure 10.7a: *Locations of Observed Traffic Data.*

The revised BSTM forecast 70 percent of the 18 locations (nine two-way locations) within acceptable criteria (chi-squared statistic less than four) of the observed data during peak periods. Of the 30 percent of locations outside the criteria, the majority of these are along roads under the control of BAC. The BSTM values were typically higher than observed values due to the TFI forecasts being a 'representative busy' day. This 'representative busy' day corresponds to a greater number of passenger movements than an average weekday, hence a greater number of car trips on the road network within the influence of the Airport.

10.7.3 Forecast Transport Network Improvements in the Study Area

A number of major transport infrastructure projects are currently planned within the study area during the forecast horizon. The planned road improvements within the study area are referenced from the SEQIPP, RIP, and Transport Plan for Brisbane.

Tables 10.7c and **10.7d** illustrate the planned road and public transport projects included in each of the forecast model years:

Table 10.7c: Planned Road Improvements for 2015 and 2035.

Planned Road Project	2015	2035
Gateway Upgrade Project: EIS design	✓	✓
Gateway Deviation upgrade to six lanes		✓
NSBT: RiverCity Motorways design	✓	✓
Northern Access Road	✓	✓
Airport Link: EIS design	✓	✓
Nudgee Road, minor corridor improvements south of Nudgee Road	✓	✓
Toombul Road, minor corridor improvements	✓	✓
Gateway Motorway: six lanes to from Nudgee Road to Bruce Highway		✓
Kingsford Smith Drive: six lanes between Nudgee Road and Links Avenue North		✓

Table 10.7d: Planned Public Transport Improvements for 2015 and 2035.

Planned Road Project	2015	2035
Construction of a Railway Station at Number 1 Airport Drive	✓	✓
Bus Priority measures along Kingsford Smith Drive	✓	✓

Table 10.7e: Comparison of Volumes Across the Brisbane River Between RiverCity Motorway and NPR.

Year	RiverCity Motorway Volumes (AADT)[1]	New Parallel Runway Volumes (AAWT)
2012	101,129	Not available
2015	Not available	126,100
2016	116,384	Not available

[1] *RiverCity Motorway NSBT Product Disclosure Statement*

At the time of writing this report, the form and the toll regime of the proposed Airport Link is unknown. The BSTM includes representations of Airport Link and NSBT as they are currently presented in publicly available documents. For Airport Link, this is information from the EIS for this project and for the NSBT it is from the RiverCity Motorway winning design.

The planned public transport improvements within the study area are referenced from the Draft Translink Network Plan and BCC Transport Plan for Brisbane.

The BSTM version made available for this study does not implicitly model the effect of tolls on route choice. Therefore to provide some certainty that the NSBT is appropriately represented in the model, a comparison between forecast traffic volumes by the successful RiverCity Motorways consortium and those for the NPR EIS is contained in **Table 10.7e**.

The RiverCity Motorway NSBT forecast traffic volumes represent Average Annual Daily Traffic (AADT) compared to the traffic volume produced by the BSTM, Annual Average Weekday Traffic (AAWT). AAWT is typically in the order of 10 percent higher than AADT across the Brisbane road network, depending upon the location. Applying this conversion would indicate the volumes from RiverCity Motorway and the BSTM are very similar in magnitude.

At the time of writing this report, no RiverCity Motorway traffic forecasts were available for the NSBT beyond 2026.

10.7.4 2015 Forecast Traffic Performance

The NPR is proposed to be open to air traffic in 2015. The forecast performance of the surrounding road network in 2015 will be the same with or without the NPR, as it is not until around 2018 that flight schedules will significantly differ between the 'with' and 'without' NPR cases.

Forecast traffic volumes along key links within the study for the 2015 scenario with NSBT and Airport Links are shown in **Table 10.7f**.

Table 10.7f: Forecast 2015 Two-Way Traffic Volumes.

Road Name	Location on Road	Direction	AM Two Hour Peak (7am–9am)	PM Two hour Peak (4pm–6pm)	AAWT
			Traffic Volume	Traffic Volume	Traffic Volume
Kingsford Smith Drive	West of Nudgee Road	Westbound	4,600	3,300	28,000
	West of Nudgee Road	Eastbound	3,800	4,300	31,900
Kingsford Smith Drive	Between Gateway Motorway and Links Avenue North/Schneider Road	Eastbound	2,000	3,200	15,000
	Between Gateway Motorway and Links Avenue North/Schneider Road	Westbound	3,700	3,000	22,400
Nudgee Road	North of Kingsford Smith Drive	Northbound	500	700	3,200
	North of Kingsford Smith Drive	Southbound	1,000	600	8,100
Nudgee Road	North of East-West Arterial Road	Northbound	600	500	3,600
	North of East-West Arterial Road	Southbound	400	800	5,400
Gateway Motorway	Between Kingsford Smith Drive and East-West Arterial Road	Northbound	5,800	6,500	38,300
	Between Kingsford Smith Drive and East-West Arterial Road	Southbound	5,800	5,000	33,700
Gateway Motorway	Between East-West Arterial Road and Toombul Road	Northbound	3,400	5,600	26,900
	Between East-West Arterial Road and Toombul Road	Southbound	5,700	3,600	25,500
East-West Arterial Road	West of Nudgee Road	Westbound	5,400	4,900	39,900
	West of Nudgee Road	Eastbound	5,300	5,500	42,300
Sandgate Road	South of East-West Arterial Road	Northbound	2,900	3,600	15,700
	South of East-West Arterial Road	Southbound	41,00	2,800	21,400
Airport Drive	Between Gateway Motorway and Lomandra Drive	Eastbound	7,400	6,800	52,400
	Between Gateway Motorway and Lomandra Drive	Westbound	6,000	8,000	57,000
Lomandra Drive	South of Airport Drive	Northbound	700	1,400	7,000
	South of Airport Drive	Southbound	1,600	700	6,500
Toombul Road	Between Gateway Motorway and Nudgee Road	Eastbound	3,600	2,900	16,000
	Between Gateway Motorway and Nudgee Road	Westbound	2,700	3,300	17,900

Road Name	Location on Road	Direction	AM Two Hour Peak (7am–9am)	PM Two hour Peak (4pm–6pm)	AAWT
			Traffic Volume	Traffic Volume	Traffic Volume
Airport Northern Access	Between Gateway Deviation and Airport Drive Merge	Eastbound	3,100	2,200	27,700
	Between Gateway Deviation and Airport Drive Merge	Westbound	2,300	2,800	22,900
GUP Northern Deviation	North of Northern Access Ramps	Northbound	3,800	4,800	22,000
	North of Northern Access Ramps	Southbound	5,800	2,800	27,800
GUP Northern Deviation	South of Northern Access Ramps	Northbound	4,200	4,900	28,000
	South of Northern Access Ramps	Southbound	5,500	3,700	28,900

Table 10.7g: Major Road Sections Forecast to Exceed Capacity in 2015.

Road Name	Location	Direction
AM Peak (7am-9am)		
Kingsford Smith Drive	West of Existing Gateway Motorway	Eastbound
Fison Avenue West	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
Gateway Motorway Off-ramp	At Links Avenue North	Southbound
Gateway Motorway On-ramp	At Toombul Road	Southbound
East-West Arterial Road	Between Nudgee Road and Gateway Motorway	Eastbound/westbound
Sandgate Road	South of Robinson Road	Southbound
PM Peak (4pm-6pm)		
Fison Avenue West	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
East-West Arterial Road	Between Nudgee Road and Gateway Motorway	Eastbound/westbound
Gateway Motorway On-ramp	At Fison Avenue	Northbound

A number of roads within the study area will be operating at or near capacity in the 2015 scenario. A mid-block analysis assesses the performance of a road section with consideration of the demand volume and capacity, including some consideration of the general, or typical, intersection delays along the link. Mid-block capacity also generally considers the density of access locations from adjacent properties. **Table 10.7g** lists key road elements forecast to be operating over mid-block capacity in 2015 without the new runway.

Figures 10.7b and **Figures 10.7c** illustrate the volume to capacity ratios across the study area network in the 2015 scenario.

Table 10.7g indicates a significant number of key road sections operating above capacity based on a mid-block analysis.

This analysis includes the impact of the Gateway Upgrade, NSBT and Airport Link projects. Key ramps accessing the existing Gateway Motorway alignment, such as those at Links Avenue North, Fison Avenue West and Toombul Road are all forecast to operate at or near capacity during peak periods.

Intersection capacity analysis relates to the specific operation of an intersection, be it a roundabout, traffic signals or priority controlled. This approach allows for different delays to be estimated for different turning movements within an intersection, as opposed to general delays for all vehicles entering an intersection.

The intersection level of service at key intersections within the study area are contained in **Table 10.7h**. It should be noted that these major 'at grade' intersections are forecast to operate at a worse level of service than the adjacent road sections capacity limits.

Figure 10.7b: *Volume to Capacity Ratio 2015 Base AM Peak (7am-9am)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.7c: *Volume to Capacity Ratio 2015 Base PM Peak (4pm-6pm)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Table 10.7h: Forecast 2015 Intersection Levels of Service at Key Intersections (Prior to Opening of NPR). Refer **Table 10.4g** for Level of Service descriptors.

Location	LOS
	2015
Airport Drive/Dryandra Road/Alpina Drive[1]	F
Airport Drive/Correa Street/International Terminal	A
Airport Drive/Lomandra Drive	F
Kingsford Smith Drive/Nudgee Road/Remora Road	F
Kingsford Smith Drive/Fison Avenue/Gateway Motorway on-ramp	F[2]
Kingsford Smith Drive/Schneider Road/Links Avenue North	F
East-West Arterial Road/Sandgate Road	F
East-West Arterial Road/Nudgee Road	E
East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout	B[2]
Toombul Road/Gateway Motorway Roundabout	A[2]

[1] *Includes traffic from DTB to NAR.*
[2] *Does not allow for queuing back through intersection from Gateway on-ramp merge.*

At the time of writing this report the Airport Drive/Dryandra Road/Alpina Drive, Airport Drive/Lomandra Drive and East-West Arterial Road/Gateway Motorway/Airport Drive intersections are all subjects of separate studies examining likely capacity upgrades at these locations. For the purpose of this analysis, it has been assumed that the Gateway Motorway/Airport Drive intersection will be further grade separated commensurate with the completion of Airport Link. For each key intersection, the 'critical peak' LOS has been reported and represents the peak showing the worst LOS value.

The broad level key intersection analysis indicates all but the Toombul Road/Gateway Motorway, Airport Drive/International Terminal and Gateway Motorway/Airport Drive intersections operating over or near capacity by 2015. However, the Toombul Road southbound on-ramp is over capacity during the AM peak with the queuing likely to have a detrimental impact on the operation of the roundabout and a lesser level of service.

Indicative capacity improvements at the East-West Arterial Road intersections (Sandgate Road, Nudgee Road, Gateway Motorway/Airport Drive) are included as part of the modelled Airport Link project; however, these locations are still forecast to operate near or over capacity in 2015 with the exception of the Gateway Motorway/Airport Drive intersection. The operational performance of this intersection is forecast to improve in 2015 compared with 2004. The improvement at this intersection is a result of the relief provided by the construction of the GUP and upgrade assumptions commensurate with the construction of Airport Link.

10.7.5 2035 Base

Forecast traffic volumes along key links within the study for the 2035 scenario without NPR are shown in **Table 10.7i**.

Table 10.7i: Forecast 2035 Base without NPR Traffic Volumes.

Road Name	Location on Road	Direction	AM Two Hour Peak (7am-9am)	PM Two Hour Peak (4pm-6pm)	AAWT (vpd)
			Traffic Volume	Traffic Volume	Traffic Volume
Kingsford Smith Drive	West of Nudgee Road	Westbound	5,900	4,600	39,300
	West of Nudgee Road	Eastbound	4,200	5,600	41,200
Kingsford Smith Drive	Between Gateway Motorway and Links Avenue North/ Schneider Road	Eastbound	4,700	5,000	28,400
	Between Gateway Motorway and Links Avenue North/ Schneider Road	Westbound	5,000	4,700	41,400
Nudgee Road	North of Kingsford Smith Drive	Northbound	500	2,000	6,400
	North of Kingsford Smith Drive	Southbound	2,400	600	7,900
Nudgee Road	North of East-West Arterial Road	Northbound	300	1,300	5,800
	North of East-West Arterial Road	Southbound	500	500	5,500
Gateway Motorway	Between Kingsford Smith Drive and East-West Arterial Road	Northbound	7,100	8,100	52,000
	Between Kingsford Smith Drive and East-West Arterial Road	Southbound	7,900	6,500	47,900
Gateway Motorway	Between East-West Arterial Road and Toombul Road	Northbound	4,200	6,700	33,000
	Between East-West Arterial Road and Toombul Road	Southbound	7,900	5,300	38,000
East-West Arterial Road	West of Nudgee Road	Westbound	5,700	5,600	46,800
	West of Nudgee Road	Eastbound	5,500	5,700	48,800
Sandgate Road	South of East-West Arterial Road	Northbound	3,200	4,500	24,000
	South of East-West Arterial Road	Southbound	4,600	3,200	25,600
Airport Drive	Between Gateway Motorway and Lomandra Drive	Eastbound	9,500	9,700	73,700
	Between Gateway Motorway and Lomandra Drive	Westbound	7,400	10,000	70,900
Lomandra Drive	South of Airport Drive	Northbound	900	2,100	9,400
	South of Airport Drive	Southbound	2,300	900	9,000
Toombul Road	Between Gateway Motorway and Nudgee Road	Eastbound	5,200	4,300	24,800
	Between Gateway Motorway and Nudgee Road	Westbound	3,300	4,000	21,000

Road Name	Location on Road	Direction	AM Two Hour Peak (7am-9am)	PM Two Hour Peak (4pm-6pm)	AAWT (vpd)
Airport Northern Access	Between Gateway Deviation and Airport Drive Merge	Eastbound	5,700	4,600	47,200
	Between Gateway Deviation and Airport Drive Merge	Westbound	4,900	6,000	44,100
GUP Northern Deviation	North of Northern Access Ramps	Northbound	7,000	9,200	48,400
	North of Northern Access Ramps	Southbound	9,700	6,100	53,000
GUP Northern Deviation	South of Northern Access Ramps	Northbound	7,900	9,100	55,200
	South of Northern Access Ramps	Southbound	9,900	7,500	56,700

Table 10.7j: Major Road Sections Forecast to Exceed Capacity in 2035 without NPR.

Road Name	Location	Direction
AM Peak		
Kingsford Smith Drive	West of Existing Gateway Motorway	Eastbound
Nudgee Road	South of Manson Road	Southbound
Kingsford Smith Drive	West of Nudgee Road	Eastbound
East-West Arterial Road	Between Sandgate Road and Gateway Motorway	Eastbound
Sandgate Road	South of East-West Arterial Road to Junction Road	Southbound
Sandgate Road	South of Robinson Road	Southbound
Existing Gateway Motorway	Between Nudgee Road and GUP Northern Deviation	Southbound
Buckland Road	East of Sandgate Road	Eastbound
Gateway Motorway off-ramp	At Links Avenue North	Southbound
Gateway Motorway on-ramp	At Toombul Road	Southbound
Fison Avenue West	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
Links Avenue North	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
PM Peak		
Kingsford Smith Drive	West of Nudgee Road	Westbound
East-West Arterial Road	Between Sandgate Road and Gateway Motorway	Eastbound/Westbound
Existing Gateway Motorway	Between Kingsford Smith Drive and East-West Arterial Road	Northbound
Existing Gateway Motorway	Between Nudgee Road and GUP Northern Deviation	Northbound
Sandgate Road	South of East-West Arterial Road	Northbound
Fison Avenue West	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
Gateway Motorway on-ramp	At Links Avenue North	Southbound
Gateway Motorway on-ramp	At Fison Avenue	Northbound
Gateway Motorway on-ramp	At Toombul Road	Southbound
Gateway Motorway on-ramp	At Toombul Road	Northbound

The 2035 Base scenario forecasts significant traffic volumes on all major roads in the study area. Traffic growth on the road network in the study area is forecast to be in the order of 2 percent per annum compound between 2015 and 2035, with the following locations experiencing higher growth:

- Kingsford Smith Drive, between Nudgee Road and Links Avenue North;
- Nudgee Road;
- Airport Northern Access Road; and
- GUP Northern Deviation.

A number of roads within the study area will be operating at or near capacity in the 2035 Base scenario. **Table 10.7j** lists key road elements operating over mid-block capacity.

Table 10.7j indicates a significant number of key links are forecast to operate above capacity. **Figures 10.7d** and **10.7e** illustrate the volume to capacity ratios across the study area network in the 2035 base scenario.

The forecast intersection level of service at key intersections within the study area is contained in **Table 10.7k**. At the time of writing this report, the Airport Drive/Dryandra Road/Alpina Drive, Airport Drive/Lomandra Drive and Gateway Motorway/ Airport Drive intersections are all subjects of separate studies examining likely capacity upgrades at these locations. For the purpose of this analysis, it has been assumed that the Gateway Motorway/ Airport Drive intersection will be further grade separated commensurate with the completion of Airport Link.

The broad level intersection analysis indicates all but the Kingsford Smith Drive/Fison Avenue, Gateway Motorway/Airport Drive and Toombul Road intersections operating over capacity. However, the Toombul Road southbound on-ramp is over capacity during the peak periods with the queuing likely to have a detrimental impact on the operation of the roundabout and a lesser level of service.

The Kingsford Smith Drive/Fison Avenue intersection has improved operational performance in 2035 compared to 2015 due to the assumed upgrade of Kingsford Smith Drive to a six lane cross-section.

Table 10.7k: Forecast 2035 Base without NPR Intersections Levels of Service (Critical Peak).
Refer **Table 10.4g** for Level of Service descriptors.

Location	LOS
	2035 without NPR
Airport Drive/Dryandra Road/Alpina Drive[1]	F
Airport Drive/Correa Street/International Terminal	F
Airport Drive/Lomandra Drive	F
Kingsford Smith Drive/Nudgee Road/Remora Road	F
Kingsford Smith Drive/Fison Avenue/Gateway Motorway on-ramp	B[2]
Kingsford Smith Drive/Schneider Road/Links Avenue North	F
East-West Arterial Road/Sandgate Road	F
East-West Arterial Road/Nudgee Road	F
East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout	B[2]
Toombul Road/Gateway Motorway Roundabout	A[2]

[1] Includes traffic from DTB to NAR.
[2] Does not allow for queuing back through intersection from Gateway Motorway on-ramp merge.

Figure 10.7d: *Volume to Capacity Ratio 2035 Base AM Peak (7am–9am)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.7e: *Volume to Capacity Ratio 2035 Base PM Peak (4pm–6pm)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

10.8 Traffic Impact Assessment

10.8.1 NPR Induced Road Traffic Generation

The central TFI passenger forecasts form the basis for forecasting future road traffic demand from the Domestic and International Terminals. In combination with the BAC Terminal Survey undertaken in 2005, the TFI data was used as an input into matrices representing road traffic demand associated with patrons travelling to and from DTB and ITB. These matrices were then added to the demand created by employment traffic generation in and around the terminals.

The critical time periods for the assessment of traffic impact are the 7am-9am and 4pm-6pm peak periods, as it is generally during these periods that the road network is most congested.

Table 10.8a shows the existing (2004) and forecast growth in daily traffic for a 'representative busy' day and road traffic peak periods generated by travel related patrons at the DTB and ITB.

It should be noted that the TFI data is a 'representative busy' day for the northern hemisphere winter and summer airline schedules. These 'representative' days tend to represent values higher than annual average weekdays. For the purposes of the traffic assessment, these values have been averaged for each hour in the day.

The table indicates forecast air travel related road traffic growth at the DTB and ITB to be in the order of 5 percent per annum between 2004 and 2015. Traffic growth between 2015 and 2035 then decreases to between 2.1 percent per annum for the scenario without NPR and 3.4 percent per annum with NPR.

10.9 Cumulative and Interactive Effects

The analysis of the Airport traffic generation on the road network with planned and/or committed improvements is contained in sections 10.9.1 to 10.9.2.

10.9.1 2015 with NPR

For the 2015 forecast year, the year of opening of the NPR, there is no additional traffic expected to be generated as a result of the facility being constructed. Therefore, the 2015 analysis is not repeated for the 'with NPR' scenario.

10.9.2 2035 with NPR

Forecast traffic volumes along key links within the study for the 2035 scenario with NPR are shown in **Table 10.9a**. Relative difference is compared to the 2035 base (without NPR) scenario.

Table 10.8a: NPR Related Traffic Generation from DTB and ITB.

Time Period	2004	2015	2035 without NPR	2035 with NPR
DTB				
'Representative Busy' Day Traffic (vpd)	40,500	67,800	101,800	133,900
AM Peak (7am-9am) (vp2h)	3,000	5,400	8,300	9,700
PM Peak (4pm-6pm) (vp2h)	3,400	5,700	9,400	12,600
ITB				
'Representative Busy' Day Traffic (vpd)	15,400	26,400	40,100	52,400
AM Peak (7am-9am) (vp2h)	1,400	2,900	4,200	4,300
PM Peak (4pm-6pm) (vp2h)	500	400	1,400	1,800

Note: TFI Central Passenger Forecasts

Table 10.9a: Forecast 2035 with NPR Traffic Volumes.

Road Name	Location on Road	Direction	AM Two Hour Peak (7am-9am)		PM Two Hour Peak (4pm-6pm)		AAWT (vpd)	
			Traffic Volume	Relative Difference	Traffic Volume	Relative Difference	Traffic Volume	Relative Difference
Kingsford Smith Drive	West of Nudgee Road	Westbound	6,000	0.16%	4,800	5.37%	41,000	4.33%
	West of Nudgee Road	Eastbound	4,300	1.65%	5,600	1.17%	43,600	5.87%
Kingsford Smith Drive	Between Gateway Motorway and Links Avenue North/Schneider Road	Eastbound	4,800	0.80%	5,100	2.10%	29,200	2.67%
	Between Gateway Motorway and Links Avenue North/Schneider Road	Westbound	5,000	0.72%	4,800	2.71%	42,000	1.47%
Nudgee Road	North of Kingsford Smith Drive	Northbound	500	0.60%	2,100	2.41%	7,100	9.82%
	North of Kingsford Smith Drive	Southbound	2,400	1.84%	600	0.40%	9,800	23.95%
Nudgee Road	North of East-West Arterial Road	Northbound	300	-0.68%	1,400	7.04%	6,500	12.92%
	North of East-West Arterial Road	Southbound	500	2.14%	500	9.17%	7,400	34.15%
Gateway Motorway	Between Kingsford Smith Drive and East-West Arterial Road	Northbound	7,100	-0.12%	8,100	0.66%	52,500	0.98%
	Between Kingsford Smith Drive and East-West Arterial Road	Southbound	7,900	0.63%	6,300	-3.72%	48,200	0.63%
Gateway Motorway	Between East-West Arterial Road and Toombul Road	Northbound	4,200	-0.77%	6,600	-0.79%	33,000	0.06%
	Between East-West Arterial Road and Toombul Road	Southbound	7,900	0.52%	5,600	4.81%	39,900	5.07%
East-West Arterial Road	West of Nudgee Road	Westbound	5,800	0.33%	5,700	1.29%	48,100	2.71%
	West of Nudgee Road	Eastbound	5,500	1.10%	5,700	0.47%	48,600	-0.42%

Road Name	Location on Road	Direction	AM Two Hour Peak (7am-9am)		PM Two Hour Peak (4pm-6pm)		AAWT (vpd)	
			Traffic Volume	Relative Difference	Traffic Volume	Relative Difference	Traffic Volume	Relative Difference
Sandgate Road	South of East-West Arterial Road	Northbound	3,200	0.42%	4,500	0.93%	26,400	10.29%
	South of East-West Arterial Road	Southbound	4,700	1.73%	3,500	7.40%	31,000	21.11%
Airport Drive	Between Gateway Motorway and Lomandra Drive	Eastbound	9,800	2.93%	10,500	8.24%	79,500	7.77%
	Between Gateway Motorway and Lomandra Drive	Westbound	7,500	1.68%	10,100	1.25%	72,800	2.72%
Lomandra Drive	South of Airport Drive	Northbound	900	0.21%	2,100	-0.20%	9,900	5.28%
	South of Airport Drive	Southbound	2,300	-0.45%	800	-15.57%	8,600	-3.80%
Toombul Road	Between Gateway Motorway and Nudgee Road	Eastbound	5,300	2.08%	4,500	6.42%	26,900	8.40%
	Between Gateway Motorway and Nudgee Road	Westbound	3,300	-0.85%	4,100	1.52%	21,400	1.79%
Airport Northern Access	Between Gateway Deviation and Airport Drive Merge	Eastbound	6,200	9.93%	5,700	25.61%	59,700	26.52%
	Between Gateway Deviation and Airport Drive Merge	Westbound	5,400	11.36%	7,100	19.17%	67,200	52.29%
GUP Northern Deviation	North of Northern Access Ramps	Northbound	7,300	3.30%	9,400	2.37%	60,100	24.13%
	North of Northern Access Ramps	Southbound	9,900	1.61%	6,500	6.25%	56,900	7.28%
GUP Northern Deviation	South of Northern Access Ramps	Northbound	8,200	3.20%	9,800	7.68%	61,100	10.63%
	South of Northern Access Ramps	Southbound	10,000	1.73%	8,300	11.21%	65,300	15.15%

The traffic impact of the NPR varies across the study area road network. Some locations are forecast to experience a greater impact across the entire day, or in off-peak periods, when the base level traffic volumes are significantly lower. Whilst some network links are forecast to experience an increase in traffic as a result of traffic generation from NPR, some also experience a decrease in particular directions and time periods.

The most significant impact is on the Airport Northern Access Road (up to 25 percent increase in the two-way PM peak) and GUP Northern Deviation (up to 11 percent increase in the two-way PM peak). The modelling however indicates relatively less impact on the East-West Arterial Road and Kingsford Smith Drive during peak periods as a result of the NPR. This indicates that the operations of these roads are near or above capacity in 2035.

Table 10.9b: Major Road Sections Forecast to Exceed Capacity in 2035 with NPR.

Road Name	Location	Direction
AM Peak		
Kingsford Smith Drive	West of Existing Gateway Motorway	Eastbound
Nudgee Road	South of Manson Road	Southbound
Kingsford Smith Drive	West of Nudgee Road	Eastbound
East-West Arterial Road	Between Sandgate Road and Gateway Motorway	Eastbound
Sandgate Road	South of East-West Arterial Road to Junction Road	Southbound
Sandgate Road	South of Robinson Road	Southbound
Existing Gateway Motorway	Between Nudgee Road and GUP Northern Deviation	Southbound
Buckland Road	East of Sandgate Road	Eastbound
Gateway Motorway off-ramp	At Links Avenue North	Southbound
Gateway Motorway on-ramp	At Toombul Road	Southbound
Fison Avenue West	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
Links Avenue North	Between Gateway Motorway off-ramp and Kingsford Smith Drive	Northbound
Toombul Road	Between Nudgee Road and Gateway Motorway	Eastbound
PM Peak		
Kingsford Smith Drive	West of Existing Gateway Motorway	Westbound
Kingsford Smith Drive	West of Nudgee Road	Westbound
Nudgee Road	South of Lancaster Road	Northbound
East-West Arterial Road	Between Sandgate Road and Gateway Motorway	East/Westbound
Existing Gateway Motorway	Between Kingsford Smith Drive and East-West Arterial Road	Northbound
Existing Gateway Motorway	Between Nudgee Road and GUP Northern Deviation	Northbound
Sandgate Road	South of East-West Arterial Road	Northbound
Fison Avenue West	Between Gateway Motorway Off Ramp and Kingsford Smith Drive	Northbound
Gateway Motorway on-ramp	At Links Avenue North	Southbound
Gateway Motorway on-ramp	At Fison Avenue	Northbound
Gateway Motorway on-ramp	At Toombul Road	Southbound
Gateway Motorway off-ramp	At Toombul Road	Northbound

Table 10.9b above indicates a significant number of key links operating above capacity based on a mid-block analysis. **Figures 10.9a** and **10.9b** illustrate the volume to capacity ratio across the study area network in the 2035 with NPR scenario.

Although a significant number of key links are identified as deficient by 2035, the deficiency analysis indicates the following new deficiencies resulting from the additional traffic generation from NPR:

- Toombul Road, between Nudgee Road and Gateway Motorway, Eastbound in the AM peak;
- Kingsford Smith Drive, between Nudgee Road and Cooksley Street west of existing Gateway Motorway, Westbound in the PM peak; and
- Nudgee Road, south of Beatrice Terrace, Northbound in the PM peak.

The forecast intersection level of service at key intersections within the study area is contained in **Table 10.9c**. At the time of writing this report, the Airport Drive/Dryandra Road/Alpina Drive, Airport Drive/Lomandra Drive and Gateway Motorway/ Airport Drive intersections are all subjects of separate studies examining likely capacity upgrades at these locations. For the purpose of this analysis, it has been assumed that the Gateway Motorway/ Airport Drive intersection will be further grade separated commensurate with the completion of Airport Link.

The broad level intersection analysis indicates all but the Kingsford Smith Drive/Fison Avenue, Gateway Motorway/Airport Drive and Toombul Road intersections operating over capacity. However, the Toombul Road southbound on-ramp is over capacity during the peak periods with the queuing likely to have a detrimental impact on the operation of the roundabout and a lesser level of service.

Table 10.9c: Forecast 2035 with NPR Intersections Levels of Service (Critical Peak).
Refer **Table 10.4g** for Level of Service descriptors.

Location	LOS
	2035 with NPR
Airport Drive/Dryandra Road/Alpina Drive[1]	F
Airport Drive/Correa Street/International Terminal	F
Airport Drive/Lomandra Drive	F
Kingsford Smith Drive/Nudgee Road/Remora Road	F
Kingsford Smith Drive/Fison Avenue/Gateway Motorway on-ramp	B[2]
Kingsford Smith Drive/Schneider Road/Links Avenue North	F
East-West Arterial Road/Sandgate Road	F
East-West Arterial Road/Nudgee Road	F
East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout	B[2]
Toombul Road/Gateway Motorway Roundabout	A[2]

[1] *Includes traffic from DTB to NAR.*
[2] *Does not allow for queuing back through intersection from Gateway Motorway on-ramp merge.*

10.10 Mitigation Measures

The forecast impact of the NPR on road traffic volumes and LOS is described in the preceding sections. Development of Greater Brisbane and lands within the area surrounding the Brisbane Airport, including those owned by BAC, Port of Brisbane Corporation, and BCC is forecast to result in significant congestion on the road network in both 2015 and 2035 without NPR traffic.

A suite of road network upgrades are planned to accommodate, in part, forecast traffic movements to and from the Australia TradeCoast North precinct, including the Brisbane Airport terminals. This suite of road network upgrades includes the GUP, NSBT and Airport Link that are all currently in the planning, pre-construction, or construction stages. These projects are intended to provide significant relief for the wider road network. Preliminary and indicative modelling of this suite of road network upgrades (GUP, NSBT and Airport Link) indicates significant relief for the following roads in the study area:

- Kingsford Smith Drive;
- Nudgee Road;
- Sandgate Road, south of the East-West Arterial Road; and
- The existing Gateway Motorway.

Further improvements to public transport infrastructure may further mitigate the impacts of the NPR as well as other development on BAC lands, on the study area road network.

These could include the following possible public transport initiatives:

- Review of the Airtrain operating hours and frequencies; and
- Improved bus service network integration to and from the Airport terminals.

Overall the NPR is forecast to have a marginal impact on the surrounding road network.

10.11 Residual Effects

The residual effects of the Airport traffic generation are those described in section 10.9.2 of this report. By 2035, the road network is forecast to be extremely congested due to the development of greater Brisbane and land owned by BAC, Port of Brisbane Corporation and BCC surrounding the Brisbane Airport, with intersections in particular, forecast to operate well above capacity. The forecast traffic generated as a result of NPR increases traffic in the order of up to 5 percent on the broader road network to the west of the existing Gateway Motorway during peak hours. This increase is forecast to result in three additional road network deficiencies beyond those that are expected in 2035 without the NPR.

The residual effects of the Airport traffic generation are likely to be barely perceptible to users of the study area road network. **Figures 10.11a**, **10.11b**, **10.11c** and **10.11d** illustrate the congested speeds on the network for the 2035 Base and NPR scenarios. A comparison between the respective Base and NPR scenarios indicates the forecast reduction in peak speeds being in the order of 3 km/h on a small number of roads. It is likely that this change would be barely perceptible by road users, as it falls well below the much broader travel speed variability that results from seasonal and non-recurrent congestion sources such as traffic fluctuations, accidents, breakdowns and road works.

In planning for the future development and expansion of the Airport, BAC has contributed to and is constructing significant road transport infrastructure to cater for forecast transport demand. A key element of this program is the Northern Access Road (NAR) which will contribute significant relief to the study area road network, well before any additional traffic is generated by the NPR.

Figure 10.9a: *Volume to Capacity Ratio 2035 NPR AM Peak (7am–9am)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.9b: *Volume to Capacity Ratio 2035 NPR PM Peak (4pm–6pm)*

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.11a: *Vehicle Speeds (km/h) 2035 Base AM Peak (7am–9am)*

Note: The speeds shown above on NAR and Airport Drive are indicative and represent available information at the time of the analysis. As the design of NAR has subsequently progressed further, the speeds on a small number of sections may differ slightly to those above.

Figure 10.11b: *Vehicle Speeds (km/h) 2035 Base PM Peak (4pm–6pm)*

Note: The speeds shown above on NAR and Airport Drive are indicative and represent available information at the time of the analysis. As the design of NAR has subsequently progressed further, the speeds on a small number of sections may differ slightly to those above.

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.11c: *Vehicle Speeds (km/h) 2035 NPR AM Peak (7am-9am)*

Note: The speeds shown above on NAR and Airport Drive are indicative and represent available information at the time of the analysis. As the design of NAR has subsequently progressed further, the speeds on a small number of sections may differ slightly to those above.

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

Figure 10.11d: *Vehicle Speeds (km/h) 2035 NPR PM Peak (4pm-6pm)*

Note: The speeds shown above on NAR and Airport Drive are indicative and represent available information at the time of the analysis. As the design of NAR has subsequently progressed further, the speeds on a small number of sections may differ slightly to those above.

NEW PARALLEL RUNWAY DRAFT EIS/MDP
FOR PUBLIC COMMENT

The traffic forecasts produced for this study indicate a number of Gateway Motorway ramps operating at or above capacity. Access to the Gateway Motorway is limited to the existing locations at Links Avenue North, Airport Drive, and Toombul Road. The NAR provides vital additional capacity to access the Gateway Motorway thereby 'releasing' capacity at these existing locations for others to access the Gateway to the north and south.

10.12 Assessment Summary Matrix

In summary, the impact of the NPR on different elements of the transport network is forecast to be minor to moderate adverse. The assessment summary matrix for the impacts of the NPR on individual transport network elements is summarised in **Table 10.12b**. The significance criteria used for assessing the impacts are described in **Table 10.12a**.

Table 10.12a: Traffic Significance Criteria.

Significance	Traffic Criteria
Major Adverse	Mid-block traffic flow during peak periods at this level increases by 50 percent when compared to the scenario without the scheme. Motorists would experience more than a doubling of travel time.
High Adverse	Mid-block traffic flows during peak periods increase by an average of between 20 percent to 50 percent when compared to the scenario without the scheme. Motorists would experience a significant increase in travel time.
Moderate Adverse	Mid-block traffic flows in the peak periods increase by between greater than 5 percent to 20 percent when compared to the scenario without the scheme. Motorists will notice an increase in travel time of 15-35 percent.
Minor Adverse	Peak period mid-block flows increase by 1 percent up to and including 5 percent when compared to the scenario without the scheme. Motorists will barely perceive an increase in travel time (<10 percent increase).
Negligible	Mid-block flows in the peak periods increase by less than 1 percent when compared to the scenario without the scheme. Motorists unlikely to perceive any impact on travel time (<2 percent).
Beneficial	Mid-block flows decrease as a result of the scheme. Generally free flow conditions with a Volume to Capacity ratio up to 0.5. Vehicles are unimpeded in manoeuvring in the traffic stream and stopped delay at intersections is minimal.

Table 10.12b: Assessment Summary Matrix.

Road Network Element	Significance Criteria
Mid-Block Capacity	
- Airport Drive	Moderate Adverse
- Northern Access Road	High Adverse
- Existing Gateway Motorway	Minor Adverse
- GUP Northern Deviation	Moderate Adverse
- East-West Arterial Road	Minor Adverse
- Nudgee Road	Moderate Adverse
- Kingsford Smith Drive	Minor Adverse
- Toombul Road	Moderate Adverse
- Sandgate Road	Moderate Adverse
Intersections	
- Airport Drive/Dryandra Road/Alpina Drive[1]	High
- Airport Drive/Correa Street/International Terminal	High
- Airport Drive/Lomandra Drive	Minor
- Kingsford Smith Drive/Nudgee Road/Remora road	Minor
- Kingsford Smith Drive/Fison Avenue/Gateway Motorway on-ramp	Minor
- Kingsford Smith Drive/Schneider Road/Links Avenue North	Minor
- East-West Arterial Road/Sandgate Road	Negligible
- East-West Arterial Road/Nudgee Road	Minor
- East-West Arterial Road/Airport Drive/Gateway Motorway Roundabout	Minor
- Toombul Road/Gateway Motorway Roundabout	Minor
Travel Times	Minor Adverse

[1] *Includes traffic from DTB to NAR.*

Table 10.12b indicates the highest traffic impacts of NPR traffic generation are forecast to be on the Northern Access Road, Airport Drive and the GUP. These roads were constructed, in part or in full, for the purposes of accessing the Airport terminals. Consequently, the high impact of NPR on these Airport 'access' roads is consistent with the road hierarchy within the study area. It should be noted that this assessment has not included the beneficial effects of NAR on the study area road network. Furthermore, the additional capacity for aircraft movements that NPR creates in the peak periods helps to relieve the shoulder periods during the rest of the day. This will also provide some relief to the periods of the day either side of the peak.

10.13 Road Safety Risk of NPR

Once operational, NPR will allow a greater number of aircraft movements during peak periods. The greater number of aircraft movements will result in an increase in the number of trips on the public transport and road networks to and from the Airport terminals. There is potential for NPR to influence the road safety risk on the surrounding road network in two ways:

- Increase in traffic volumes on the surrounding road network therefore potentially increasing the number of vehicle accidents by increasing vehicular exposure to road safety risk; and
- The increase in numbers of aircraft flying over road leading to greater potential for distractions of drivers on the surrounding road network.

Whilst the NPR is forecast to generate additional traffic on the road network, traffic will also grow in the area as result of surrounding development and regional growth. This traffic growth is likely to lead to a greater number of accidents if the road network environment and road user behaviour patterns remain the same. Road safety risk can be defined as the risk any one particular vehicle has in being involved in an accident. This is typically defined as a rate or number of accidents per unit exposure to the road environment (i.e. when the vehicle is on the road network). The rate in which accidents occur is typically measured as the number of accidents

per million vehicle kilometres travelled. This rate is generally influenced more by the road environment and driver behaviour factors rather than the number of vehicles travelling along the road.

To contextualise the accident rates, if a driver travels 50,000 km per annum along the same road with an accident rate of 0.3 accidents per million vehicle kilometres travelled, then the driver has a probability of an accident every 6 years.

Analysis of accident data between 2003 and 2005 (inclusive) along the existing Gateway Motorway indicates the southern section of the Gateway Motorway to have a higher accident rate. The analysis also indicated that accident rates generally remain static with an increasing amount of traffic between 2003 and 2005 (refer **Table 10.13a**).

The accident rate analysis does not appear to indicate any correlation between the proximity to approaching aircraft and road accident rates, particularly when the accident rate is greater for the section of the Gateway Motorway south of the Brisbane River where flight paths are typically less of a distraction for drivers.

Furthermore, not one of the 879 accidents analysed reported aircraft as a contributing factor to the cause of an accident.

International research papers[1] into the causes of road accidents also indicate no significant or direct link between aircraft flight paths and road accidents. Factors much more likely to influence driver behaviour with the potential to cause accidents are indicated as:

- Drowsiness;
- Using mobile phone;
- Talking to another vehicle occupant; and
- Behaviour of other road users.

Table 10.13a: Road Safety Accident Rates 2003 to 2005.

Gateway Motorway Section	Accidents per Million Vehicle Kilometre Travelled
Between Mt Gravatt Capalaba Road and Lytton Road	0.37
Gateway Bridge	0.26
Between Gateway Bridge and Nudgee Road	0.26

Source: Department of Main Roads Accident Data (2003 to 2005).

[1] *A number of research papers were used for information in this study:*
"The Role of Driver Distraction in Traffic Crashes", Prepared for AAA Foundation for Traffic Safety, May 2001.
"Distractions in Everyday Driving", Prepared for AAA Foundation for Traffic Safety, June 2003.
"The Impact of Driver Inattention on Near-Crash/Crash Risk: An analysis Using the 100-Car Naturalistic Driving Study Data", Prepared for National Highway Traffic Safety Administration, April 2006.
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