VOLUME 4

Appendix J
Surface transport and access

Department of Infrastructure and Regional Development

Western Sydney Airport EIS

Surface Transport and Access Study

August 2016

Limitations

GHD has prepared this report pursuant to the conditions in the Department of Infrastructure and Regional Development Deed of Standing Quotation (SON2030181), the Commonwealth RFQTS Number 2014/7540/001, the subsequent response accepted and referenced in the relevant Official Order (collectively the "Contract"): In particular, this report has been prepared by GHD for the Commonwealth and may only be used and relied on by the Commonwealth and the party or parties identified in the Contract (Other Parties) in accordance with the Contract for the purpose agreed between [GHD, consultant name] and the Commonwealth as set out in the Contract and Section 1.2 of this report.

Other than as stated in the Contract, GHD disclaims responsibility to any person other than the Commonwealth (or the Other Parties) arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the Contract and are subject to the scope limitations set out in the Contract and this report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Western Sydney Unit and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and field surveys undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific survey locations. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report. Site conditions (including the presence or abundance of threatened biota) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Executive summary

Introduction

The Australian Government Department of Infrastructure and Regional Development is undertaking detailed planning and investigations for a proposed airport at Badgerys Creek. The proposed airport would provide both domestic and international services, with development staged in response to demand.

The initial development of the proposed airport (referred to as the Stage 1 Development) would include a single, 3,700 metre runway coupled with landside and airside facilities such as passenger terminals, cargo and maintenance areas, car parks and navigational instrumentation capable of facilitating the safe and efficient movement of approximately 10 million passengers per year as well as freight operations. To maximise the potential of the site, the airport is proposed to operate on a 24-hour basis.

In the longer term, approximately 40 years after operations commence and in accordance with relevant planning approval processes, the airport development is expected to fully occupy the airport site, with additional passenger and transport facilities for around 82 million passenger movements per year.

This Assessment

This report has been prepared for inclusion in the Western Sydney Airport (WSA) EIS. It provides an assessment of the traffic and transport impacts during the operation and construction stages of the proposed WSA and identifies mitigating measures necessary to address identified impacts. It focuses on the traffic implications from the proposed Stage 1 development and the long term development on the surrounding road network.

This report is subject to, and must be read in conjunction with, the limitations set out on page i and the assumptions and qualifications contained throughout the report.

The periods considered in this traffic and transport impact assessment are:

- Construction
- Stage 1 (initial) airport development; and
- Long term airport development

The key findings of this traffic and transport assessment are outlined in the following sections.

Existing conditions and planned infrastructure developments

The existing land use in the vicinity of the airport site is generally rural residential and agricultural, consisting mainly of farming land and rural residential properties. However, significant urban development is expected in Western Sydney in the coming years, especially in the areas designated by the NSW Government for growth, such as the Western Sydney Priority Growth Area, South West Priority Land Release Area and the Western Sydney Employment Area.

The existing traffic volumes on the surrounding road network are within the expected functional classification outlined by NSW Roads and Maritime Services, as the majority of roads in proximity to the proposed airport are arterial roads.

The Australian and NSW government's Western Sydney Infrastructure Plan (WSIP) is investing more than $3.6 billion over 10 years in major road infrastructure upgrades to capitalise on the economic gains from the proposed airport development at Badgerys Creek. This package of

works is expected to increase the capacity of the region to handle future traffic growth. In addition, the future development of the Western Sydney Priority Growth Area, Western Sydney Employment Area and South West Priority Land Release Area will result in significant upgrades to road and transport infrastructure.

The surrounding transport system is currently being upgraded by the Australian and NSW governments through the WSIP. Road infrastructure works are proposed to be undertaken in preparation for the airport and include major road upgrades on the following roads as part of the WSIP:

- The Northern Road;
- Bringelly Road;
- Werrington Arterial;
- Ross Street and the Great Western Highway, Glenbrook; and
- M12 motorway, broadly parallel to the current Elizabeth Drive alignment between the M7 Motorway and The Northern Road.

In addition, major road infrastructure works are also proposed on the following roads:

- Cowpasture Road;
- Camden Valley Way;
- Narellan Road; and
- M4 with development of a managed motorway system.

Other infrastructure investigations underway include corridor preservation activities for an Outer Sydney Orbital (OSO) and the extension of the South West Rail Link. In addition, the Australian and NSW governments are undertaking a Joint Scoping Study on the rail needs for Western Sydney, including the proposed airport. The study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region.

Pedestrian and cycling infrastructure is provided within the study area but is currently very limited.

Construction

The construction of the proposed WSA would generate an additional 1,254 vehicle movements per day on the surrounding road network during the construction period. This equates to around 160 peak hour vehicle movements during the morning traffic peak period and around 150 peak hour vehicle movements during the evening peak period on the surrounding road network.

The construction stages for the airport would not impact significantly on the surrounding transport system with the exception of potential oversized vehicle movements for the earthworks. These movements may require temporary road closures or police escorts.

A Traffic and Access Construction Environmental Management Plan (TACEMP) would be developed for approval by the Infrastructure Minister or an SES Officer in the Department of Infrastructure and Regional Development following consultation with NSW Roads and Maritime Services. The TACEMP would provide the overall plan and staging for managing traffic through and around each work site.

An important measure relating to construction traffic impacts is the implementation of a community information awareness program. This program would be initiated prior to major construction activities commencing and continue throughout the entire construction period to

ensure that local residents are aware of the construction traffic issues, with particular regard to diversions, temporary road closures, traffic signalling and speed limits.

Stage 1 development – key features

The main access to the airport site from the north would be via the new M12 Motorway that would generally run parallel to Elizabeth Drive. It is expected to include a grade separated interchange for vehicular access to the proposed airport. The proposed access corridors within the airport site will be 100 m wide comprising of six traffic lanes, two bus lanes and a 40 metre rail reserve corridor (including provision for station(s) within the corridor).

Access to the main terminal is expected to be from the airport motorway connection for passengers, while staff and freight access is expected to be from Elizabeth Drive.

Access to the airport site from the south-west would be via The Northern Road, which would be relocated and upgraded prior to the commencement of operations. This access point is anticipated as being primarily for secure commercial access to operational areas of the site, including maintenance. This access road into the site is expected to consist of a 50 metre-wide corridor allowing four trafficable lanes.

Parking for approximately 11,500 vehicles would be provided, consisting of short and long stay parking, employee and operational parking, commercial vehicle parking and storage, parking for rental cars and emergency services vehicle parking.

Pedestrian and cycle access would be included in the Terminal and Ground Transport precincts and parking areas.

Stage 1 development operational impact assessment

This surface transport assessment has used 2031 as the design year for the assessment of impacts resulting from the proposed initial airport development. The year 2031 has been used in this study because it is broadly consistent with the other EIS assessments undertaken (which adopt 2030 as the year of assessment) and it represents a midpoint between the current available traffic and transport models for Sydney which include the years 2026 and 2036. For the purpose of this analysis, it is assumed that an airport rail link is not operational before 2036. The Australian and NSW governments are undertaking a Joint Scoping Study to determine future rail links, including timing and rail service options.

The following key findings concerning passenger and employee trip generation and freight trip generation were identified:

- daily passenger, employee and freight vehicle trip generation of 21,562 vehicles to the proposed airport and 21,556 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 6:00 am and 7:00 am and is 2,397 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 pm and 7:00 pm and is 2,254 vehicles per hour; and
- daily freight vehicle trip generation of 66 trucks to / from the airport (equivalent to 145 pcu).

The impact assessment concluded that operation of the Stage 1 airport would not significantly impact the capacity of the surrounding road transport system. The public transport and walking and cycling systems proposed by the NSW Government and local councils identified in Chapter 5 would also have sufficient capacity to cater for the expected passenger and employee demand of the proposed airport.

Long term development operational impact assessment

For assessment purposes in the EIS, the design year for the assessment of future impacts resulting from the long term development of the proposed airport was 2063.

The following key findings concerning passenger and employee trip generation and freight trip generation were identified:

- daily passenger, employee and freight vehicle trip generation of 103,291 vehicles to the airport and 103,628 vehicles from the proposed airport, with 309 trains per day;
- the peak passenger and employee vehicle demand to the proposed airport is between 9.00 am and 10.00 am and is 8,567 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6.00 pm and 7 pm and is 7,957 vehicles per hour; and
- daily freight vehicle trip generation is expected to be 537 trucks per day in each direction, with a peak hour of 45 trucks.

The following key findings were identified from the impact assessment:

- the increase in volumes during peak periods on the motorway network attributable to the airport are less than 10% with the exception of the M12 and sections of the M7 in close proximity to the M12.
- greater congestion on motorways M12 and M7 (near the interchange with the M12) in particular;
- greater congestion on arterial routes Elizabeth Drive, Northern Road and Bringelly Road in particular; and
- greater congestion on local roads in the vicinity of the airport.

These changes are as a result of the additional traffic that is generated to and from the airport as both an employment and travel destination placing additional demand on the road network.

Given the time horizon being forecast and that there is no available information from either the NSW or Australian governments concerning long term road or other transport infrastructure upgrades beyond 2041, the assessment of the impact of public transport is limited to the forecast reduction in traffic volumes as a consequence of a possible South West Rail Link extension from Leppington to St Marys via the proposed airport.

The long term operations of the proposed airport and forecast development growth in Western Sydney would have an impact on both the road and other transport systems through the significant additional travel generated by both airport staff and employees

The long term airport operations would be reliant on the introduction of rail operations after 2031. Even with an assumed South West Rail Link extension, the assessed increases in demand vs capacity for 2063 show that detailed planning is required to preserve additional corridors and transport upgrades to cater for the overall population and development growth which would accompany the proposed airport.

It is recommended that more detailed planning is commenced to address the envisioned capacity shortfall in the long term so that potential future corridor upgrades are not constrained by encroachment from surrounding development.

Table of contents

Table index

Figure index

Appendices

Glossary and abbreviations

Term	Usage
ABS	Australian Bureau of Statistics
AM	Ante Meridiem
ART	Articulated Vehicles
BTS	Bureau of Transport Statistics
CBD	Central Business District
CCTV	Closed-circuit television
CTMP	Construction Traffic Management Plan
EIS	Environmental Impact Statement
GMA	Greater Metropolitan Area
HTS	Household Travel Surveys
Interpeak	The time period between the AM and PM peak periods
Kiss ‘n’ Fly	Air passenger trips involving a car dropping or picking up air passengers with minimal stopping time at the airport.
JTW	Journey to Work
LCV	Light Commercial Vehicles
LGA	Local Government Area
Long term development	A future stage in the development of the proposed airport, where the airport is assumed to comprise parallel runways and is capable of handling approximately 82 million passengers annually. The EIS assumes this occurs in 2063 for assessment purposes.
Mitigation	Reduction in severity
NSW	New South Wales
Park ‘n’ fly	A trip type where one air passenger drives a car to the airport and it is stored in a car park until the passenger returns to the airport
PCU	Passenger Car Unit
PM	Post Meridiem
RAAF	The Royal Australian Air Force
RIG	Rigid Vehicles
RMS (formerly NSW RTA)	NSW Roads and Maritime Services
SALTM	Sydney Airport Land Use Transport Model
Shuttle	A small bus capable of carrying up to 30 passengers direct to the airport from a major centre
Stage 1 (or initial) development	The initial stage in the development of the proposed airport, including a single runway and the capacity to handle approximately 10 million passengers annually. The EIS assumes this occurs approximately five years after operations commence for assessment purposes.

Term	Usage
STM3	The Strategic Sydney Travel Model version 3
SWPGA	South West Priority Growth Area
TACEMP	Traffic and Access Construction Environmental Management Plan
TfNSW	Transport for New South Wales
USA	United States of America
VPD	Vehicles Per Day
WSA	Western Sydney Airport
WSIP	Western Sydney Infrastructure Plan
WSU	Western Sydney Unit

1. Introduction

1.1 Background

Planning investigations to identify a site for a second Sydney airport first commenced in 1946, with a number of comprehensive studies—including two previous environmental impact statements for a site at Badgerys Creek—having been completed over the last 30 years.

More recently, the Joint Study on Aviation Capacity in the Sydney Region (Department of Infrastructure and Transport 2012) and A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations (Department of Infrastructure and Transport 2013) led to the Australian Government announcement on 15 April 2014 that Badgerys Creek will be the site of a new airport for Western Sydney. The airport is proposed to be developed on approximately 1,780 hectares of land acquired by the Commonwealth in the 1980s and 1990s. Airport operations are expected to commence in the mid-2020s.

The proposed airport would provide both domestic and international services, with development staged in response to demand. The initial development of the proposed airport (referred to as the Stage 1 development) would include a single, 3,700 metre runway coupled with landside and airside facilities such as passenger terminals, cargo and maintenance areas, car parks and navigational instrumentation capable of facilitating the safe and efficient movement of approximately 10 million passengers per year as well as freight operations. To maximise the potential of the site, the airport is proposed to operate on a 24-hour basis. Consistent with the practice at all federally leased airports, non-aeronautical commercial uses could be permitted on the airport site subject to relevant approvals.

While the proposed Stage 1 development does not currently include a rail service, planning for the proposed airport preserves flexibility for several possible rail alignments including a potential express service. A joint scoping study is being undertaken with the NSW Government to determine rail needs for Western Sydney and the airport. A potential final rail alignment will be determined through the joint scoping study with the New South Wales Government, with any significant enabling work required during Stage 1 expected to be subject to a separate approval and environmental assessment process.

As demand increases, additional aviation infrastructure and aviation support precincts are expected to be developed until the first runway reaches capacity at around 37 million passenger movements. At this time, expected to be around 2050, a second parallel runway is expected to be required. In the longer term, approximately 40 years after operations commence, the airport development is expected to fully occupy the airport site, with additional passenger and transport facilities for around 82 million passenger movements per year.

On 23 December 2014, the Australian Government Minister for the Environment determined that the construction and operation of the airport would require assessment in accordance with the *Environment Protection and Biodiversity Conservation Act* 1999 (Cth) (EPBC Act). Guidelines for the content of an environmental impact statement (EIS) were issued in January 2015.

Approval for the construction and operation of the proposed airport will be controlled by the *Airports Act 1996* (Cth) (Airports Act). The Airports Act provides for the preparation of an Airport Plan, which will serve as the authorisation for the development of the proposed airport.

The Australian Government Department of Infrastructure and Regional Development is undertaking detailed planning and investigations for the proposed airport, including the

development of an Airport Plan. A draft Airport Plan was exhibited for public comment with the draft EIS late in 2015.

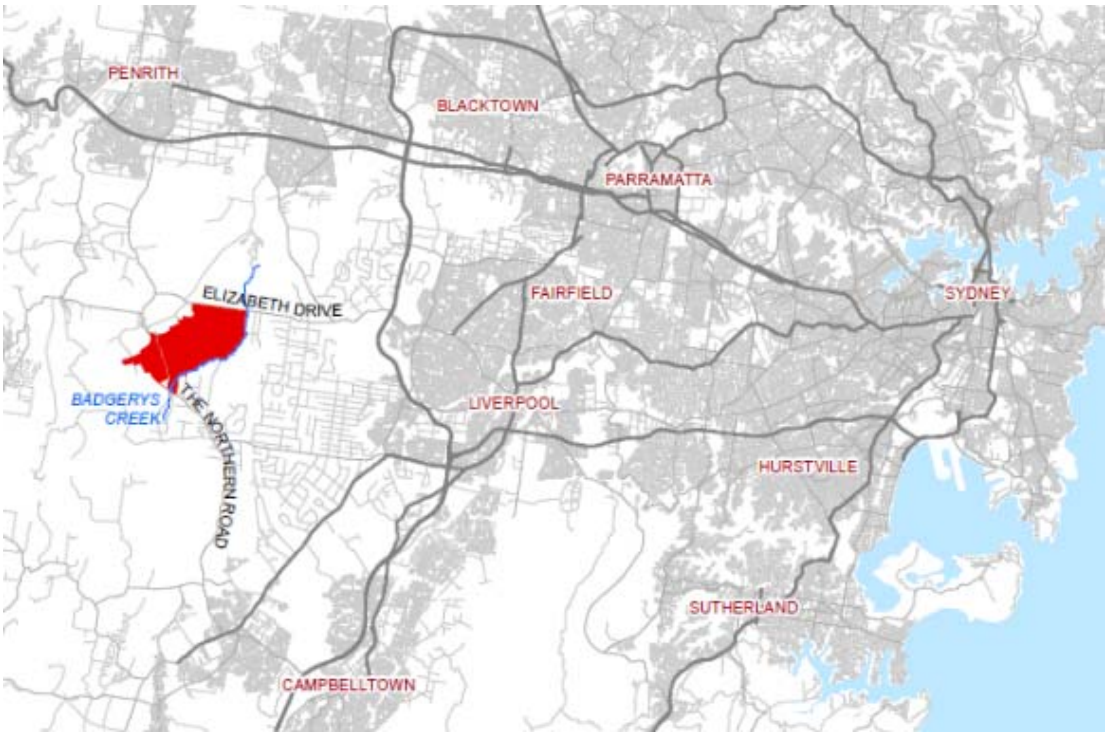
Following receipt of public comments, a revised draft Airport Plan has been developed. The revised draft Airport Plan is the primary source of reference for, and companion document to, the EIS. The revised draft Airport Plan identifies a staged development of the proposed airport. It provides details of the initial development being authorised, as well as a long-term vision of the airport's development over a number of stages. This enables preliminary consideration of the implications of longer term airport operations. Any airport development beyond Stage 1, including the construction of additional terminal areas or supporting infrastructure to expand the capacity of the airport using the first runway or construction of a second runway, would be managed in accordance with the existing process in the Airports Act. This includes a requirement that, for major developments (defined in the Airports Act), a major development plan be approved by the Australian Government Minister for Infrastructure and Regional Development following a referral under the EPBC Act.

The Airport Plan will be required to include any conditions notified by the Environment Minister following this EIS. Any subsequent approvals for future stages of the development will form part of the airport lessee company's responsibilities in accordance with the relevant legislation.

1.2 Study area

The proposed Western Sydney Airport (WSA) is located approximately 56 km from the centre of Sydney and is bounded by Elizabeth Drive to the north, Willowdene Avenue to the south, Luddenham and Adams Road to the west and Badgerys Creek to the east. The Northern Road currently cuts across the south-western side of the site but will be relocated off site to allow the proposed development to proceed. The proposed airport site is approximately 1,780 hectares in size and its regional location is shown in Figure 1-1.

Figure 1-1 Regional location of the Western Sydney Airport



Source: GHD

1.3 Purpose and structure of this report

This report has been prepared to meet the requirements of the *EIS Guidelines – Western Sydney Airport EPBC 2014/7391*. In relation to surface transport, the guidelines require assessment of:

(Section 5g): "…. changes in traffic movements during construction and operation (associated with both passenger movements and workers)".

The report focuses on the traffic implications of both the initial stage and the long term development of the proposed airport on the surrounding transport network. Particular attention is paid to the peak periods during these years of assessment and the overall effect on the NSW local and regional road network, public transport and pedestrian and cycling facilities.

The report does not consider in detail the existing internal road network and planned transport network within the proposed airport as this is subject to confirmation as the design is developed.

The remainder of this report is structured as follows:

- **Section 2 - Methodology**: describes the key steps undertaken in the assessment including key data sources, modelling methodology and assumptions.
- **Section 3 - Existing Environment**: this section provides a review of existing road features, adjacent developments, traffic volumes, sight distances and historical crash data.
- **Section 4 - Construction traffic assessment**: this section details the additional traffic generated as a result of construction of the proposal including expected construction traffic access routes. An assessment of the likely impact of construction traffic on the surrounding transport network is provided.

Part A Assessment of the initial (Stage 1) airport development:

- **Section 5 – Key development components and assumed road network conditions**: provides a description of the key Stage 1 airport and transport infrastructure including proposed access arrangements and internal transport infrastructure.
- **Section 6 – Trip generation**: describes the methodology for and presentation of the calculation of the trips generated by the initial development.
- **Section 7 – Operational traffic assessment**: examines the potential traffic and transport impacts associated with Stage 1 operations which for the assessment undertaken in this report is assumed to occur around 2031 (approximately five years after opening).

Part B Assessment of the long term airport development

- **Section 8 – Key development components and assumed road network conditions**: provides a description of the key long term airport and transport infrastructure including proposed access arrangements and internal transport infrastructure.
- **Section 9 – Trip generation**: describes the methodology for and presentation of the calculation of the trips generated by the long term airport development.
- **Section 10 – Operational traffic assessment**: examines the potential traffic and transport impacts associated with the operation of the proposed project in the design year 2063.

2. Methodology

This section outlines the methodology and evaluation criteria used in the assessment of both the initial stage airport development and the long term development.

2.1 Scope

The scope of this report is to meet the relevant requirements of the *EIS Guidelines – Western Sydney Airport EPBC 2014/7391* dated 22 January 2015. These guidelines require the EIS to address:

(Section 5g): "…. changes in traffic movements during construction and operation (associated with both passenger movements and workers)".

This report provides an assessment of traffic and transport impacts during the following stages:

- construction – analysed an eight-year period with 2021 considered to be a worst case year for assessment purposes;
- Stage 1 operations – assumed to be 2030/2031; and
- long term development – assessment year 2063.

The construction stage focuses on the traffic implications from haulage of material required by the proposed project along the road network, and the transporting of plant, equipment and vehicular traffic generated by construction employees. The report focuses on the peak construction period and the overall effect on the higher order road network.

Selection of the year 2031 as the basis for the proposed Stage 1 traffic and transport assessment is broadly consistent with the other EIS assessments undertaken, which assume that the proposed airport would be processing approximately 10 million annual passengers about five years after operations commence. For the purposes of most assessments in the EIS, this level of activity has been assumed to occur in 2030. The use of traffic demand forecasts for the year 2031 provides a consistent basis for comparing outputs from this assessment with other studies utilising the Sydney Strategic Travel Model (see sections 2.2 and 2.3 below) and does not affect the general conclusions about the proposed airport's impacts on traffic volumes and road capacities compared to a year 2030 scenario.

The analysis of impacts of the proposed long term airport development is based on the year 2063. There is no published information about Western Sydney's transport system for this time. Therefore, the 2063 traffic and transport models provided by the Transport for NSW Bureau of Statistics and Analytics apply transport demand data based on 2051 land use and population assumptions onto a 2051 transport system.

2.2 Data sources

The investigation and analysis of impacts was undertaken at a desktop level. The desktop assessment included the collection and review of the following relevant information:

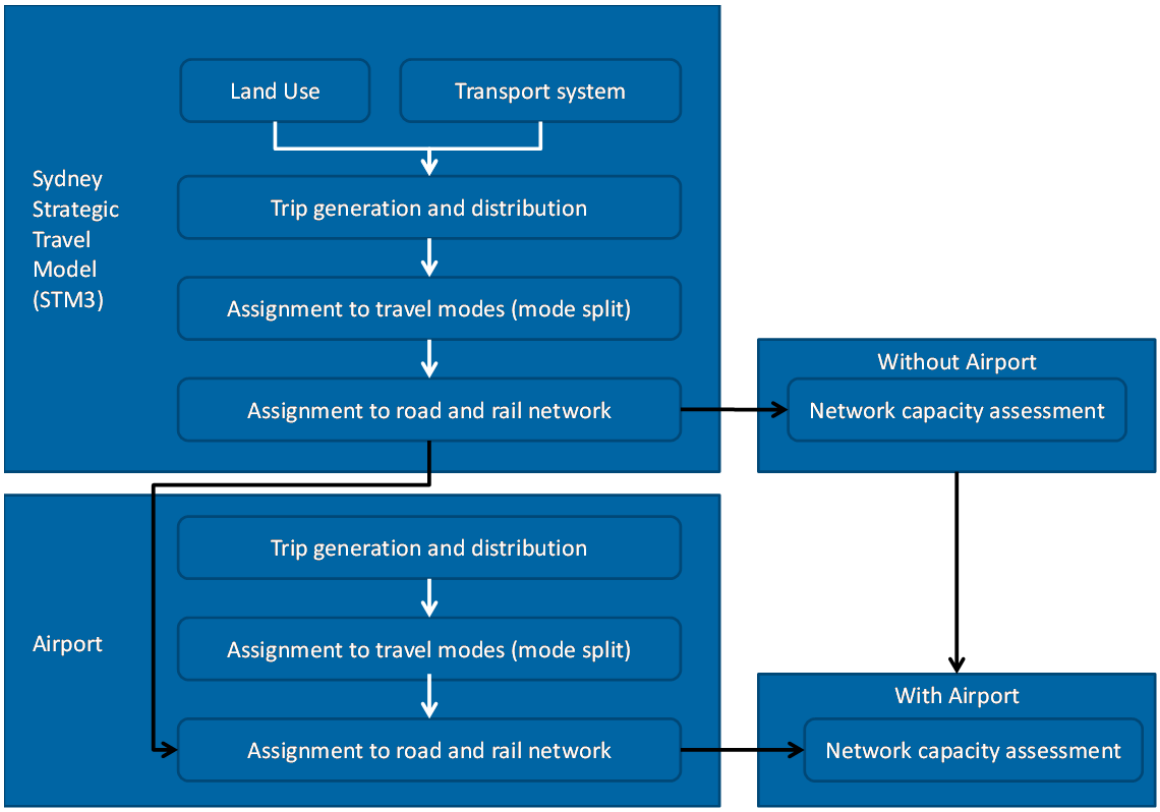
- Aerial photography and other GIS mapping information.
- Traffic count data for the study area (as defined in section 1.2) obtained from the NSW Roads and Maritime Services (Roads and Maritime).
- Roads and Maritime crash data for state and local authority controlled roads in the study area.
- Sydney Airport Land Transport Model (SALTM).

- Airport Cooperative Research Program (Transportation Research Board).
- US Customs and Border Protection clearance time data.
- US Transportation Security Administration security screening clearance times.
- Sydney Strategic Travel Model v3.12 (STM3), provided by Transport for NSW for a number of forecast years and modelling scenarios:
    - 2011 Standard (no specific adjustment for Western Sydney or Western Sydney Airport).
    - 2021 Standard (no specific adjustment for Western Sydney or Western Sydney Airport).
    - 2031 Without airport
    - 2031 With Airport
    - 2041 Without Airport
    - 2041 With Airport
    - 2051 Without Airport
    - 2051 With Airport

2.3 Modelling methodology

The method for undertaking the assessment of the proposed airport using the Sydney Strategic Travel Model with the trip generation from Western Sydney Airport is shown in Figure 2-1.

Figure 2-1 Modelling methodology



2.3.1 Sydney Strategic Travel Model overview

The STM (Strategic Travel Model) is a tool provided by the Transport for NSW Bureau of Statistics and Analytics to project travel patterns in the Sydney Greater Metropolitan Area (GMA).

The STM uses land use forecasts in the form of population and employment projections by travel zone combined with a detailed representation of the road and public transport networks in the GMA to assess the impact of growth and trip making behaviour on transport infrastructure and vice versa.

The STM is underpinned by a series of behavioural models, derived from observed data such as the Household Travel Survey (HTS) and Journey to Work (JTW) data.

In common with most strategic travel models globally, there are, broadly speaking, four stages of analyses required to develop travel demand forecasts:

1. Trip generation, or travel frequency – that is, given the demographics and land uses of a given travel zone, how many trips to and from this zone will occur.
2. Trip distribution (where will these trips go).
3. Mode choice (how will they get there - car, bus, rail, ferry or a combination); and
4. Assignment (route chosen for each trip, for each mode, between each origin-destination pair). This stage provides the detail for the number of vehicles on each road and people on each public transport service.

The STM3 is the latest iteration of the STM. The STM3 models detailed in section 2.2 have been used as the foundation of the traffic impact assessment. For the purposes of the Final EIS, this assessment has used an updated version of STM3, which has been refined in a number of ways, including the land use and road infrastructure input assumptions. The revised modelling has resulted in different outcomes to those presented in the Draft EIS.

2.3.2 Traffic impact assessment methodology

The traffic impact assessment has focussed on the 'assignment' stage of the STM outlined above. That is, complete 4-stage model runs have not been undertaken. Instead, revised traffic assignments have been carried out making best use of the available, specific data pertaining to the Western Sydney Airport.

The impacts of the Stage 1 and long term operations were assessed using the 2031 and 2051 STM3 models as the foundation, respectively.

The following changes have been made to the models for the specific purpose of this assessment:

- removal of trips destined for proposed airport travel zones in the STM model. This constitutes the demand for the 'Without Airport' scenarios, used to ascertain the impact of the airport on the road network above those associated with other development forecast for Western Sydney;
- use of revised numbers of trips originating in and destined for the airport site for cars, light goods, rigid and articulated vehicles. This represents:
    - construction traffic in 2021 (see section 4.9 for further details)
    - Stage 1 operations (see section 7.1 for further details)
    - long term operations (see section 10.1 for further details);

- additional road infrastructure in the form of the proposed M12 and connections, running generally parallel to Elizabeth Drive and providing direct motorway grade access to the proposed airport (see section 5.5.3 for further details). It is assumed that the proposed M12 will be operational by the time operations commence at the proposed airport, and it is included in all model scenarios, both 'With' and 'Without' the airport;
- the Outer Sydney Orbital (OSO) is currently in the planning and corridor reservation stage. It has been included in the long term operations analysis only, both With and Without the airport; and
- implicit within the calculation of vehicle trips coming from and to the proposed airport in the long term operations scenario is the presence of a railway line extension from Leppington in the east, linking the airport with St Marys to the north.

Following the above alterations, the revised road vehicle demand is reassigned to the revised road network. This is conducted in a manner consistent with a standard STM3 assignment, in two stages:

- a separate assignment of heavy vehicle demands is undertaken first, segmented into different mass and length classes (light commercial vehicles, rigid vehicles and articulated vehicles), with the resulting volumes used as a 'preload' onto the road network; and
- an assignment of the car-based demand, segmented into those willing to pay tolls on the motorway network and those that are not willing.

For each model scenario, four two-hour time periods are assigned. These time periods are representative of the AM peak (07:00-09:00), Interpeak (09:00 – 15:00), PM peak (15:00 – 18:00) and Evening peak (18:00 – 07:00). Combining and factoring these volumes allows a 24-hour weekday volume to be calculated. Note that the 'Evening Peak' represents a 2-hour period ostensibly between 19:00 and 21:00. However, the modelled demand in this period is factored so that this portion of the daily demand is representative of the 19:00 – 07:00 time period.

The network exhibits the largest capacity constraint in the AM and PM peaks. Analysis of the network capacity in this report has therefore been restricted to these periods. All time periods are used to calculate 18-hour and 24-hour traffic volumes, for use by other disciplines, such as the noise and air quality assessments.

Traffic volumes are presented in passenger car units (pcu). Trip generation calculations are carried out using vehicles. STM3 converts from vehicles to pcu using the following factors:

- light commercial vehicles (LCV) factor equal to 1.2
- rigid vehicles (RIG) factor equal to 2
- articulated vehicles (ART) factor equal to 3 for semi-trailers and 5 for B-Doubles.

Therefore, for example, it is considered that an articulated semi-trailer takes up the equivalent road space of three cars.

2.3.3 Modelling assumptions

The trip generation and traffic distribution for the proposed airport have been synthesised based on the assumptions derived from the Sydney Airport Land Use Transport Model (SALTM). This model describes the types of trips to Sydney (Kingsford Smith) Airport and is based on surveys completed in 2008.

The following components of future traffic demand have not been included in the modelling for this assessment:

- non-aeronautical demand (e.g. business park); and
- delivery of consumable items (e.g. food and retail items) to support aeronautical and other related services and businesses, or waste removal.

From this model and recent developments in airport practice, such as self-check-in and bag drop-off and security clearance times, certain assumptions have been made about the initial and long term operations of the proposed airport.

These assumptions include:

- passenger arrival and departure profiles for landside transportation will compact – i.e. people will arrive at the proposed airport closer to their flight departure time and depart from the airport more quickly;
- the main access road for the proposed airport is limited to three traffic lanes in each direction and one bus lane in each direction. This will act as a capacity constraint in the long term resulting in a shift away from cars towards public transport.

Strategic traffic modelling has been undertaken to assess the impact of the proposed airport development. STM3 models were provided by Transport for NSW for this task. GHD has not reviewed or corroborated the models provided beyond consistency checks of outputs.

The road and public transport networks for 'Without Airport' modelling scenarios is consistent with assumptions made in the STM3 models adopted (see section 2.2)

The M12 motorway is assumed to be present in both the 'With Airport' and 'Without Airport' scenarios. The assumed form of the M12, in terms of its capacity and connectivity, should be considered to be indicative and has not been checked for feasibility or assessed in any other manner. Details of the assumptions pertaining to the M12 are provided in section 5.5.3.

For the purposes of this assessment, the construction impact has been analysed from 2016 to 2024. The construction profile assumes that the fifth year of construction works (2021 in the assessed profile) has the peak construction movements and therefore the construction modelling and assessment has been based on the year 2021 to capture a likely worst case scenario.

2.4 Assessment criteria

This traffic and transport assessment has been undertaken with reference to the *Guide to Traffic Generating Developments* (NSW RTA 2002) in lieu of any specific relevant Australian Government guidelines. This guideline suggests a process and methodology to undertake the assessment which is familiar to NSW stakeholders and the community. The operational traffic assessment process outlined in the guidelines stipulates that the operating characteristics need to be compared with agreed performance criteria.

The assessment criteria adopted for this report are outlined in the following sections.

2.4.1 Midblock capacity

The capacity of urban roads is generally determined by the capacity of the intersections. Based on Austroads *Guide to Traffic Management Part 3 Traffic Studies and Analysis (2009) Table 5.1*, typical one-way midblock capacities for a median or inner lane on urban arterial roads under interrupted flow conditions are 900 vehicles per hour per lane (undivided road) or 1,000 vehicles per hour per lane (divided road). The capacity falls to 600 vehicles per hour per lane for a kerbside lane with occasional parked vehicles. These capacities at times may increase under ideal conditions to 1,200 – 1,400 vehicles per hour per lane. Based on this, the mid-block capacities for roads can be estimated and compared to the existing traffic volumes in terms of volume to capacity ratios (VCR).

The STM3 has inbuilt assumptions of link capacities, which are more detailed than the Austroads assumptions. A mid-block volume/capacity analysis derived from STM3 has been used for this study.

The volume/capacity ratio for each link is a measure of the amount of traffic carried by a link compared to its nominal capacity. As volume/capacity nears 1, the speed on the link decreases and both the likelihood and the duration of flow breakdowns increase.

The Austroads *Guide to Traffic Management – Part 3: Traffic Studies and Analysis (2009)* outlines Level of Service criteria for mid-block sections of road based on the VCR. A summary of these Levels of Service is presented below in Table 2-1.

Table 2-1 Level of service descriptions for roads

Level of Service	Uninterrupted Flow Facilities (Motorways)	Interrupted Flow Facilities (Arterial and Collector Roads)	VCR Range
A	Free flow conditions in which individual drivers are unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.	Primarily free flow operations at average travel speeds, usually about 90% of the FFS (free flow speed) for the given street class. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at signalised intersections is minimal.	0.00 to 0.34
B	Zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is less than with LoS A.	Reasonably unimpeded operations at average travel speeds, usually about 70% of the FFS for the street class. The ability to manoeuvre within the traffic stream is only slightly restricted and control delays at signalised intersections are not significant.	0.35 to 0.50
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	Stable operations; however ability to manoeuvre and change lanes in mid-block locations may be more restricted than at LoS B, and longer queues, adverse signal coordination or both may contribute to lower average travel speeds of about 50% of the FFS for the street class.	0.51 to 0.74
D	Close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.	A range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LoS D may be due to adverse signal progression, inappropriate signal timing, high volumes or a combination of these factors. Average travel speeds are about 40% of FFS.	0.75 to 0.89
E	Occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.	Characterised by significant delays and average travel speeds of 33% of the FFS or less. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections and inappropriate signal timing.	0.90 to 0.99
F	In the zone of forced flow. With LoS F, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs and queuing and delays result.	Characterised by urban street flow at extremely low speeds, typically 25% to 33% of the FFS. Intersection congestion is likely at critical signalised locations, with high delays, high volumes and extensive queuing.	1.0 or greater.

Source: Adapted from Austroads Guide to Traffic Management - Part 3: Traffic Studies and Analysis.

VCR = Volume/ capacity ratio

3. Existing environment

This section outlines the existing traffic and transport environment in the vicinity of the airport site including traffic conditions on The Northern Road, Elizabeth Drive, Badgerys Creek Road, Bringelly Road, Adams Road and the M7 Motorway. This includes a profile of the existing development, the existing transport and accessibility conditions and the existing road network performance.

3.1 Existing road network characteristics

3.1.1 Functional road hierarchy

Roads are classified according to the functions that they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to its intended service or qualities. Functional road classification involves the relative balance of the mobility and access functions.

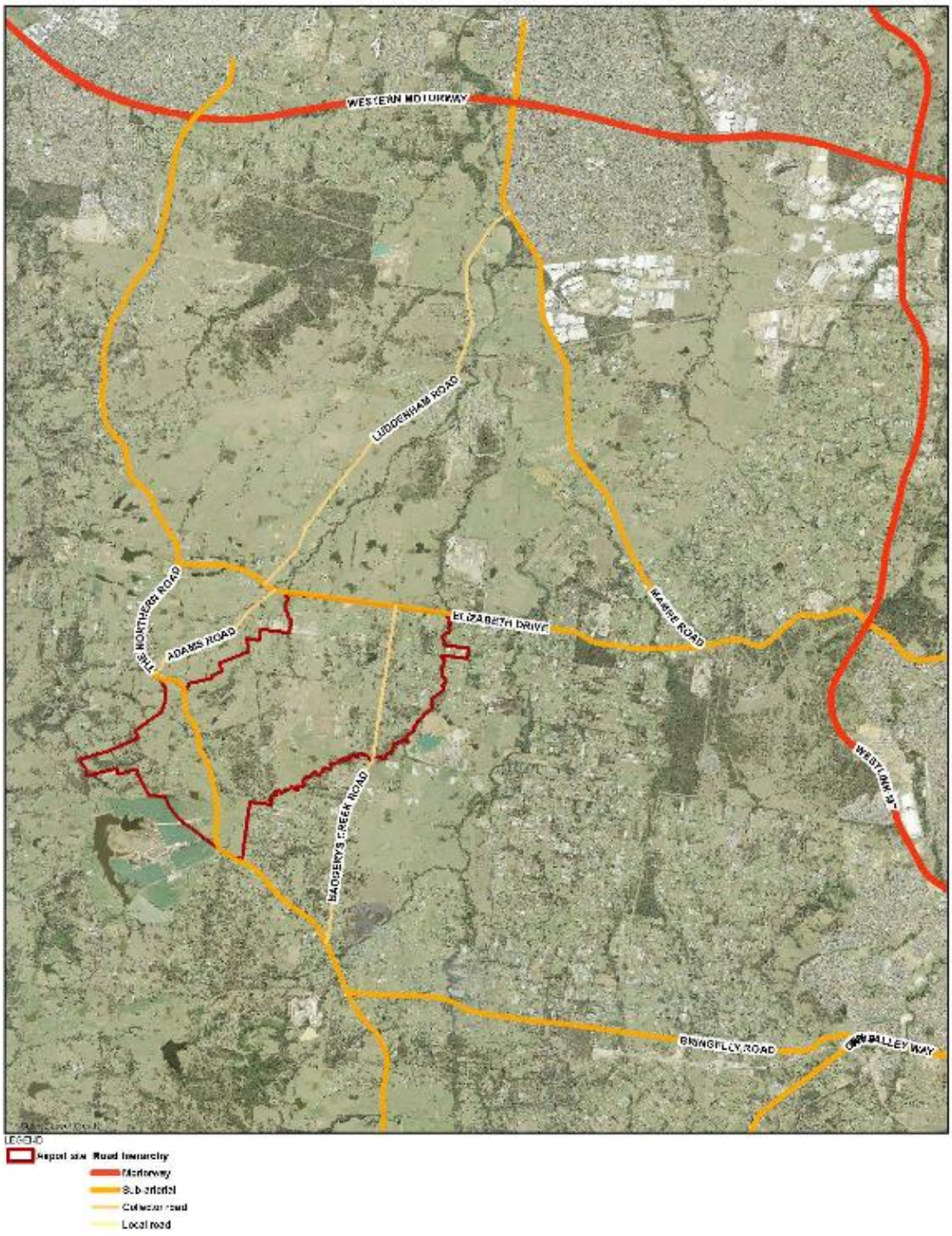
In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions within Sydney, and throughout the State. State roads are the responsibility of the Roads and Maritime to fund, prioritise and carry out works. State roads generally include roads classified as Freeways, State Highways, and Main Roads under the NSW *Roads Act 1993*. The regulation to manage the road system is stated in the Australian Road Rules (1999).

Roads and Maritime define four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

- **Arterial Roads** – controlled by Roads and Maritime, they typically exhibit no limit in flow and are designed to carry vehicles long distances between regional centres.
- **Sub-Arterial Roads** – can be managed by either council or Roads and Maritime under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through-traffic between specific areas in a sub region, or provide connectivity from arterial road routes (regional links).
- **Collector Roads** – provide connectivity between local sites and the arterial road network, and typically carry between 2,000 and 10,000 vehicles per day.
- **Local Roads** – provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

The road network around the Western Sydney Airport site is shown in Figure 3-1 and described in the following sections.

Figure 3-1 Major road network around Western Sydney Airport



3.1.2 Westlink M7 Motorway (M7)

The M7 is an arterial road which connects western Sydney by providing an uninterrupted journey between the M2, M4 and M5 motorways. It is a fully electronic toll road with no toll booths and uses a distance based tolling system.

In the vicinity of Elizabeth Drive, the M7 has two lanes in each direction separated by a grass median around 14 metres wide. The M7 provides for travel at variable speeds up to 100 km/h.

An off-road shared cycle / pedestrian pathway traverses the motorway and connects with the Sydney Cycleway network.

3.1.3 The Northern Road

The Northern Road is an arterial road that connects Narellan in the south west to the Great Western Highway in Penrith. In the vicinity of Luddenham, The Northern Road has an undivided carriageway with one lane in each direction and a sign posted speed limit of 80 km/h.

3.1.4 Elizabeth Drive

Elizabeth Drive is an arterial road which connects The Northern Road at its western end, and the M7 to the Hume Highway at Liverpool. Between The Northern Road and the Mamre Road roundabout, Elizabeth Drive has an undivided carriageway with one lane in each direction and has a sign posted speed limit of 80 km/h. Elizabeth Drive between Mamre Road and the M7 has two eastbound lanes and one westbound lane. In the vicinity of Wallgrove Road, Elizabeth Drive carries around 26,000 vehicles per day.

3.1.5 Bringelly Road

Bringelly Road is a collector road which connects The Northern Road at Bringelly to Camden Valley Way at Horningsea Park. Bringelly Road is around 10 kilometres in length and has an undivided carriageway with one lane in each direction, unsealed shoulders and a sign posted speed limit of 80 km/h for the majority of its length.

3.1.6 Badgerys Creek Road

Badgerys Creek Road is a collector road in a rural environment which connects The Northern Road at a roundabout to the north of Bringelly to Elizabeth Drive, around seven kilometres in length. The carriageway is undivided with one lane in each direction, unsealed shoulders and a sign posted speed limit of 80 km/h.

3.1.7 Adams Road

Adams Road is a collector road in a rural environment connecting The Northern Road at Luddenham to Elizabeth Drive. The carriageway is undivided with one lane in each direction and a sign posted speed limit of 70 km/h.

3.1.8 Mamre Road

Mamre Road is an arterial road which connects The Great Western Highway in St Marys to Elizabeth Drive. Mamre Road has an undivided carriageway with one lane in each direction and has a sign posted speed limit of 80 km/h.

3.1.9 Luddenham Road

Luddenham Road is a collector road in a rural environment connecting Elizabeth Drive at Luddenham to Mamre Road. The carriageway is undivided with one lane in each direction and a sign posted speed limit of 80 km/h.

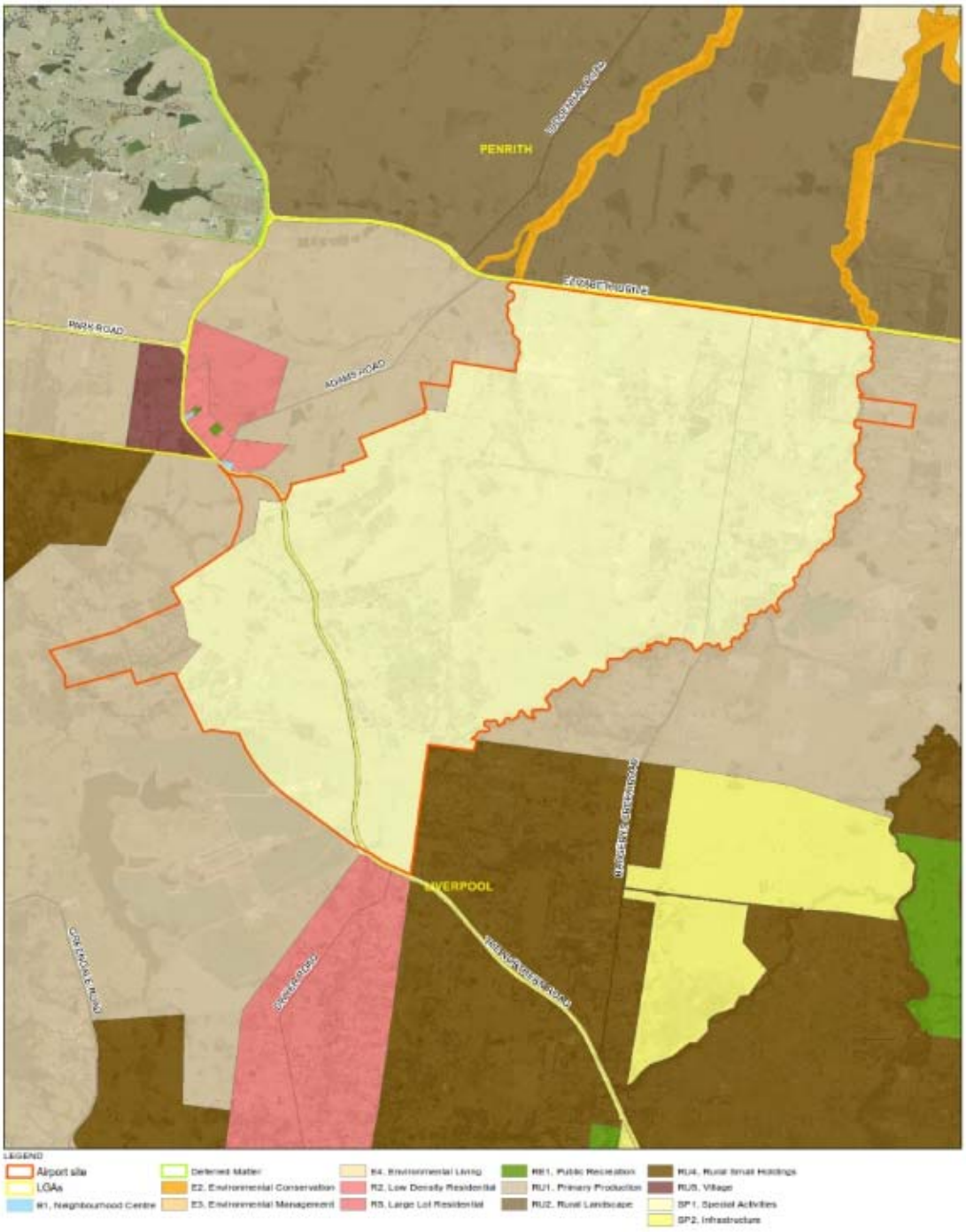
3.1.10 Local roads within the airport site

A number of roads pass through the airport site. Figure 3-2 shows their geographic locations. With the exception of The Northern Road, all other roads were compulsorily acquired by the Australian Government in July 1991. These roads are currently maintained by Liverpool City Council under an agreement with the Australian Government.

Figure 3-2 Map of existing roads in and around the airport site

Existing land uses in the vicinity of the study area are shown in Figure 3-3. The areas surrounding the airport site are mostly rural-residential properties with a few residential areas adjacent to The Northern Road and Park Road intersection and further south of The Northern Road.

Figure 3-3 Map of land use surrounding the airport development site



Source: NSW LPI 2012 adapted by GHD

3.2 Existing daily traffic volumes

Roads and Maritime have provided daily traffic volumes within the study area. The data provided in Table 3-1 are from 2005 and are a combination of vehicle counts and axle pair counts. Roads and Maritime no longer collect data from these count locations. Therefore, the most recent data currently available are from 2005. Data provided are in Appendix A.

Table 3-1 Historical two-way daily traffic volumes - 2005

Location	Annual Average Daily Traffic (AADT)	Vehicle count or axle pairs	Road classification
The Northern Road north of Bringelly Road	16,944	vehicle	arterial
The Northern Road north of Elizabeth Drive	16,654	vehicle	arterial
Elizabeth Drive east of The Northern Road	7,311	axle pairs	collector
Mamre Road south of Erskine Park Road	13,793	vehicle	sub-arterial
Bringelly Road west of Camden Valley Way	8,900	axle pairs	collector
Bringelly Road east of The Northern Road	6,212	axle pairs	collector

Roads and Maritime have permanent counting stations on Elizabeth Drive at Cecil Hills and Bonnyrigg. Historical data have been analysed to gain an understanding of traffic growth in the surrounding area, with the time series data shown in Table 3-2 and growth rate calculation shown in Table 3-3.

Table 3-2 Elizabeth Drive – historical traffic volumes (AADT)

Location	Direction	2008	2009	2010	2011	2012	2013	2014
Elizabeth Drive at Cecil Hills	Westbound	10,927	10,980	11,835	12,061	12,129	12,636	12,923
	Eastbound	11,596	11,715	12,552	12,818	13,075	13,448	13,675
Elizabeth Drive at Bonnyrigg	Westbound	16,726	16,685	17,585	17,760	17,750	17,898	17,989
	Eastbound	18,874	20,201	18,697	18,818	19,358	20,140	20,132

Table 3-3 Elizabeth Drive - historical traffic growth rate (AADT)

Location	Direction	2008	2008 combined	2014	2014 combined	% growth per annum compounding
Elizabeth Drive at Cecil Hills	Westbound	10,927	22,523	12,923	26,598	2.8%
	Eastbound	11,596		13,675		
Elizabeth Drive at Bonnyrigg	Westbound	16,726	35,600	17,989	38,121	1.2%
	Eastbound	18,874		20,132		

3.3 Daily traffic profiles

Traffic surveys were undertaken by Roads and Maritime as part of The Northern Road Upgrade Stage 2B project between 16 June and 22 June 2015 at the following locations:

- The Northern Road, north of Bringelly Road;
- The Northern Road south of Bringelly Road; and
- Bringelly Road, east of The Northern Road.

Table 3-4 provides a summary of the 2015 counts and Figure 3-4 to Figure 3-6 present the 24-hour traffic profile for each site during both weekday and weekend periods.

Table 3-4 Existing daily traffic volumes - 2015

Location	Vehicles per day(vpd) weekday	Vehicles per day(vpd) weekend	Vehicles per day(vpd) 7 day average
The Northern Road north of Bringelly Road	16,916	12,286	15,593
The Northern Road south of Bringelly Road	14,745	11,100	13,704
Bringelly Road east of The Northern Road	6,462	4,908	6,018

Figure 3-4 Traffic profile at The Northern Road north of Bringelly Road

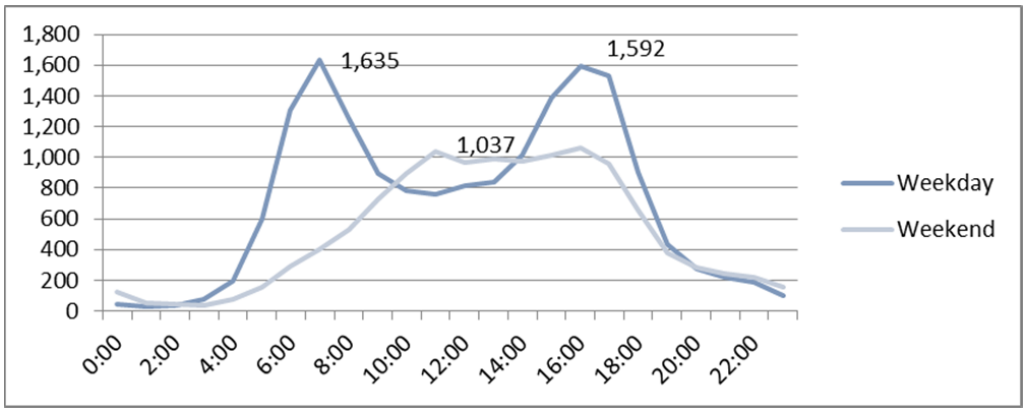


Figure 3-5 Traffic profile at The Northern Road south of Bringelly Road

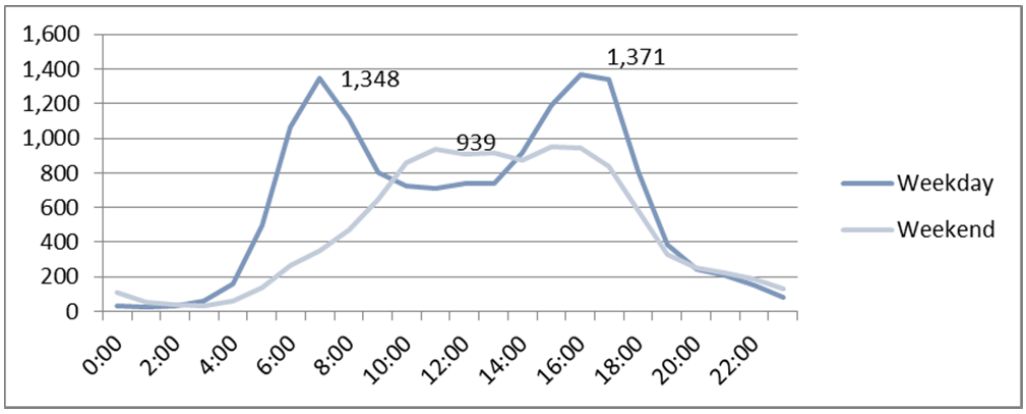
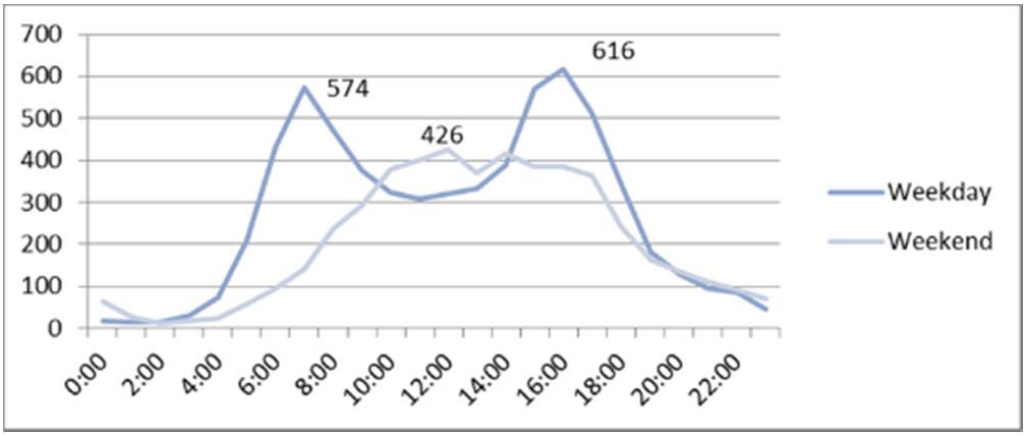


Figure 3-6 Traffic profile at Bringelly Road east of The Northern Road



3.4 Existing network peak period performance

The STM3 model provides a tool to assess the impact of land use and transport infrastructure changes. In order to provide an understanding of the current transport system, the 2011 base year model has been analysed to provide an insight into the prevailing peak period performance in the area surrounding the proposed airport site. No changes were made to the 2011 model for this analysis.

The model forecasts the traffic volumes on major roads in New South Wales in peak periods. From this, an assessment of the forecast volume/capacity and average speed of each link in the network can be made. It should be noted that this analysis is based on mid-block capacities on the road network and does not explicitly model behaviour at intersections, although some allowance is made for the delays incurred. More details on the volume/capacity assessment and the relationship between volume/capacity and Level of Service (LoS) is provided in section 2.4 and Table 2-1.

The Level of Service for each modelled road in the study area is shown in Figure 3-8 and Figure 3-9. The results from certain critical links have been provided in Table 3-5 (refer to Table 2-1 for an explanation of Level of Service).

Table 3-5 Level of Service for 2011 Existing Network

ID	Road	Location	AM Peak		PM Peak	
			Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd
1	The Northern Road	North of Elizabeth Drive	C	D	C	C
2	The Northern Road	South of M4	D	B	B	C
3	The Northern Road	South of Bringelly Road	B	B	B	B
4	M4	West of Mamre Road	D	C	C	C
5	M4	West of M7	F	C	C	D
6	M7	South of M4	E	D	D	D
7	M7	South of Elizabeth Drive	D	C	C	C
8	M5	East of M7	F	D	D	E
9	M31	South of Campbelltown Road	D	C	C	C
10	Narellan Road	North of Tramway Drive	C	D	C	C
11	Bringelly Road	West of Cowpasture Road	B	A	A	B
12	Cowpasture Road	At M7	C	C	C	C
13	Elizabeth Drive	East of M7	C	C	C	C
14	Elizabeth Drive	West of M7	D	C	C	D
15	Elizabeth Drive	West of Mamre Road	C	B	A	C
16	Elizabeth Drive	East of the Northern Road	C	A	A	B
17	Mamre Road	North of Elizabeth Drive	C	C	B	C
18	Mamre Road	South of M4	D	C	C	C
19	Luddenham Drive	West of Mamre Road	B	A	A	B
20	Lawson Road	South of Elizabeth Drive	A	A	A	A
21	Western Road	South of Elizabeth Drive	A	A	A	A
22	Fifteenth Avenue	West of Cowpasture Road	B	A	A	B

Road ID refers to notation on Figure 3-7.

Figure 3-7 Location of Tabulated Level of Service output

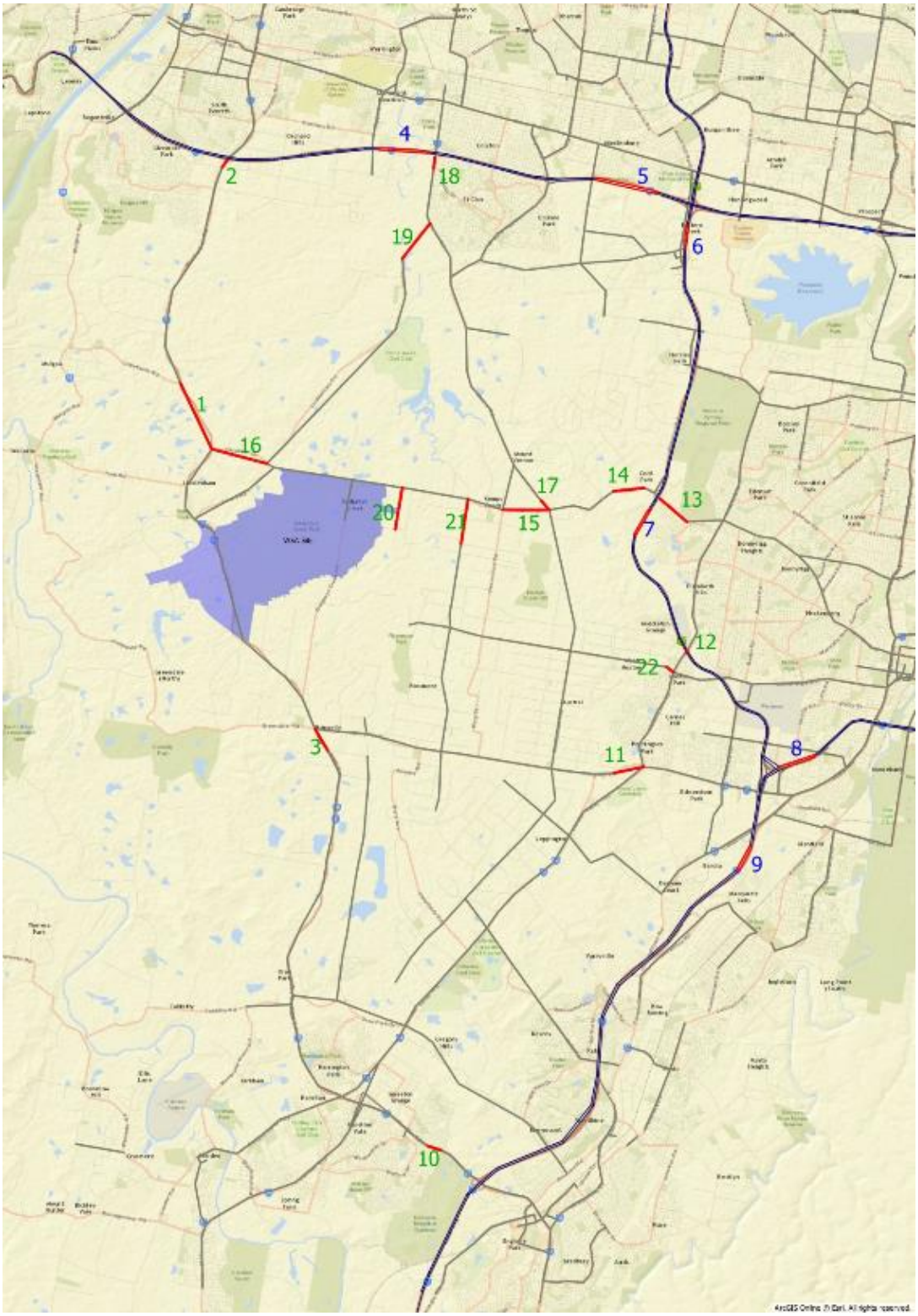
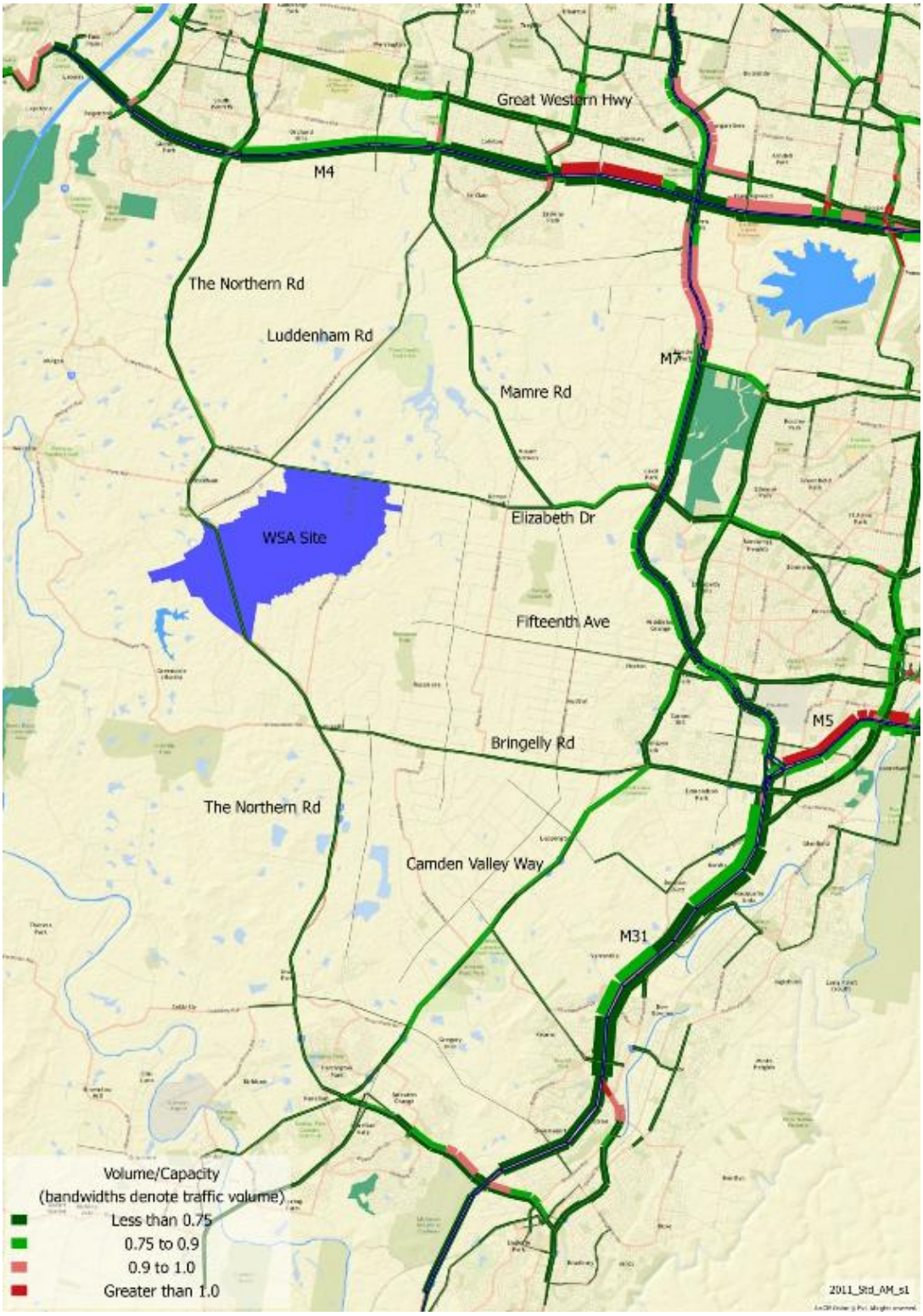


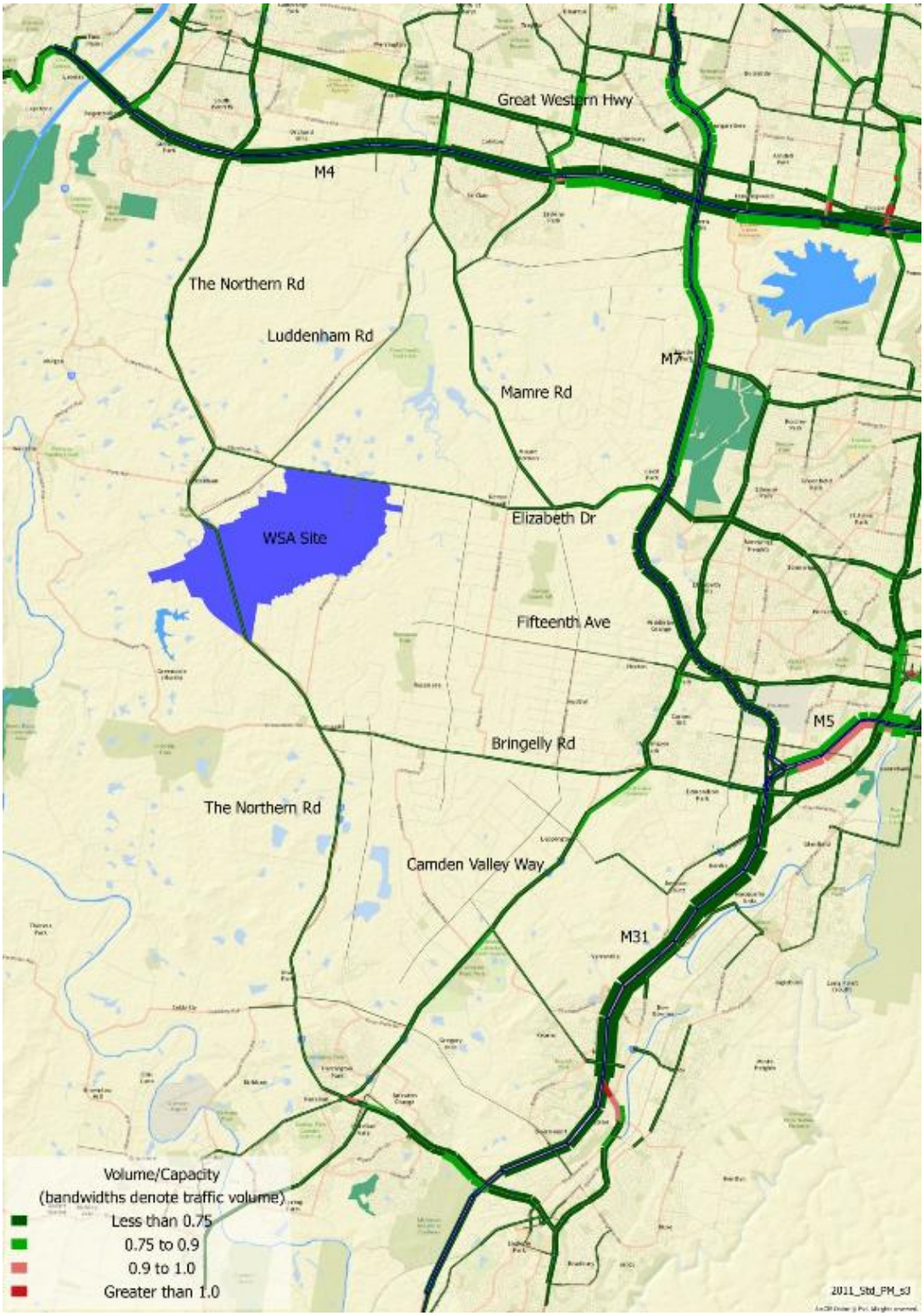
Figure 3-8 and Figure 3-9 show the modelled volume/capacity ratios for the 2011 base year model. The bandwidths in the figures are proportional to the total traffic volume, so the wider the bandwidth, the more traffic is using the link. The colour coding relates to the LoS criteria shown in Table 2-1, with grey, yellow, pink and red representing LoS A to C, D, E and F respectively.

Figure 3-8 2011 AM Peak Volume/Capacity - existing conditions



Source: STM3 2011 Standard Model, AM Peak

Figure 3-9 2011 PM Peak Volume/Capacity - existing conditions



Source: STM3 2011 Standard Model, PM Peak

The 2011 base model, as represented by Table 3-5, Figure 3-8 and Figure 3-9, shows that the roads in the vicinity of the airport site are relatively uncongested in 2011, with only sections of Narellan Road and Camden Valley Way showing a LoS equal to or greater than D in either peak period. Since 2011, there has been further development in the area, for example in the Western Sydney Employment Area and in areas designated for the Western Sydney Priority Growth Area and the South West Priority Growth Area, but there remains spare capacity on much of the network near the airport site.

In the AM peak, the model shows capacity constraints on:

- The M4
  - LoS F eastbound to the west of the M7
  - LoS E eastbound to the east of the M7
- The M7
  - LoS E in both directions south of the M4
  - LoS E southbound to the north of the M4
- The M5
  - LoS F eastbound, east of the M7
- Narellan Road
  - LoS E southeast-bound towards the M31

In the PM peak, overall the capacity constraint is less acute, however the model still shows constraints on:

- The M5
  - LoS E, westbound, east of the M7
- The M4
  - LoS D, westbound along much of the length of the motorway
- The M7
  - LoS D in both directions, particularly close to the M4 intersection.

Therefore, although the immediate area around the airport site does not exhibit significant congestion, there are existing constraints on the strategic motorway network.

3.5 Public transport

3.5.1 Bus services

There are currently four bus services within the study area:

- Route 789 Penrith Interchange to Luddenham.
- Route 801 Liverpool Interchange to Badgerys Creek Road.
- Route 855 Austral to Liverpool via Prestons and Churchill Gardens.
- Route 856 Bringelly to Liverpool via Prestons and Churchill Gardens.

Route 789 Penrith Interchange to Luddenham

Route 789 provides a bus service between Penrith Interchange and Luddenham via The Northern Road. This service operates two times a day as follows:

- two services depart Penrith Interchange per day at 7:00 am and 3:45 pm.
- two services depart Luddenham per day at 7:34 am and 3:45 pm.

Route 801 Liverpool Interchange to Badgerys Creek

Route 801 provides a bus service between Badgerys Creek and Liverpool via Kemps Creek, Cecil Park and Bonnyrigg. This service operates three times a day as follows:

- three services depart Badgerys Creek per day at 7:15 am; 8:50 am and 4:42 pm.
- three services depart Liverpool Interchange per day at 3:08 pm; 3:50 pm and 5:53 pm.

Route 855 Austral to Liverpool via Prestons and Churchill Gardens

Route 855 provides a bus service between Austral and Liverpool via Prestons and Churchill Gardens. This service operates around ten times a day as follows:

- AM services depart Austral between 5:17 am and 9:44 am with PM services operating at 12:04 pm; 3:18 pm and 5:16 pm.
- AM services depart Liverpool at 8:38 am and 11:08 am with PM services operating at 1:38 pm; 4 pm; 5 pm and 6:30 pm.

Route 856 Bringelly to Liverpool via Prestons and Churchill Gardens

Route 855 provides a bus service between Bringelly and Liverpool via Prestons and Churchill Gardens. This service operates around seven times a day as follows:

- five AM services depart Bringelly between 5:38 am and 11:07 am with PM services operating at 4:15 pm and 5:49 pm.
- AM services depart Liverpool at 7:37 am and 10:08 am with PM services operating at 1:08 pm; 4:40 pm and 6 pm.

Figure 3-10 shows the bus services within the study area.

Figure 3-10 Bus services within study area

Source: Transport for NSW modified by GHD

3.5.2 Train services

The following train interchanges are currently the closest to the site:

- T1 Western Line – Penrith Interchange.
- T2 Inner West and South Line – Liverpool Interchange.
- South West Rail Link – Leppington.

Penrith and Leppington stations are around 15 kilometres from the site and Liverpool is around 21 kilometres.

3.6 Pedestrian and cycle facilities

3.6.1 Camden

According to the Liverpool City Council Bike Plan (2009), there are currently limited bicycle links within Camden LGA. Roads and Maritime has proposed a regional cycle way along the length of Camden Valley Way within the Liverpool LGA as part of the upgrade of this road. This will form the principal cycle link with Camden LGA for the foreseeable future.

As the growth areas develop, additional cycleway links are to be enhanced and integrated within the Liverpool cycleway network. By 2018, the expected Bringelly Road Stage 1 and Stage 2 upgrades described in the Western Sydney Infrastructure Plan will deliver more than 10 km of shared pedestrian and cyclist paths between Leppington and The Northern Road.

Also, according to the Western Sydney Infrastructure Plan, The Northern Road is expected to have shared pedestrian and cyclist paths between Narellan area and the M4 Motorway by 2019.

3.6.2 Liverpool

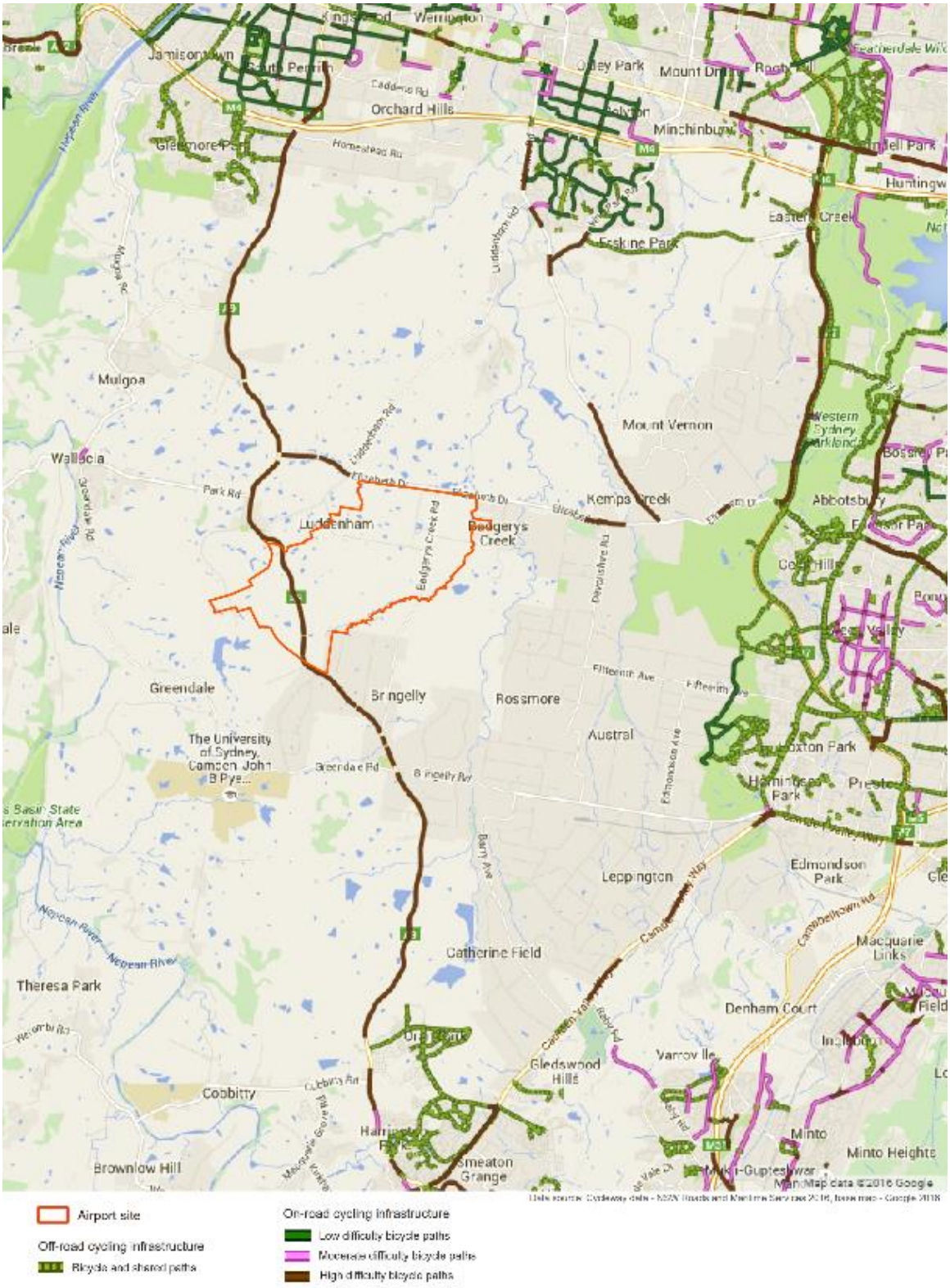
Local bike routes within Liverpool generally consist of recreational routes, such as the Wattle Grove cycle ways, Green Valley Road and the Chipping Norton Lakes cycle way. Other local routes that exist at present include the Cartwright Avenue route and the Memorial Avenue route. There are also some cyclist loops around existing recreational areas in Hinchinbrook, and other western areas.

3.6.3 Penrith

Besides Glenmore Park, St Clair and Erskine Park areas, there is no additional cycling infrastructure up to Penrith's LGA border with Liverpool due to the predominance of mostly rural and residential land use in these areas at present. In the future when the growth centres areas within Liverpool reach this border, some local pathway crossings will most likely be required, potentially with links down Elizabeth Drive, The Northern Road, Bringelly Road, Badgerys Creek Road and Devonshire Road.

Existing cycling infrastructure in the study area is shown in Figure 3-11.

Figure 3-11 Cycling infrastructure within study area



Source: http://www.rms.nsw.gov.au/roads/using-roads/bicycles/cyclewayfinder/index.html

3.7 Crash statistics

The Roads and Maritime Crash Analysis Department supplied crash statistics for a five-year period from January 2009 to December 2013 as seen in Figure 3-12 for The Northern Road –

between Maxwell Street and Mersey Street and for a five-year period from July 2009 to June 2014 for the following locations:

- The Northern Road – between Badgerys Creek Road and Mersey Street.
- Bringelly Road – between The Northern Road and Camden Valley Way.
- Elizabeth Drive – between The Northern Road and Westlink M7.
- Mamre Road - between Elizabeth Drive and the M4 Motorway.
- Badgerys Creek Road – between Elizabeth Drive and The Northern Road.
- Adams Road – between Elizabeth Drive and The Northern Road.

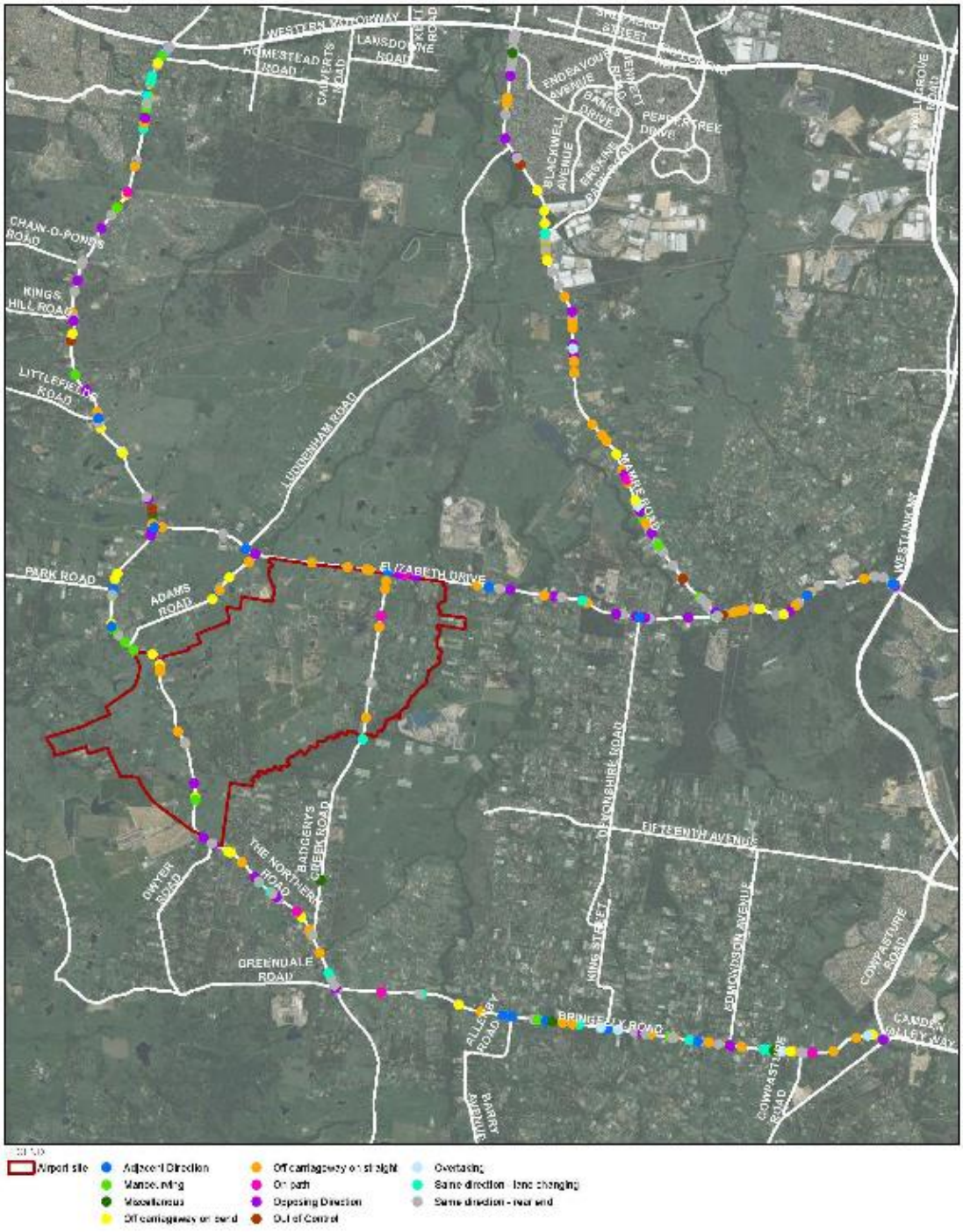
3.7.1 The Northern Road

The Northern Road – between Maxwell Street and Mersey Street

In total, 304 crashes occurred over this five-year period. Of these recorded crashes:

- four crashes (1%) resulted in fatalities; three of these fatal crashes involved a head on collision with opposing traffic;
- 130 crashes (43%) resulted in 190 injuries;
- 157 (52%) occurred at intersections;
- 141 (46%) were rear-end crashes;
- 28 (9%) were opposing vehicles turning;
- 24 (8%) crashes resulted in vehicles leaving the carriageway on a straight section of road;
- speed was a contributing factor in 32 (11%) of the crashes;
- 21 (7%) crashes involved heavy vehicles including articulated trucks and buses;
- crashes were evenly spread throughout the day and not concentrated in a particular time period; and
- crashes occurring in wet or dark conditions were not over represented.

Figure 3-12 Location of crashes (2009 to 2014)



Source: NSW Centre for Road Safety modified by GHD

The crash statistics for each location are summarised below and detailed crash reports are provided in Appendix B.

The Northern Road – between Badgerys Creek Road and Mersey Street

In total, 16 crashes occurred over this five-year period. Of these recorded crashes:

- one crash (6%) resulted in a fatality; this crash involved a head on collision with opposing traffic;
- six crashes (38%) resulted in eight injuries;
- four (25%) were rear-end crashes;
- three crashes (19%) resulted in vehicles leaving the carriageway on a straight section of road;
- three crashes (19%) resulted in vehicles leaving the carriageway on a curved section of road;
- two (13%) were head-on crashes (not overtaking);
- fatigue was a contributing factor in five (31%) of the crashes; and
- speed was a contributing factor in four (25%) of the crashes.

3.7.2 Bringelly Road - The Northern Road and Camden Valley Way

In total, 113 crashes occurred over this five-year period. Of these recorded crashes:

- two crashes (2%) resulted in a fatality; these two crashes involved adjacent approaches at the intersection of Bringelly Road and Camden Valley Way;
- 61 crashes (54%) resulted in 92 injuries;
- 72 (64%) occurred at intersections;
- 29 (26%) were rear-end crashes;
- 15 crashes (12%) resulted in vehicles leaving the carriageway on a straight section of road;
- seven (6%) were opposing vehicles turning;
- 10 crashes (9%) involved heavy vehicles including articulated trucks and buses;
- speed was a contributing factor in eight (7%) of the crashes;
- fatigue was a contributing factor in seven (6%) of the crashes; and
- crashes occurring in wet or dark conditions were not over represented.

3.7.3 Elizabeth Drive - The Northern Road and Westlink M7

In total, 157 crashes occurred over this five-year period. Of these recorded crashes:

- two crashes (1%) resulted in a fatality;
- 75 crashes (48%) resulted in 99 injuries;
- 86 (55%) occurred at intersections;
- 50 (32%) were rear-end crashes;
- 23 (15%) crashes resulted in vehicles leaving the carriageway on a straight section of road;
- 12 (8%) were head-on crashes (not overtaking);
- 11 (7%) were as a result of lane changing;

- 24 (15%) crashes involved heavy vehicles including articulated trucks;
- speed was a contributing factor in 21 (13%) of the crashes;
- fatigue was a contributing factor in 14 (9%) of the crashes;
- crashes were evenly spread throughout the day and not concentrated in a particular time period; and
- crashes occurring in wet or dark conditions were not over represented.

3.7.4 Mamre Road - Elizabeth Drive and M4 Motorway

In total, 159 crashes occurred over this five-year period. Of these recorded crashes:

- one crash (1%) resulted in a fatality;
- 79 crashes (50%) resulted in 105 injuries;
- 67 (42%) occurred at intersections;
- 50 (31%) were rear-end crashes;
- 26 crashes (16%) resulted in vehicles leaving the carriageway on a straight section of road;
- 11 (7%) were head-on crashes (not overtaking);
- 10 (6%) were as a result of opposing vehicles turning;
- 22 crashes (14%) involved heavy vehicles including articulated trucks;
- speed was a contributing factor in 14 (9%) of the crashes;
- fatigue was a contributing factor in 14 (9%) of the crashes;
- crashes were evenly spread throughout the day and not concentrated in a particular time period; and
- crashes occurring in wet or dark conditions were not over represented.

3.7.5 Badgerys Creek Road - Elizabeth Drive and The Northern Road

In total, 24 crashes occurred over this five-year period. Of these recorded crashes:

- nine crashes (38%) resulted in 12 injuries;
- 17 (71%) occurred at intersections;
- five crashes (21%) resulted in vehicles leaving the carriageway on a straight section of road;
- two (8%) were rear end crashes;
- speed was a contributing factor in six (25%) of the crashes;
- fatigue was a contributing factor in three (13%) of the crashes;
- crashes were evenly spread throughout the day and not concentrated in a particular time period; and
- crashes occurring in wet or dark conditions were not over represented.

3.7.6 Adams Road - Elizabeth Drive and The Northern Road

In total, six crashes occurred over this five-year period. Of these recorded crashes:

- four crashes (67%) resulted in six injuries;
- only one crash (17%) occurred at an intersection;
- two crashes (33%) resulted in vehicles leaving the carriageway on a straight section of road;
- speed was a contributing factor in four (67%) of the crashes;
- fatigue was a contributing factor in one (17%) of the crashes;
- crashes were evenly spread throughout the day and not concentrated in a particular time period; and
- crashes occurring in wet or dark conditions were not over represented.

3.8 Key findings

The existing land use in the vicinity of the airport site is generally rural /agricultural, consisting mainly of farming land and residential properties.

As identified in section 3.1, the existing traffic volumes on the surrounding road network are within the expected functional classification for arterial roads outlined by Roads and Maritime Services.

Bus routes 789 and 801 currently service the area in the vicinity of the airport site.

Pedestrian and cycling infrastructure is provided within the study area but is currently very limited due to the rural nature of the existing environment.

The 2011 STM3 model for existing conditions shows capacity constraints on the M4 and M5 eastbound and in both directions on the M7 during the AM peak and in, the westbound direction on the M4 and M5, as well as both directions on the M7, during the PM peak. Therefore, although the immediate area around the airport site does not exhibit significant congestion, there are constraints on the strategic motorway network.

The number of crashes is not out of character for roads with these high traffic volumes. The following stands out in the analysis:

- there is a high representation of speed and fatigue related crashes for the roads analysed;
- there is a high number of rear end crashes on The Northern Road; and
- there have been two fatalities at the intersection of Bringelly Road and Camden Valley Way.

The identified common crash types and themes should be considered in future proposed works associated with the Western Sydney Infrastructure Plan. The Western Sydney Infrastructure Plan is discussed in section 5.5.

4. Construction traffic assessment

4.1 Overview

The proposed Western Sydney Airport is a multidisciplinary civil engineering and building construction project that would require diverse technical skills to complete.

Construction of the initial development of the airport has been assumed to occur in two distinct packages for this assessment:

- site preparation including bulk earthworks within the Stage 1 construction footprint; and
- aviation infrastructure activities.

These works will be authorised through the Airport Plan.

Any subsequent construction beyond Stage 1, including the construction of a second runway, would be subject to separate approvals in accordance with the *Airports Act 1996*.

4.2 Construction methodology

The indicative construction methodology is outlined in Chapter 6 of the EIS and the following is a summary from that document.

4.2.1 Bulk earthworks and associated activities

The main construction activities would include:

- establishment of temporary construction facilities
- vegetation and site clearing
- removal of existing roads and utilities
- earthworks
- installation of drainage
- rehabilitation

4.2.2 Aviation infrastructure activities

The main construction activities would include:

- establishment of site facilities
- establishment of main access point
- construction of paved areas
- provision of services
- building construction
- construction of fuel farm.

Other works related to the project but subject to separate planning approvals processes and not directly addressed by this report include the construction of replacement sections of The Northern Road. This project is being progressed in parallel with this EIS by Roads and Maritime.

The construction impact has been analysed based on the assumption that site construction activities would occur from 2016 to 2025. The indicative construction profile shows peak

construction activity would occur in the year 2021. This analysis of construction traffic movements has been based on 2021 to capture the worst case scenario.

4.3 Construction programme

The following indicative construction programme was used for the purpose of this assessment, noting that some activities of the key work phases below would be undertaken in parallel with one another:

- bulk earthworks activities are assumed to commence from late 2016 and be completed by 2021 with progressive handover of parts of the site to the aviation infrastructure contractor;
- aviation infrastructure activities are assumed to commence mid-2020 and be completed by mid-2025; and
- commissioning and operational readiness is assumed to occur in 2025 allowing for first passengers in the mid-2020s.

4.4 Estimated workforce

The proposed airport would create employment opportunities for construction workers and support staff. Estimated peak construction personnel for the bulk earthworks and associated activities and aviation infrastructure works are shown in Table 4-1.

Table 4-1 Peak on site construction personnel

Package	Peak personnel onsite
Bulk earthworks and associated activities	233
Aviation infrastructure activities	704
Construction peak (concurrent site preparation and aviation infrastructure works)	809

It is anticipated that the majority of the workforce, both labour and supervisory and professional, would be sourced from the Western Sydney region. No onsite accommodation would be necessary with personnel housed within existing and local communities.

4.5 Hours of work

During the bulk earthworks and associated activities works, it is expected that the onsite works would be undertaken 6.00 am to 6.00 pm, Monday to Saturday.

During the aviation infrastructure works, the site would generally work 6.00 am to 6.00 pm, Monday to Saturday, however, due to the scale of the pavement works, it is anticipated that pavement materials would need to be delivered to site 24 hours per day for extended periods.

Other works that may potentially need to be undertaken at night during both phases of Stage 1 construction include:

- works to existing services, if requiring shut downs;
- deliveries of oversize loads; and
- continuous work processes including concrete pours, paving, etc.

4.6 Key access routes to/from site

The site is approximately 10 km from the M7 and the majority of deliveries are expected to arrive via the M7 and Elizabeth Drive. The M7 has good connectivity to the south via the M31,

Sydney CBD via the M5 and M4 and the north via the M2. Figure 4-1 shows the indicative key routes which are expected to be used by construction vehicles to access the airport site.

These routes are indicative only and have been used for the purposes of the impact assessment, however it may be the case that alternate or additional routes are proposed and these would be documented in a Traffic and Access Construction Environmental Management Plan (TACEMP).

Deliveries from the south of Sydney (such as cement, sand and aggregate) are expected to arrive into Sydney via the M31 Hume Motorway as this is the fastest route to the proposed main heavy vehicle access to the site.

The M7 and Elizabeth Drive are the most likely key access routes for heavy vehicles due to the shorter travel distance to the site and regular congestion that occurs on Narellan Road and The Northern Road around Campbelltown and Narellan.

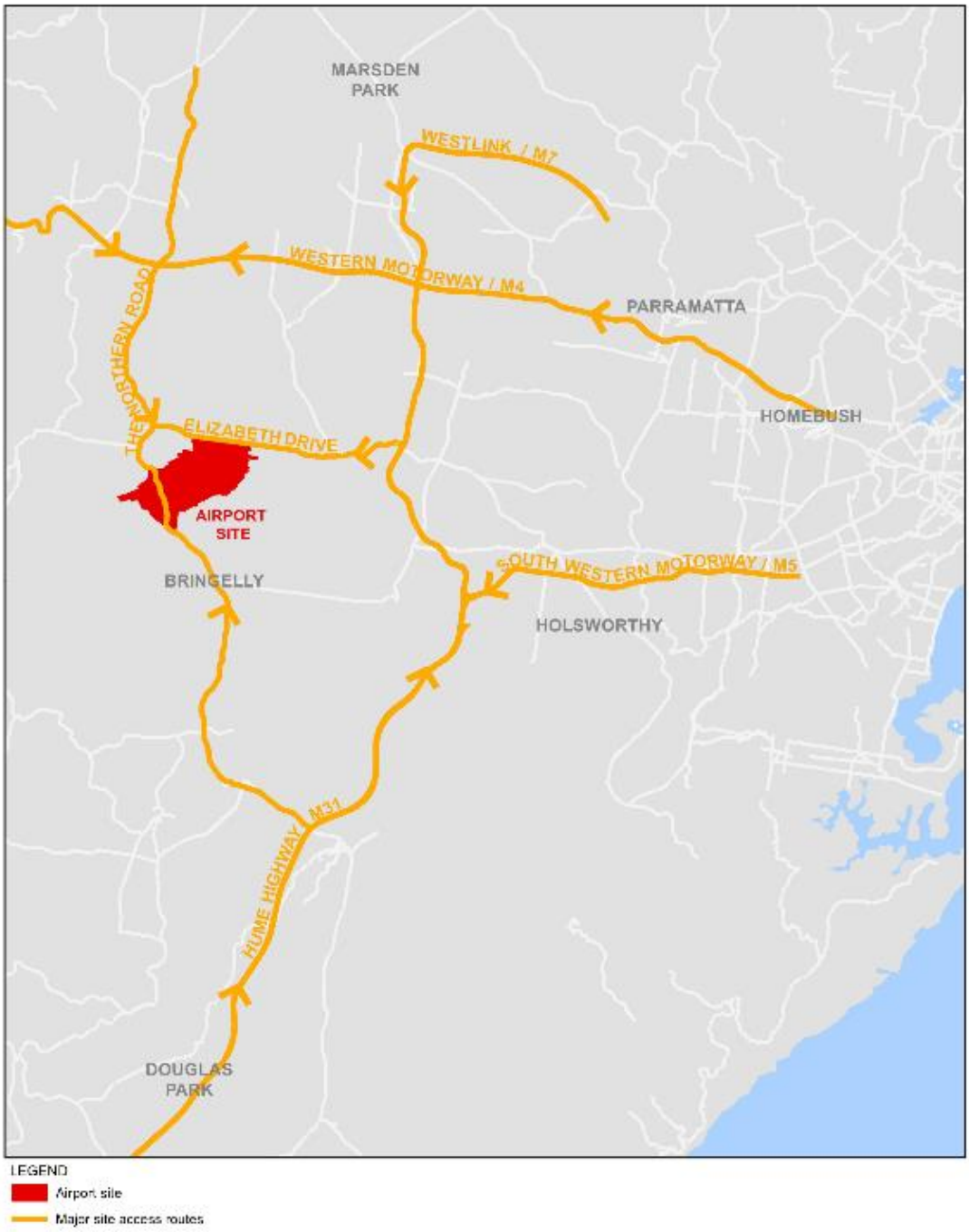
A number of site access gates would be established at the commencement of site preparatory works with provision for access by heavy and light vehicles. Seven gates would be established as detailed in Table 4-2.

Table 4-2 Access gates to airport site

Gate Number	Road	Access to	Vehicles
1	Elizabeth Drive	Site office	Light only
2	Elizabeth Drive	Airport site (east)	Heavy only
3	Elizabeth Drive	Fuel farm, maintenance facility and laydown area	Light and heavy
4	Anton Road	Satellite Office 1	Light only
5	The Northern Road	Satellite Office 2	Light only
6	The Northern Road	Airport site (west)	Light and heavy
7	Badgerys Creek Road	Airport site (east)	Light only

Upgrades to Elizabeth Drive and The Northern Road at the access points are expected to include deceleration and acceleration lanes and right-turn lanes as required to accommodate heavy vehicle movements associated with construction. Other roads in the vicinity may also require upgrades and traffic control measures to accommodate additional vehicle movements. The access points would have lockable temporary gates in the permanent boundary fence. Internal egress through the site would initially be provided by the existing roads. As the site develops and the earthworks progress, new site access roads would be constructed. The site access roads would be constructed with imported gravels and maintained by graders and water carts, as required.

Figure 4-1 EIS assessed site access routes



4.6.1 Potential source quarries

It is assumed that gravel will be imported onto site from an established quarry. The potential existing quarries are:

- Gunlake Marulan Quarry
- Holcim Lynwood Quarry
- Boral Peppertree Quarry

All of these quarries are located in the Southern Highlands.

4.7 Construction traffic impacts

4.7.1 Construction traffic generation

The construction report prepared for the EIS provides a detailed estimate of the total number of light and heavy vehicles accessing the site throughout the construction period.

Daily light vehicle numbers have been estimated based on the assumption that 80% of construction personnel drive to/from the site on a given day. The remainder would either utilise public transport or car-pooling. It is estimated that 440 light vehicles (cars/utes) would access the site each day including arrivals and departures.

The construction report also identifies that bulk concrete and asphalt batching will take place on site.

For heavy vehicles, the following construction traffic generation assumptions have been adopted based on preliminary construction planning:

- heavy vehicles would operate to and from the site 24 hours per day during aviation infrastructure works;
- average daily heavy vehicles would consist of:
  - 40 B-Doubles (night time - modelled in the evening period)
  - 122 B-Doubles (articulated vehicle class)
  - three truck and dog (articulated vehicle class)
  - 22 semi-trailers

Table 4-3 Peak construction vehicle generation

Vehicles		AM Peak	Inter-peak	PM Peak	Evening	Total (vtpd)*
Light vehicles	In	264	88	0	88	440
	Out	0	66	220	154	440
Semi-trailers	In	4	11	5	2	22
	Out	4	11	5	2	22
B-Double and Truck and Dog	In	21	63	31	50	165
	Out	21	63	31	50	165
Total		**314**	**302**	**292**	**346**	**1,254**

Note: * (vtpd) = vehicle trips per day. Peaks

The time periods in Table 4-3 are defined as follows:

- AM peak (07:00 – 09:00)
- Interpeak (09:00 – 15:00)
- PM peak (15:00 – 18:00)
- Evening peak (18:00 – 07:00)

The time periods detailed above are those required by the STM3 model. The detailed profiles of arrival and departure times have been allocated to the appropriate STM3 time periods for assignment in the traffic model.

4.7.2 Expected traffic distribution

The peak hour temporal distribution in Table 4-3 is based on the following assumptions:

- an arrival and departure profile for light vehicles from 5.00 am to 7.00 pm; and
- regular arrivals/departures throughout the day and night of B-Doubles and regular arrivals/departures throughout the day of semi-trailers and truck-and-dog

The geographic distribution for light vehicles is assumed to be consistent with the distribution of light vehicle arrivals and departures from this area in the existing 2021 STM3 model.

As detailed information on a probable distribution for heavy vehicles is not available, the following assumptions have been made:

- 50% to/from the M31 (Hume Highway)
- 20% to/from the M5
- 10% to/from the M4 east
- 10% to/from the M4 west
- 10% to/from the M7 north.

As the compound locations within the site are currently unknown, for the purposes of the EIS, it is assumed that all vehicles access the construction site via Elizabeth Drive to the north of the site.

4.8 Road network performance

The STM3 2021 Standard model has been used as the basis for the construction traffic analysis. The 2021 Standard model uses land use forecasts for the GMA in 2021 to calculate the expected background traffic growth to 2021.

The additional trips generated by the construction activity have been added to the network and the effect on traffic levels on the road network recalculated through a reassignment of all trips and applied to the road network within the model to determine the potential impacts of construction.

Table 4-4 provides a summary of the level of service both with and without construction traffic for a series of critical links in the study area. The location of these links is shown in Figure 3-7.

Figure 4-2 and Figure 4-3 show the volume/capacity ratios when construction traffic is added on top of the projected 2021 background traffic volumes.

Table 4-4 Level of Service for 2021 With and Without Construction Traffic

Id	Road	Location	Baseline (Without Construction Traffic)				With Construction Traffic			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd
1	The Northern Road	North of Elizabeth Drive	C	F	E	D	C	F	E	D
2	The Northern Road	South of M4	E	C	C	E	E	C	C	E
3	The Northern Road	South of Bringelly Road	C	A	B	C	C	A	B	C
4	M4	West of Mamre Road	F	C	C	F	F	C	C	F
5	M4	West of M7	F	C	D	F	F	C	D	F
6	M7	South of M4	D	E	F	E	D	E	F	E
7	M7	South of Elizabeth Drive	D	C	D	D	D	C	D	D
8	M5	East of M7	F	D	D	F	F	D	D	F
9	M31	South of Campbelltown Road	D	D	D	F	D	D	D	F
10	Narellan Road	North of Tramway Drive	C	E	D	D	C	E	D	D
11	Bringelly Road	West of Cowpasture Road	B	B	B	B	B	B	B	B
12	Cowpasture Road	At M7	D	C	C	E	D	C	**D**	E
13	Elizabeth Drive	East of M7	C	C	C	C	C	C	C	C
14	Elizabeth Drive	West of M7	E	C	C	E	E	C	C	E
15	Elizabeth Drive	West of Mamre Road	D	C	C	D	D	C	C	D
16	Elizabeth Drive	East of the Northern Road	C	A	A	C	C	A	A	C
17	Mamre Road	North of Elizabeth Drive	C	C	C	C	C	C	C	C
18	Mamre Road	South of M4	D	D	D	D	D	D	D	D
19	Luddenham Drive	West of Mamre Road	C	B	B	C	C	B	**C**	C
20	Lawson Road	South of Elizabeth Drive	A	A	A	A	A	A	A	A
21	Western Road	South of Elizabeth Drive	A	A	A	A	A	A	A	A
22	Fifteenth Avenue	West of Cowpasture Road	B	A	A	B	B	A	A	B

Note: Bold text has been used to identify a change in LoS from the base case – whether this is an improvement or a deterioration.

Figure 4-2 Volume/Capacity (AM Peak) in 2021 without (left) and with construction traffic (right)

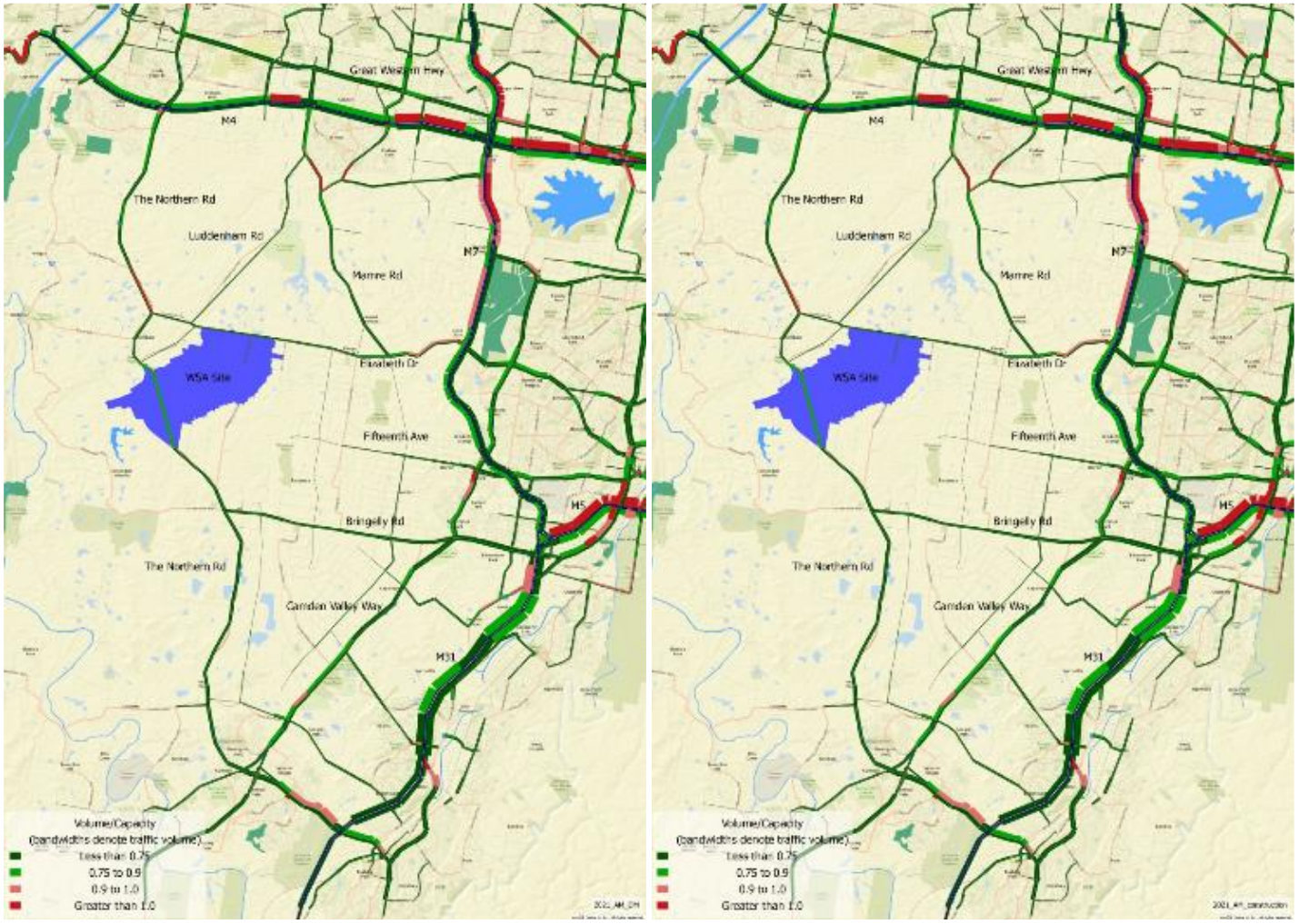
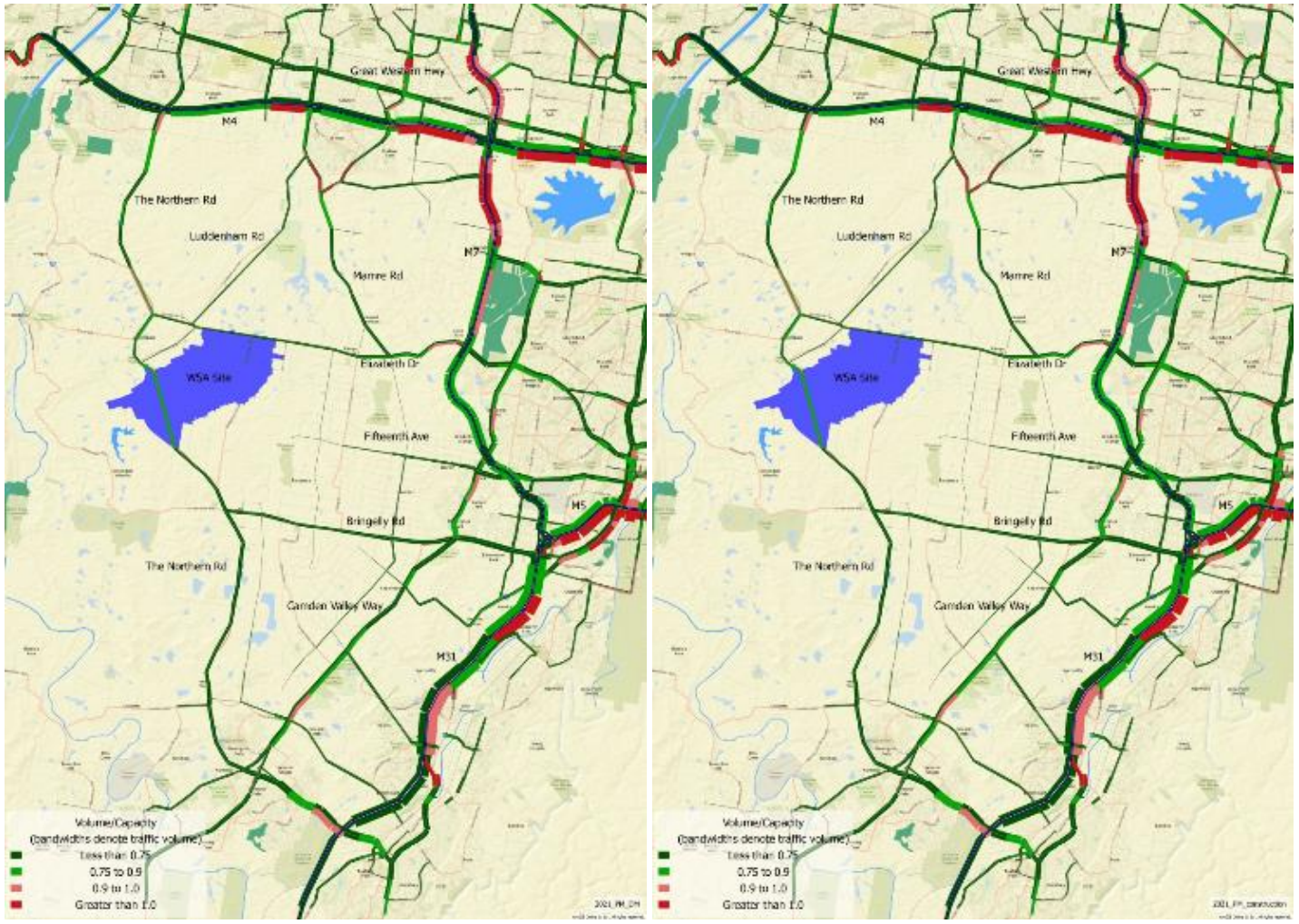


Figure 4-3 Volume/Capacity (PM Peak) in 2021 without (left) and with construction traffic (right)



The calculation of construction traffic volumes indicates an additional ~160 and ~150 vehicles per hour (two directions) on Elizabeth Drive in the AM and PM peaks respectively. This level of additional traffic volume does not increase the LoS above C on Elizabeth Drive near the site.

In the wider area there are capacity constraints, principally on the M4, M5 and M7, however:

- these constraints exist both with and without the construction traffic;
- the LoS does not deteriorate when construction traffic is included with the exception of a minor increase from C to D on Cowpasture Road and from B to C on Luddenham Drive during the PM peak (west of Mamre Road); and
- the proportion of construction traffic compared to overall traffic reduces with distance from the WSA site, meaning that the impact of construction is reduced with distance from the site.

Therefore, the analysis concludes that the construction traffic would not have a significant impact on the operation of the road network.

4.9 Construction mitigation measures

A community awareness programme would be implemented prior to construction commencing and would continue throughout the entire construction period. The programme would aim to make road users (including local residents) aware of construction traffic and safety issues, such as diversions, temporary road closures, traffic signalling and speed limits.

A Traffic and Access Construction Environmental Management Plan (TACEMP) would be developed prior to construction of the proposed airport as part of the construction environmental management framework. The plan would collate measures to mitigate and manage potential traffic impacts. The plan would consider the following elements:

- management for the temporary and permanent closures of roads within the airport site;
- a community engagement strategy;
- ongoing consultation with Roads and Maritime, local councils as appropriate and emergency services;
- induction for drivers working on the project to cover safety measures particularly for night works;
- review of speed environments along transport corridors;
- restriction of construction related traffic within the AM and PM peak periods where required;
- management of the transportation of construction materials to optimise vehicle loads in order to minimise vehicle movements;
- traffic control measures to manage and regulate traffic movements during construction;
- identification of potential disruption to road users;
- identification of any road closures and/or road upgrades that may be required to facilitate construction;
- construction vehicle routes, including the use of arterial roads, haulage routes, access to the airport site and procedures for oversize and heavy vehicles; and
- parking facilities for construction workers.

The plan would be developed prior to the commencement of construction.

The plan would provide the overall strategy and staging for managing traffic through and around each work site. This would be in accordance with the Roads and Maritime's Road Design Guide, Roads and Maritime Traffic Control at Work Sites manual and AS 1742.3 Manual of Uniform Traffic Control Devices – Traffic control for works on roads, and any other relevant standard, guide or manual. The draft plan would be prepared in consultation with relevant stakeholders including NSW Police, Transport for NSW, Road and Maritime Services and affected local councils.

4.10 Key findings

Construction of the proposed airport would generate an estimated additional 1,254 vehicle movements per day on the surrounding road network during the construction period. This equates to around 160 peak hour vehicle movements during the AM peak period and around 150 peak hour vehicle movements during the PM peak period.

The types of vehicle movements associated with the construction stages for the proposed airport would not impact significantly on the surrounding transport system with the exception of potential oversized vehicle movements for the earthworks. These movements may require temporary road closures or police escorts.

A TACEMP would be developed in consultation with relevant stakeholders prior to the commencement of construction. The TACEMP would provide the overall plan and staging for managing traffic through and around each work site.

An important measure relating to construction traffic impacts is the implementation of a community information awareness programme. This programme should be initiated prior to construction commencing and throughout the entire construction period to ensure that local residents are aware of the construction traffic issues, with particular regard to diversions, temporary road closures, traffic signalling and speed limits.

Part A – Assessment of the initial airport development

5. Airport facilities and road network conditions

Key details of the proposed Stage 1 airport development are provided in section 1.1 and more comprehensively in the project description section of the Volume 1 of the EIS. A principal component of the Stage 1 development would involve construction of a single 3.7 km runway in the northern part of the site and related airside and landside facilities sufficient to service approximately 10 million passengers per year. This traffic assessment assumes 2031 as the appropriate year to analyse the potential impacts of the proposed initial airport development on traffic and transport conditions (see section 2.1).

5.1 Airport access

5.1.1 Main access roadway

The main public access to the proposed airport would be from the north via the proposed M12 Motorway (being planned by Roads and Maritime and therefore not part of this EIS) that is expected to run generally parallel to Elizabeth Drive. It is expected to include a grade separated interchange for the airport access road. The proposed access corridor within the airport site is 100 metres wide, with capacity for six traffic lanes, two bus lanes and a 40 metre rail reserve in which a future rail link could be constructed.

Additional accesses to proposed commercial development areas on either side of the main access roadway could be via Elizabeth Drive and the southern end of the existing Badgerys Creek Road. These additional roads would be developed in parallel with the commercial areas when needed and are not included in this assessment.

Access to the proposed airport from the south-west would be via The Northern Road, which would be relocated and upgraded by Roads and Maritime prior to the commencement of airport operations. This access point is anticipated as being primarily for secure access to operational areas of the site, including maintenance but may also include cargo, either temporarily or in the long term.

5.1.2 Off-Airport secondary roadways

Anton Road and Adams Road connect to Elizabeth Drive and would provide a secure access to the proposed airport from the north-west to such areas as the fuel farm and Aviation Rescue and Firefighting Services. These are currently local roads which would be upgraded as necessary to support the desired airport functions.

It is expected that part of Badgerys Creek Road would be maintained as a secure alternate access to the airport from the south. It is not envisaged that this access would be used for freight or public access in the longer term. It may form an interim secondary public access prior to the construction of the second runway.

5.2 Airport parking

The proposed airport would include dedicated car parking facilities that may include:

- parking for up to 12,500 vehicles;
- short and long stay parking;
- employee and operational parking;

- commercial vehicle parking and storage;
- parking for rental cars; and
- emergency services vehicle parking.

The majority of car parking for the initial stage development may be at ground level. Multi-level parking may be provided, but as a minimum any car parking facility would include covered parking and covered pedestrian access from the parking area to the terminal. Any car parking facilities would comply with appropriate standards.

Estimated kerbside length requirements (or equivalent vehicle set down/pick up capacity) are provided in Table 5-1.

Table 5-1 Estimated parking capacity requirements

Kerbside length (metres)	Initial stage (10 MAP)	
	Departure	Arrival
	185	191

MAP - Million Annual Passengers

Source: Western Sydney Airport Concept Development Report

The internal road system and car parking has not been assessed as part of this technical report and is included for reference only as the report only considers the impacts on the external transport system.

5.3 Pedestrian and cycling facilities

Pedestrian and cycle access would be included in the proposed airport terminal and ground transport precincts and parking areas, and pedestrian and cycle routes likely provided throughout the site including:

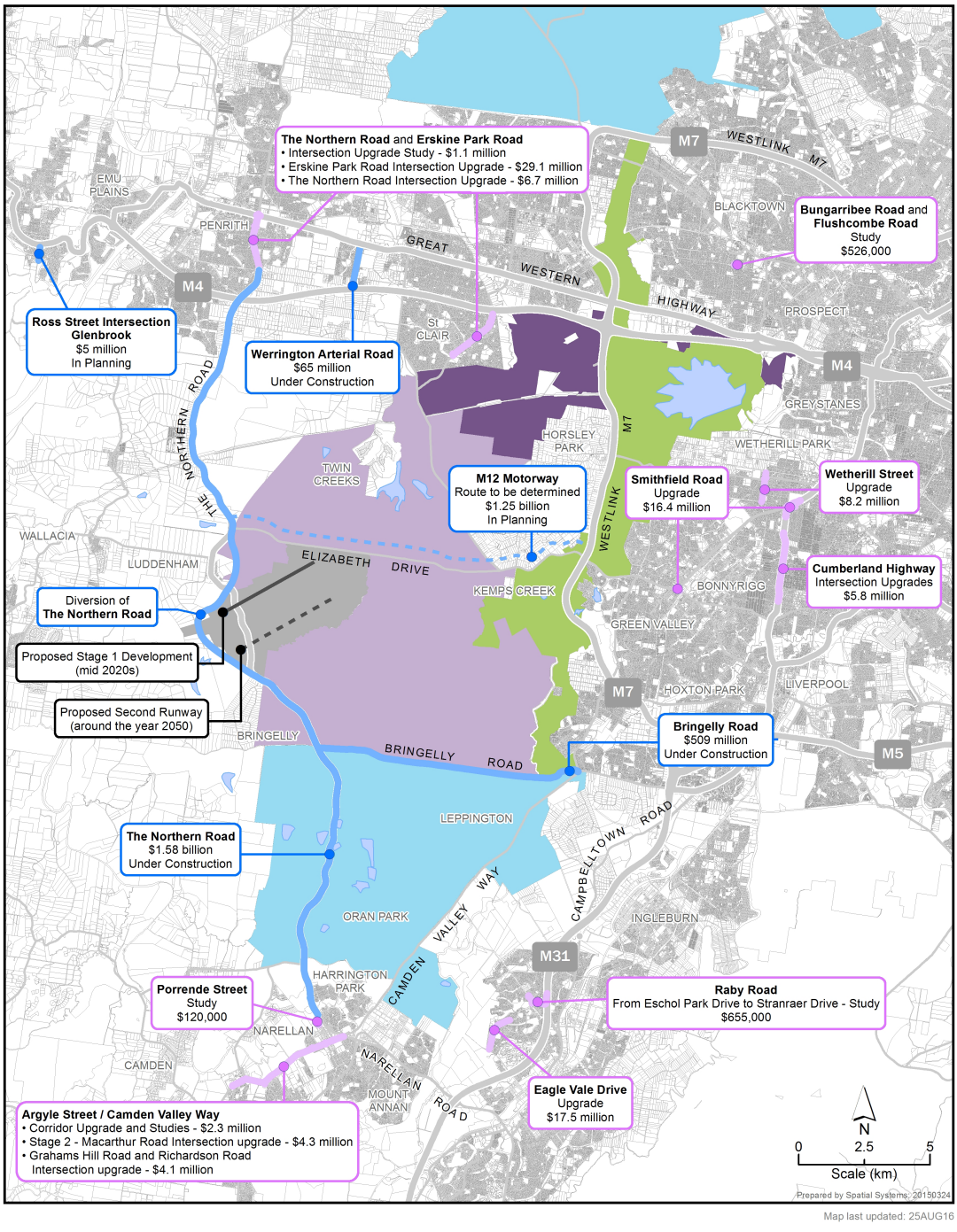
- pedestrian graded ramps for level changes for passengers arriving/departing with baggage;
- cycle parking with storage cages and storage sheds within the dedicated car park area; and
- safe, undercover pedestrian movement between premium parking, pick up/drop-off areas and the terminal.

All ground transport connections would comply with the Commonwealth *Disability Discrimination Act 1992*.

5.4 Future road network conditions

The Commonwealth and New South Wales governments have committed $3.6 billion over 10 years in major road infrastructure upgrades in Western Sydney. These upgrades will relieve pressure on existing infrastructure and provide connectivity to the new airport and surrounding areas before inauguration of services at the proposed airport. The projects which comprise the Western Sydney Infrastructure Plan (WSIP) are shown in Figure 5-1 (noting some funding is yet to be committed under the $200 million local roads package).

WESTERN SYDNEY - AIRPORT SITE AND INFRASTRUCTURE



Legend

- Western Sydney Infrastructure Plan Projects
- Local Roads Package Rounds 1 and 2
- Western Sydney Parklands
- Western Sydney Employment Area
- Western Sydney Priority Growth Area
- North West & South West Priority Land Release Areas
- Western Sydney Airport Site

Figure 5-1 Western Sydney Infrastructure Plan

Source: https://infrastructure.gov.au/infrastructure/western_sydney/index.aspx

Based on information provided by Transport for NSW a summary of the future road network projects that would likely be implemented by the 2031 assessment year is provided in Table 5-2. Further details of these projects are provided in section 5.5**.**

Table 5-2 Expected future road network changes by 2031

Project	Comments
Western Sydney Infrastructure Plan	• Upgrade of The Northern Road to a minimum of four lanes from Narellan to the M4 Motorway; • Construction of a new four-lane M12 Motorway between the M7 Motorway and The Northern Road; • Upgrade of Bringelly Road to a minimum of four lanes from Camden Valley Way to The Northern Road; • Ross Street and the Great Western Highway, Glenbrook; • Werrington Arterial Road; • Improve interchanges connecting The Northern Road and new M12 Motorway with arterial roads; • A $200 million local roads package.
Western Sydney Employment Area roads	Proposed road network to support the Priority Growth Areas, as identified in the Western Sydney Employment Area Structure Plan.
Great Western Highway, Blue Mountains	Widening from 1 to 2 lanes
NorthConnex	Due for completion by 2019.
WestConnex (stages 1, 2 and 3)	All three stages of WestConnex are targeted for completion by 2023. Includes: • M4 widening Church Street to Strathfield and M4 East (stage 1); • new M5 tunnel and St Peters interchange (stage 2); • M4 to M5 link including CityWest Link/Victoria Road and Camperdown interchanges, Airport Gateway and Southern Connector to President Ave, Monterey (stage 3)
Western Harbour Tunnel	Final business case for the Western Harbour Tunnel expected by the end of 2015, with the aim of delivering the project immediately after WestConnex Stage 3.
North West Priority Land Release Area roads	Proposed road network to support the Priority Land Release Area, as identified in the North West Priority Growth Area Structure Plan.
South West Priority Land Release Area roads	Proposed road network to support the Priority Land Release Area, as identified in the South West Priority Growth Area Structure Plan.
M4 Widening, Church Street to Mamre Road	Widening from 3 to 4 lanes (westbound west of Coleman Street, eastbound west of Cumberland Highway)
M7 Widening (M4 to M5)	Widening from 2 to 3 lanes between the M4 and M5 Motorways

Source: TfNSW Western Sydney Strategic Modelling Assumptions Book v1

Section 5.5 provides an indicative description of the key projects identified in Table 5-2. The descriptions are subject to change as decision-making and detailed design for the projects progress.

5.5 Local road network improvements

5.5.1 The Northern Road

The Northern Road will be realigned outside the area required for the operation of the proposed airport by Roads and Maritime prior to the commencement of operations at the airport. Concurrently, utilities in easements along The Northern Road alignment are expected to be relocated. In November 2015, Roads and Maritime announced the Eastern option is the preferred alignment of the relocated The Northern Road around the airport site.

A connection to The Northern Road would be constructed to the airport site boundary by Roads and Maritime as part of the construction of The Northern Road realignment...

The Northern Road will be formed with two traffic lanes and one shoulder bus lane in each direction, with provision for walking and cycling through shared paths on the western side and footpath along the eastern side along its route. The corridor will have additional width to allow for three lanes in each direction to be retrofitted at a later date.

5.5.2 Bringelly Road

Bringelly Road is being upgraded between Camden Valley Way and The Northern Road to support the development of growth centres, employment lands and the proposed airport. The project consists of upgrading the two-lane segment between the eastern side of Upper Canal Bridge and the western side of the Eastwood Road intersection, through the forthcoming Leppington Town Centre, into a six lane divided road by 2018. Furthermore, the remaining sections of Bringelly Road will also be upgraded from two lanes to a four-lane divided road with a central median which will cater for future extra capacity by widening Bringelly Road into six lanes if needed.

5.5.3 M12 Motorway

This new motorway is proposed to connect the M7 near Cecil Park to The Northern Road near Luddenham. The motorway will generally be parallel to Elizabeth Drive to provide access and traffic capacity for the proposed airport. The future M12 is likely to be built as a four lane road with capacity for six lanes in the future.

The primary public access road to the airport site would be from the future M12. Roads and Maritime will construct the connection from the M12 to the airport site boundary.

The design of this connection with the future M12 will include:

- a maximum design speed of 90 km/h and maximum posted speed of 80 km/h for the main carriageways including the connections to the M12 Motorway, decreasing to safe speeds in the vicinity of the terminal forecourt;
- a minimum of two, and up to three, trafficable lanes for each carriageway on the main carriageways with provision for bus lanes in the shoulder; and
- connection to allow efficient and safe vehicle movement around the ground transport hub within the terminal forecourt, including access to the commercial precinct, support areas and airport parking.

5.5.4 Badgerys Creek Road

Badgerys Creek Road is a collector road under the control of Liverpool City Council outside of the airport site and owned by the Commonwealth and maintained by the Council within the airport site. It is expected to remain a public road to the boundary of the airport site. Similarly, it is expected at this stage that the connection into the airport site from Badgerys Creek Road

would remain open to public transport and private vehicles on the airport site prior to the construction of the second (southern) runway, depending on the requirements for additional access to landside facilities and the location of the airport security fence. Arrangements would be confirmed in the ground transport management plan.

5.5.5 Other external roads

Other roads which would be upgraded (by others) to meet the requirements of the proposed initial airport development include:

- Adams Road to be upgraded from Elizabeth Drive at least to Anton Road to meet the needs of the proposed airport, including B-Double traffic;
- Anton Road to be upgraded from Adams Road to meet the need for secondary access to non–public facilities for the proposed airport located along the northern site boundary, including B-Double traffic; and
- an airport perimeter road would provide access to support infrastructure and navigational aids. This two-lane roadway will also be used to monitor the airport security and perform any maintenance of the security fencing, perimeter lighting, and CCTV system.

5.6 Public transport

In the short term, public transport access to the proposed airport could be provided through road upgrades, park and ride facilities and new bus services directly linking to major centres in Western Sydney.

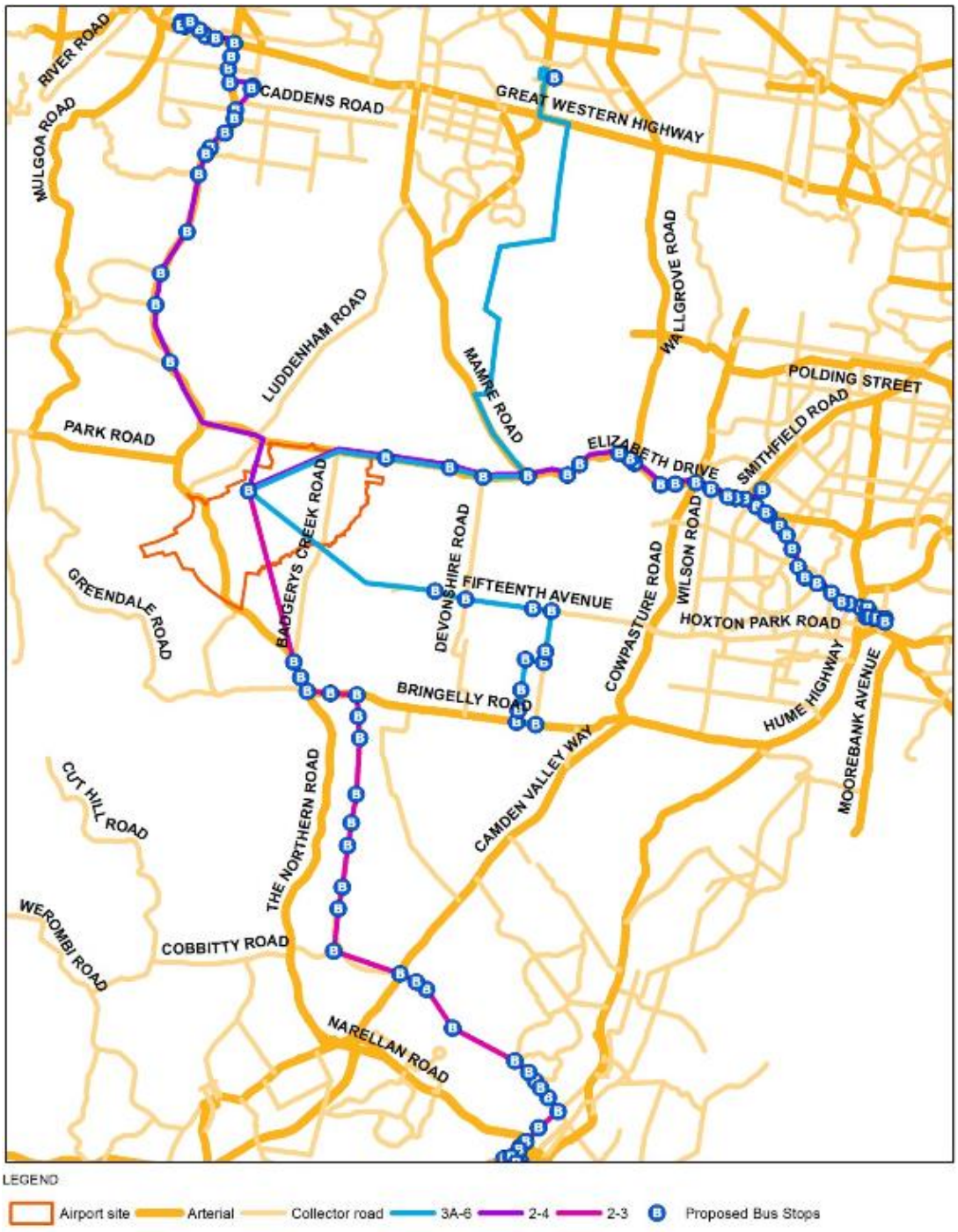
There are three additional bus routes identified by Transport for NSW to the proposed airport, as shown in Figure 5-2. These routes are:

- 2-4 Liverpool-Badgerys Creek-Penrith (suburban).
- 2-3 Campbelltown-Oran Park-Badgerys Creek (suburban).
- 3A-6 Leppington-Badgerys Creek-Mt Druitt (local).

These bus routes would have service frequencies that would be determined based on the demand for travel to the proposed airport, with the suburban services having fewer bus stops.

Two existing bus routes that currently traverse the site (789 and 801) will be diverted as required.

Figure 5-2 Proposed bus routes



5.7 Pedestrian and cycling facilities

Sydney's Cycling Future (Transport for NSW, 2013) is a plan to encourage people to ride more often and safely. It includes actions to promote and improve cycling which are relevant to the WSA proposal. One of these actions includes providing shared off-road pedestrian and cycle facilities in appropriate locations to provide links between key centres and activities across the Sydney Metropolitan Area. This includes a plan for the development of a network of strategic bicycle corridors potentially linking Liverpool, Blacktown, Penrith and the future town centre of Leppington to the airport site in the future.

As the Western Sydney Priority Growth Area, South West Priority Land Release Area and Western Sydney Employment Area lands develop, additional cycleway links are to be enhanced and integrated within the regional Western Sydney cycle way network. By 2018, the expected Bringelly Road Stage 1 and Stage 2 upgrades described in the *Western Sydney Infrastructure Plan* will deliver more than 10 km of shared pedestrian and cyclist paths in the area.

Also, according to the *Western Sydney Infrastructure Plan*, the proposed M12 Motorway, The Northern Road and Bringelly Road upgrades are expected to have pedestrian and cyclist infrastructure included as part of the project planning. These proposals will improve walking and cycling access within the vicinity of the airport site by providing shared paths along The Northern Road and Bringelly Road, therefore potentially increasing the mode share towards active transport to the airport site.

5.8 Mitigation/Management Measures

A ground transport management plan would be prepared as part of the detailed design of Stage 1 and before the proposed airport begins operating. The plan would address both internal and external road networks and be developed in consultation with relevant stakeholders. The please would include:

- road design speeds;
- security issues;
- traffic loads from airport and other developments on site;
- connections with off-site/external roads, including matching capacity, speeds and road geometry;
- forecast traffic flows, including public transport requirements;
- car parking;
- commercial and operational vehicles and storage;
- terminal interface;
- passenger pick-up and drop-off by private and commercial vehicles;
- pedestrian linkages between terminals and all transport drop-off/pick-up areas;
- pedestrian, cycle or road networks for movement around the airport site;
- use of dedicated busways;
- ability to continue to provide access to and from the airport when key intersections are unavailable; and
- the ability to expand, with minimal disruption, to meet future airport and business development requirements.

6. Trip generation

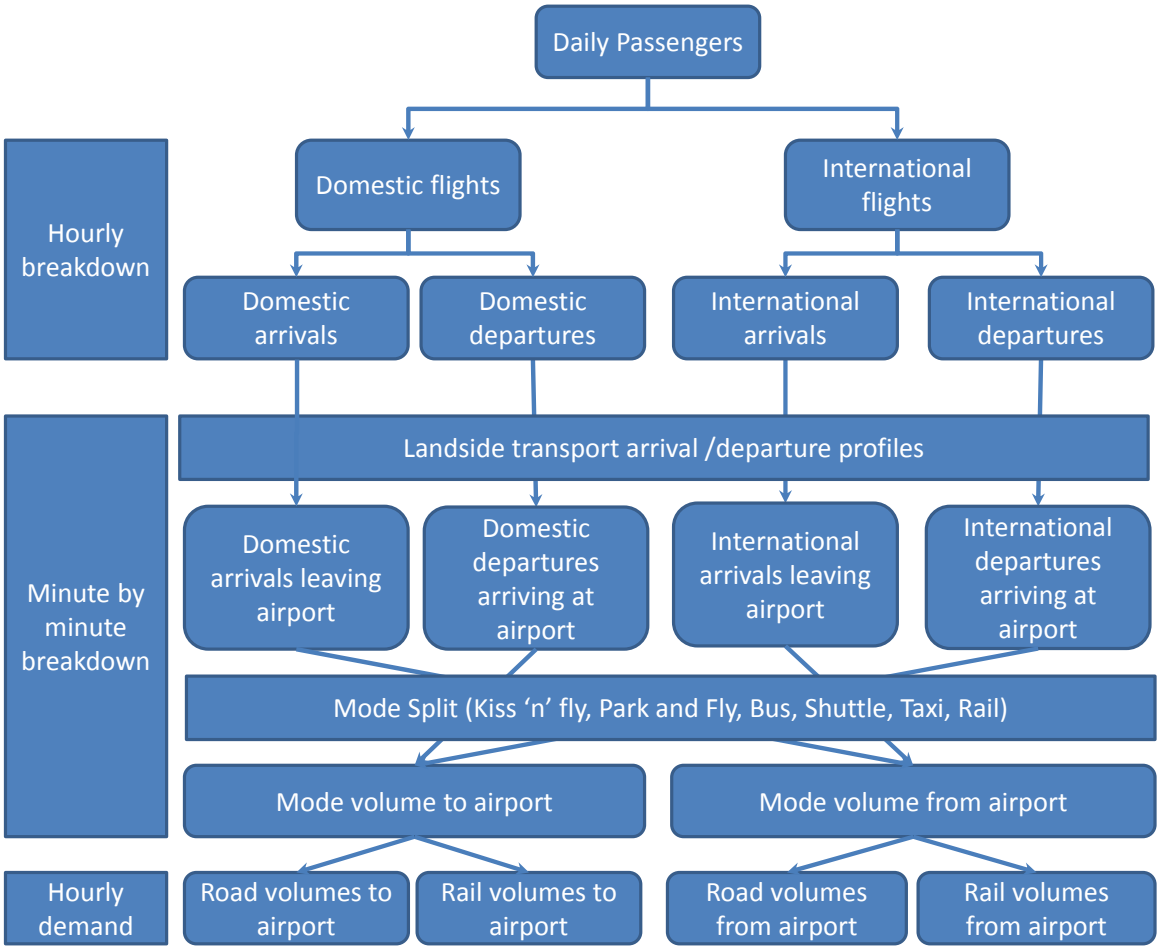
6.1 Introduction

In 2030, it is estimated that the proposed airport could be operating with passenger movements of 10 million per annum and an employee level of approximately 7,500 persons. In order to determine the impact of these passenger and staff movements on the ground transport system, including impacts on the road and public transport networks, it is necessary to disaggregate these trips into a form for which an assessment can be undertaken.

As discussed in Section 2.3, the available transport models are created in 5 and 10 year increments using a 2016 base. For this EIS, the passenger trip generation relies on a flight profile developed for 2030 (as described in 6.2.1), while the staffing levels are based on the estimated number of annual passengers in 2031 (as described in 6.3). This creates a slight discontinuity between the information sources; however, as the traffic model is based on year 2031 as well, some discontinuity is unavoidable.

Detailed forecast passenger and aircraft movement data were provided by the airport planning team. From these data sets, it was necessary to determine the number of passengers that would be arriving and departing in any one-hour period. The method for deriving passenger volumes is shown in Figure 6-1 and described in section 6.2.

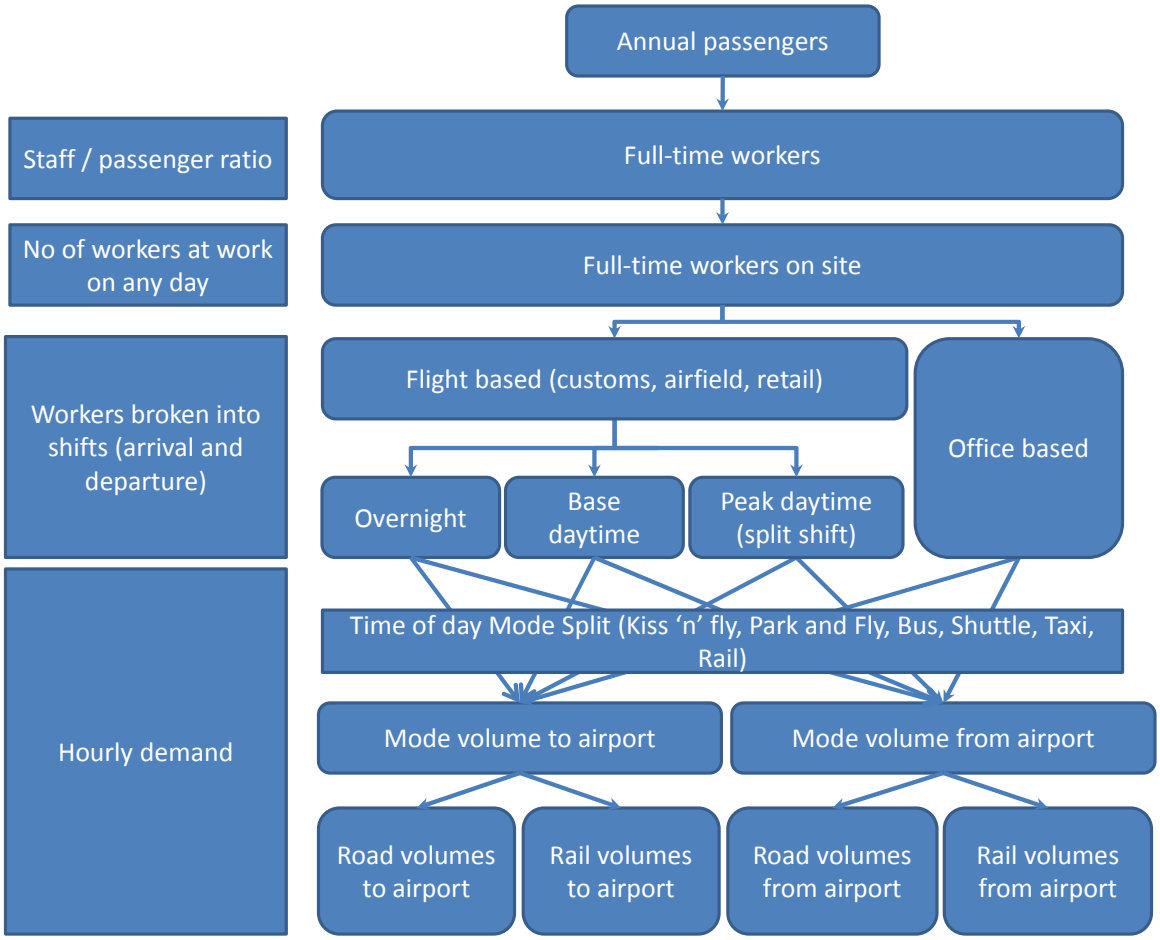
Figure 6-1 Passenger trip generation and mode assignment



Airfield, terminal and airside employment estimates are directly related to the volume of passengers passing through the airport. Having regard to the experience at other major airports,

a ratio of 750 workers per 1 million annual passenger movements is considered a reasonable basis on which to estimate the number of full time employees at the airport. In order to determine the trip generation of these employees, these employees need to be broken down into shifts across the 24 hour operations of the proposed airport. The method for deriving this is shown in Figure 6-2 and described in section 6.3.

Figure 6-2 Employee trip generation



6.2 Passenger trip generation

Passenger trip generation to the proposed airport would be dependent on a number of factors including:

- the number of flights arriving and departing over 24 hours and the carrying capacity of each flight;
- terminal factors time, such as the Customs and Border Protection clearances for international passengers and security clearances for departing domestic passengers; and
- the effects of landside uses within the airport precinct and surrounding areas.

6.2.1 Flight profiles

The passenger flight profile for the airport in 2030 is shown in Table 6-1 and graphically in Figure 6-3.

Table 6-1 Daily passenger flight movements 2030

Design Day Passenger Air Traffic Movements	2030
Domestic passenger flights	144
International passenger flights	26
Total	**170**

Source: LEK Airport Demand Summary April 2015

Additionally, the number of flights per peak hour has been determined as shown in Table 6-2.

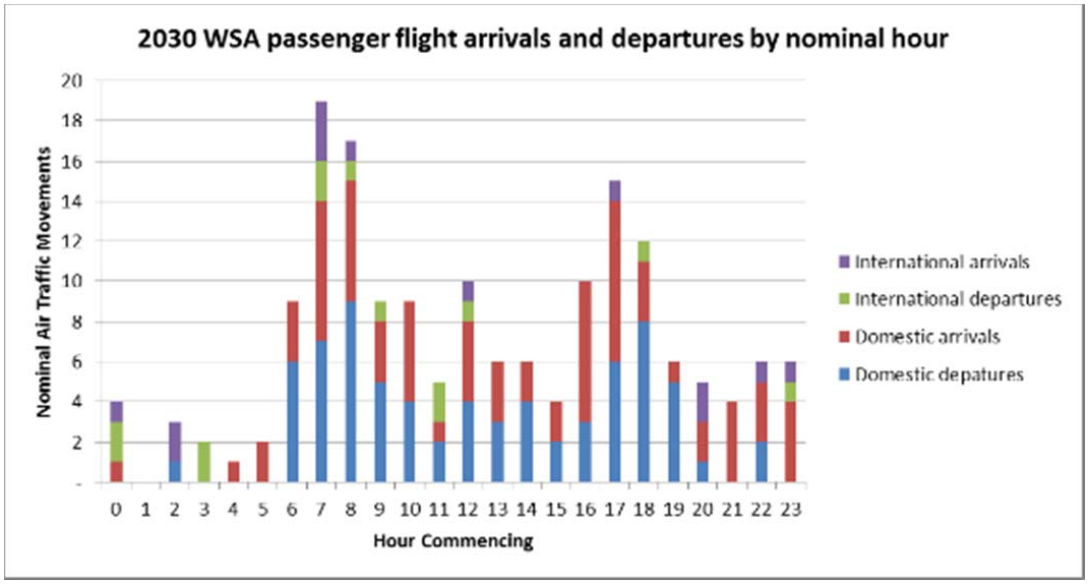
Table 6-2 Peak hour flight movements 2030

Peak hour flights	No. of flights	% of daily total
Arrivals (Domestic and International)	9	5.2%
Departures (Domestic and International)	10	5.9%
Total	**19**	**11.1%**

Source: LEK Airport Demand Summary March 2015

Tables relating to the figures in section 6.2 are provided in Appendix C.

Figure 6-3 2030 daily flight profile



Source: LEK Flight Profile March 2015

6.2.2 Passenger arrival profiles

For each domestic and international flight, a profile for the passengers entering and exiting the airport has been determined. In determining this profile, the SALTM has been used as a starting point. However, this model was based on survey data completed prior to 2012 and before the advent of 'Smart Gates' at passport control and self-check-in and online check-in for both domestic and international passengers.

In order to develop a more realistic future passenger arrival profile, it has been assumed that check-in and departures will take less time as a result of the above new technologies and based on field observations. Therefore, information from the USA Customs and Border Protection and Transport Security Administration, who keep detailed information on all airports in the USA, has been used as a basis for the analysis to create arrival and departure profiles for passengers with shorter dwell times at the airport than reflected in the SALTM model. Similar published information is not currently available for Australia.

The derived landside passenger arrival and departure profiles are shown in Figure 6-4 and Figure 6-5.

Figure 6-4 Assumed landside arrival – percentage of passengers

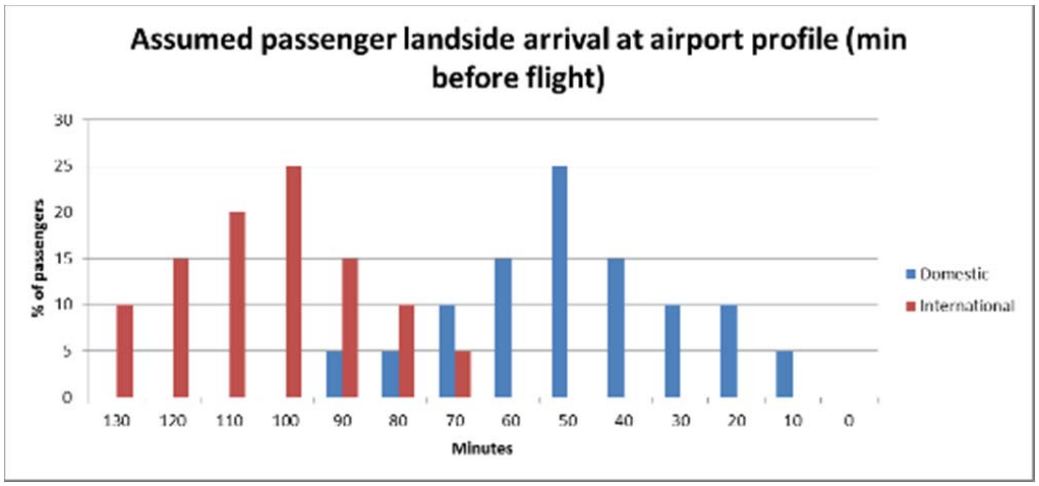
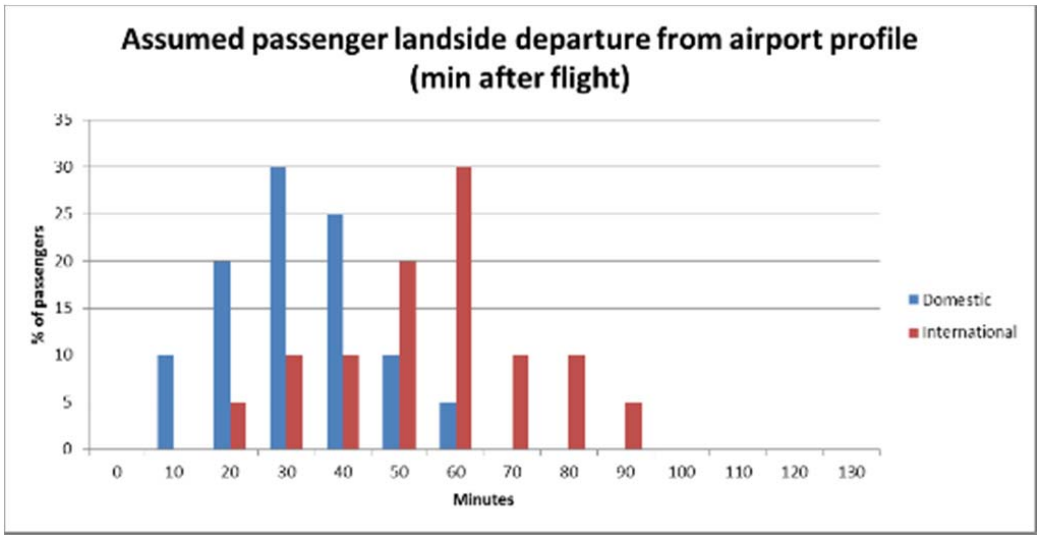


Figure 6-5 Assumed landside departure profile – percentage of passengers



The profiles were converted into passengers as follows:

- for each domestic aircraft, an assumed average capacity of 180 passengers with an average flight occupancy of 93 per cent has been assumed.
- for each international aircraft, an assumed average capacity of 400 passengers with an average flight occupancy of 95 per cent has been assumed.

The arrival and departure profiles, as passenger numbers, are shown in Figure 6-6 and Figure 6-7.

Figure 6-6 Landside arrival profile for passengers – volumes

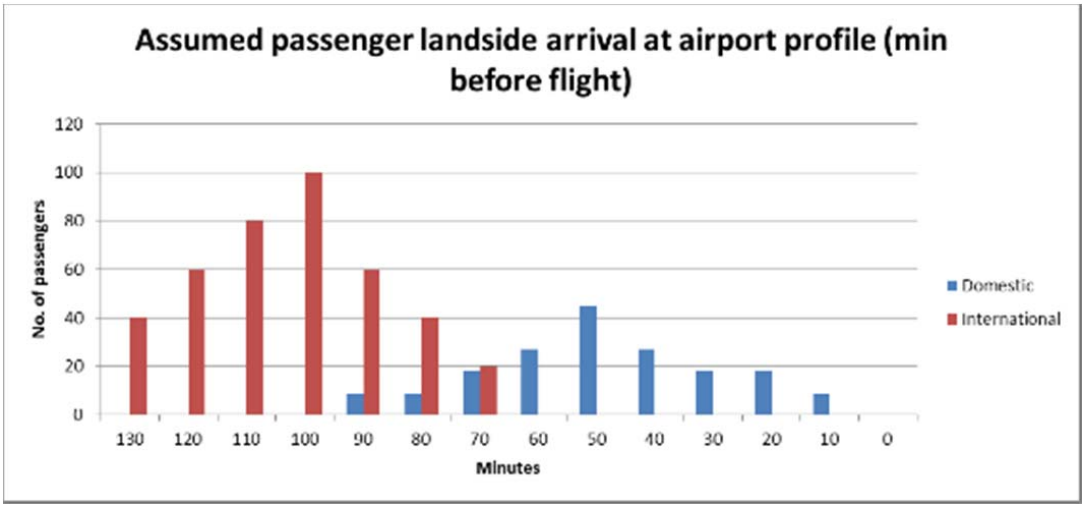
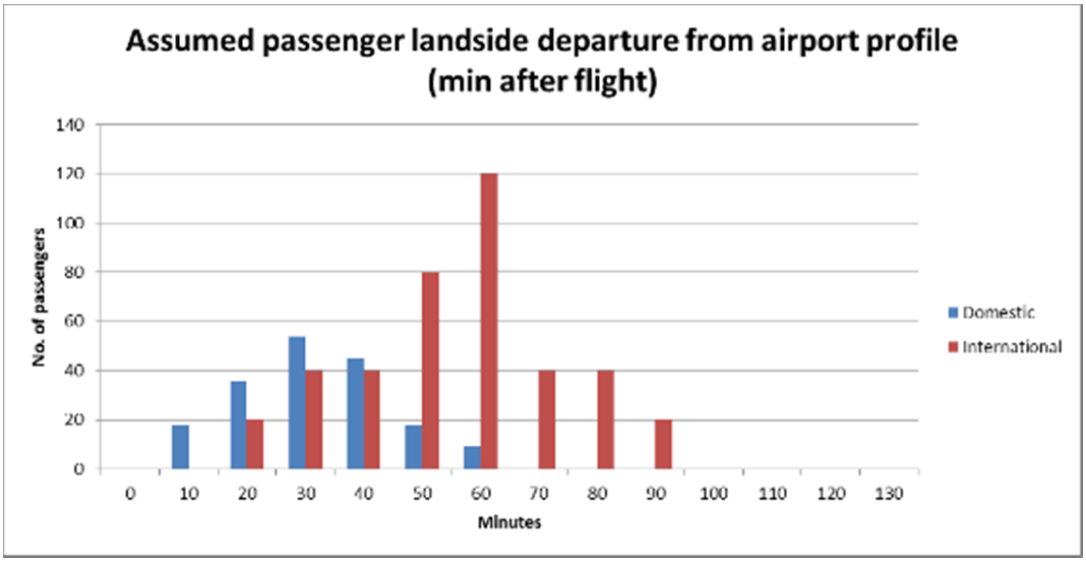
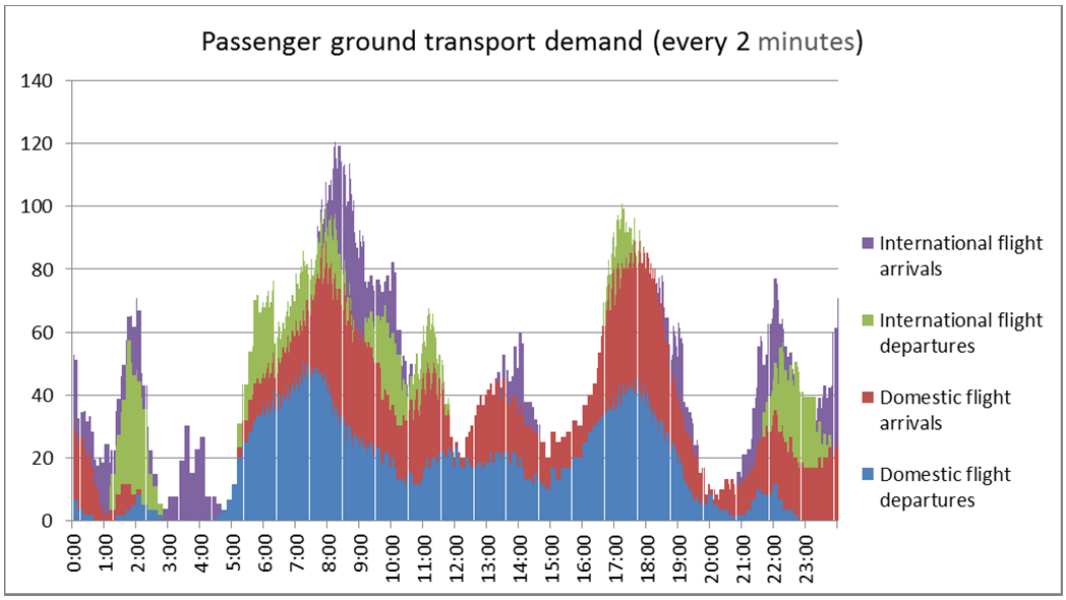


Figure 6-7 Landside departure profile for passengers – volumes



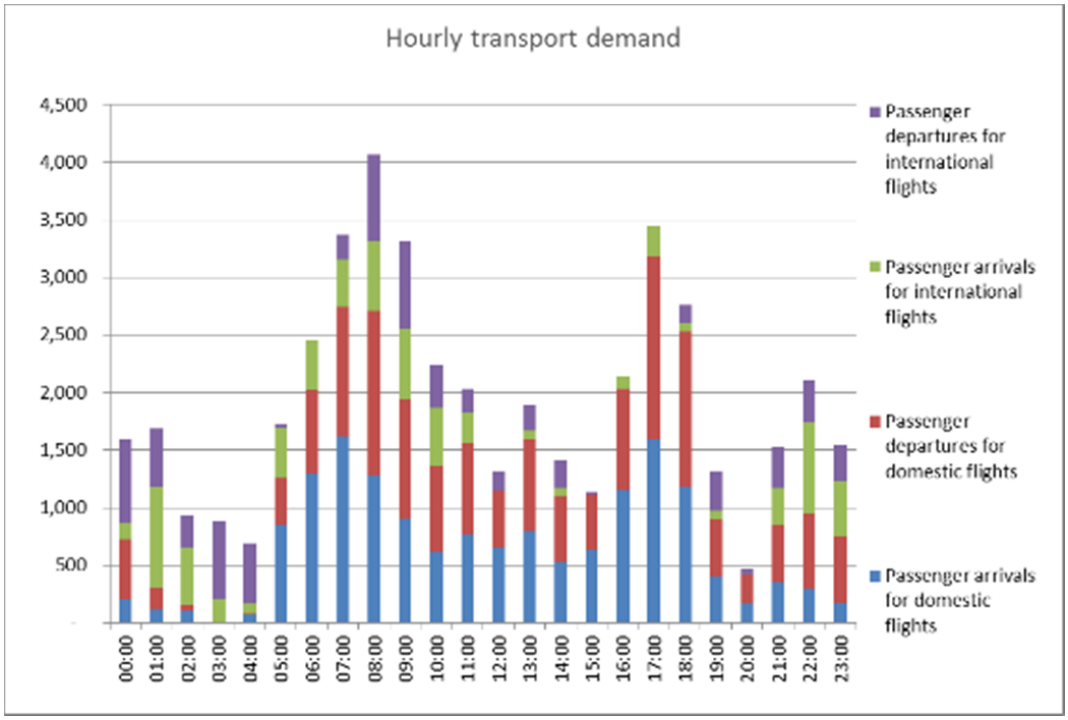
The combination of the arrival and departure profiles and the flight profiles results in a passenger distribution across the day in two-minute intervals to show the passenger arrivals and departures from the airport between individual flights. This is shown in Figure 6-8.

Figure 6-8 Forecast 2030 passenger ground transport demand



When this is converted into hourly volumes, the peak hourly demand is shown in Figure 6-9.

Figure 6-9 Forecast 2030 hourly ground transport demand



6.2.3 Ground transportation modes

Departing and arriving passengers at the proposed airport would use various modes of travel. These have been assigned as the following modes:

- kiss ‘n’ fly;
- park ‘n’ fly;
- taxi;
- shuttles;
- bus;
- rail; and
- other modes.

Kiss ‘n’ fly

Kiss ‘n’ fly is the term used to describe air passengers being dropped at the airport terminal for departure or in short term parking for passenger arrival. These trips feature a trip to the airport in close proximity to a trip leaving the airport.

It has been assumed that each Kiss ‘n’ fly vehicle will contain 1.1 domestic passengers and 1.5 international passengers.

Park ‘n’ fly

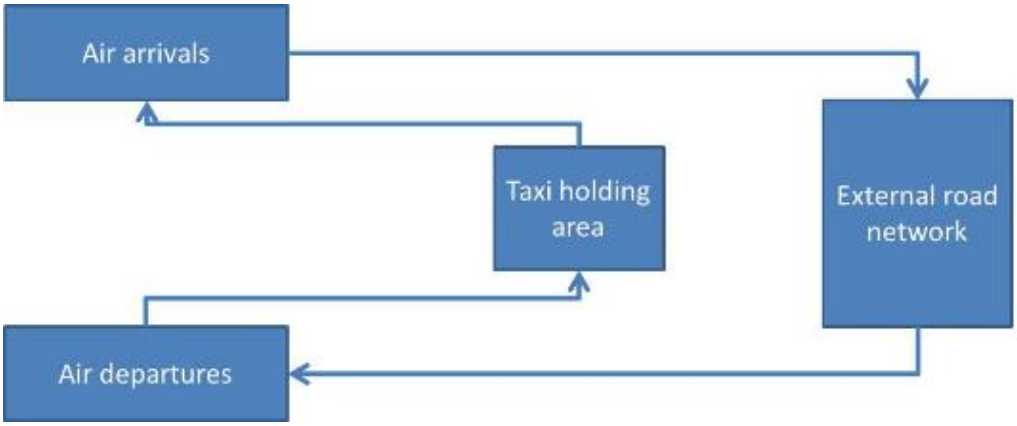
Park ‘n’ fly is the term used to describe air passengers driving themselves and parking in all day or long term parking prior to flying and exiting the airport later in the same or subsequent days.

It has been assumed that each Park ‘n’ fly vehicle will contain 1.5 domestic passengers and 2 international passengers.

Taxi

Taxis are a common form of travel to airports as they provide air passengers with flexibility in arrival. This category includes hire cars and “Uber” type services for the purposes of analysis. Each taxi is assumed to have an external trip to the airport, an internal trip to the holding area, another internal trip to pick up and a final external trip following collection of passengers leaving the airport. This is shown in Figure 6-10.

Figure 6-10 Airport taxi movements



It has been assumed that each taxi vehicle will contain 1.1 domestic passengers and 1.5 international passengers.

Shuttles

Shuttles are dedicated bus services with limited stops that run between major centres and key destinations and airports. These vehicles usually operate on motorway and arterial road networks to provide the most direct service and are privately operated.

It has been assumed that each shuttle will contain 8 passengers, representing an average mini bus.

Bus

Regular bus services would serve the proposed airport as part of their normal service. These buses provide connections to rail services on the Sydney Trains network at Penrith, Leppington and Liverpool. With the completion of the South West Rail Link Extension, these services may be redesigned to serve other areas.

It has been assumed that these buses will make two stops at the terminal.

It has also been assumed that the terminal will have 15 arriving and 15 departing passengers per bus (within the arrival and departure profiles).

Rail

While the proposed Stage 1 development does not currently include a rail service, planning for the proposed airport preserves flexibility for several possible rail alignments including a potential express service. A final alignment will be determined in consultation with the New South Wales Government, with any enabling work required during Stage 1 subject to a separate approval and environmental assessment process.

For this assessment, rail is assumed to service the proposed airport at some time after Stage 1 operations.

Other modes

Due to the relative isolation of the proposed airport terminal (2.5 km from Elizabeth Drive), it has been assumed that walking and cycling to the airport (as passengers) will be minimal and is not included in the analysis.

6.2.4 Mode split

Based on the Sydney Airport Land Transport Model (SALTM), the proportions of use of each transport mode have been assigned, with the rail mode being discounted as it is assumed that no railway will exist for WSA until after Stage 1 operations.

The approach used within this analysis varies from the SALTM model, as the SALTM model is a 4-step model that determines transport mode splits based on travel times and origin/destination pairs. The capacity of the proposed access road network has been identified as a constraint to be taken into account in the modelling, although the constraint is not expected to be material during Stage 1 operations. This constraint requires mode split proportions to be an input. The proportions assumed for each mode are shown in Table 6-3.

Table 6-3 2030 assumed mode split

Mode	2030 mode splits			
	Domestic		International	
	Drop off	Pick up	Drop off	Pick up
Kiss and Fly	30%	30%	40%	40%
Park and Fly	35%	35%	30%	30%
Taxi	20%	20%	20%	20%
Shuttle	5%	5%	5%	5%
Bus	10%	10%	5%	5%
Rail*	0%	0%	0%	0%

Note: Rail has been assumed to be provided post 2031 for the Stage 1 airport assessment

6.2.5 Dwell times

For each transport mode, there is a range of dwell times based on the mode type and trip purpose. For example, an international Kiss 'n' fly pickup trip may involve arriving prior to the flight's arrival at the proposed airport, allowing enough travel time to cater to the variability in the external road network and the passengers being collected passing through the border. In comparison, a bus vehicle will have a nominated dwell time at each stop.

The nominated dwell times for each mode are shown in Table 6-4.

Table 6-4 2030 assumed dwell times by mode

Mode	Dwell time (minutes)			
	Domestic		International	
	Drop off	Pick up	Drop off	Pick up
Kiss and Fly	6	16	120	44
Park and Fly	-	-	-	-
Taxi	16	16	16	16
Shuttle	30	30	30	30
Bus	3	3	3	3

6.2.6 Mode distribution

Using the values identified in the previous sections, each passenger has been assigned to a transport mode. The hourly demand is shown in Figure 6-11 to Figure 6-14.

These passenger demands are then agglomerated into passenger entries and exits from the airport as shown in Figure 6-15 to Figure 6-16.

Figure 6-11 2030 domestic air departures – ground arrival at the proposed airport

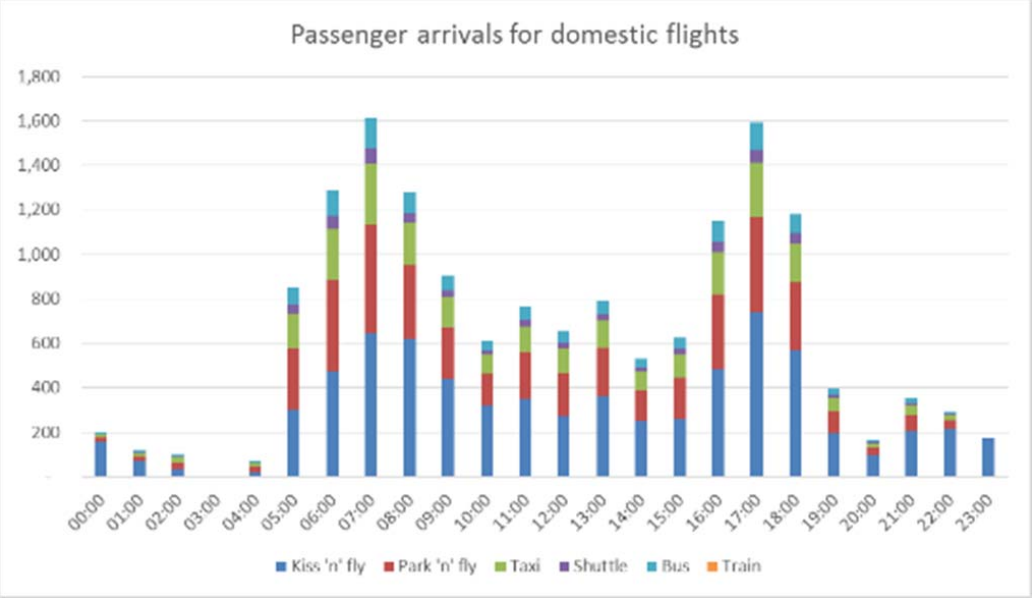


Figure 6-12 2030 domestic air arrivals – ground departure from the proposed airport

Figure 6-13 2030 international air departures – ground arrival at the proposed airport

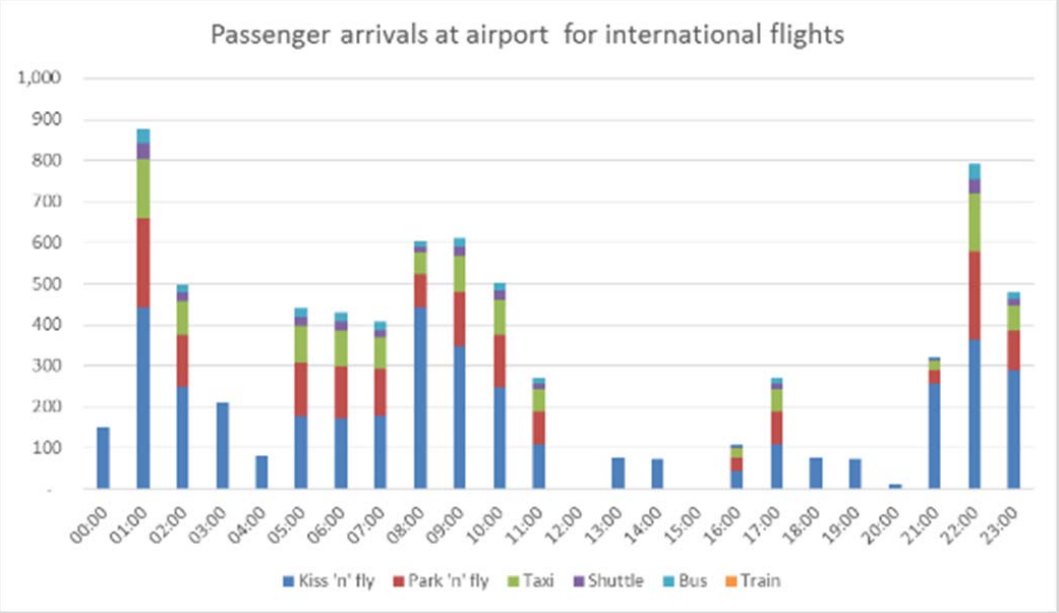


Figure 6-14 2030 international air arrivals – ground departure from the proposed airport

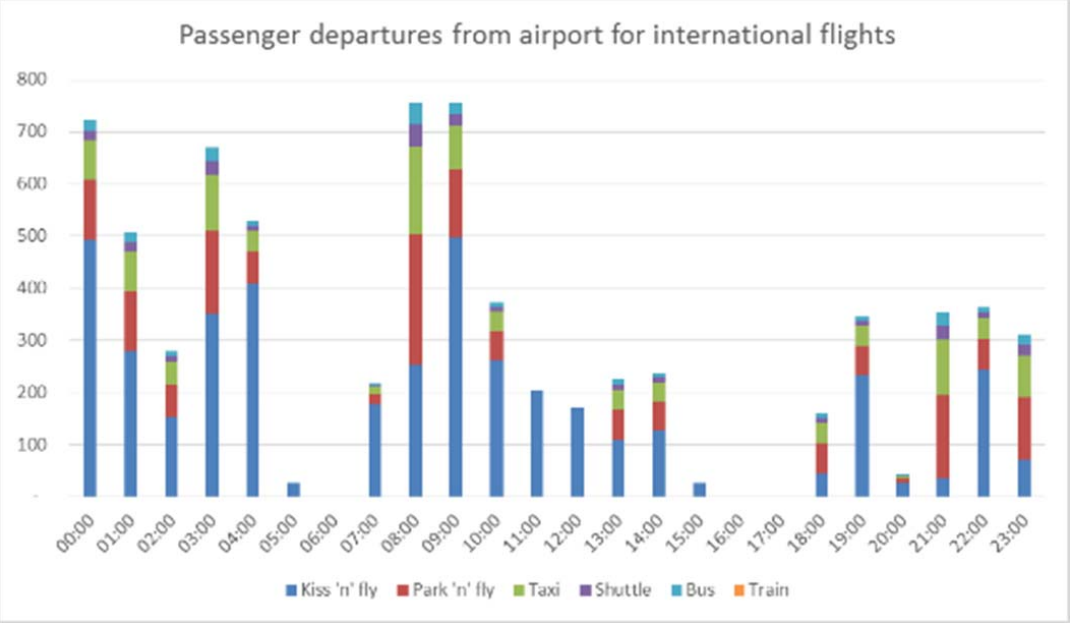


Figure 6-15 2030 total air departures – ground arrival at the proposed airport

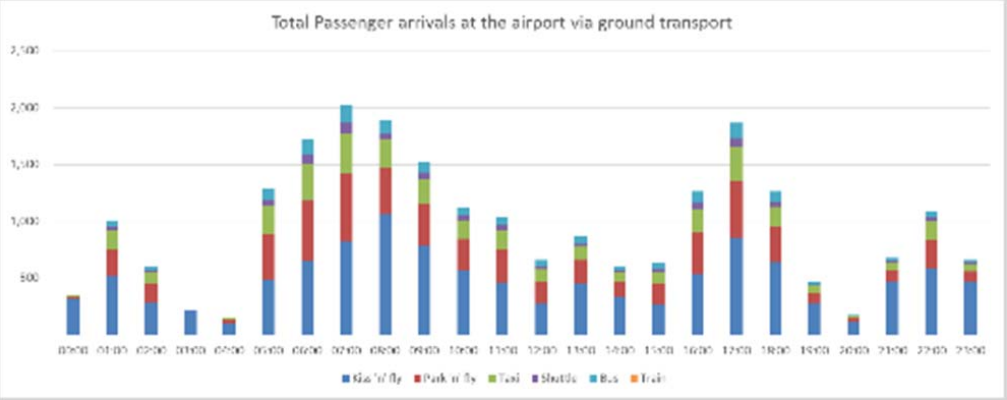
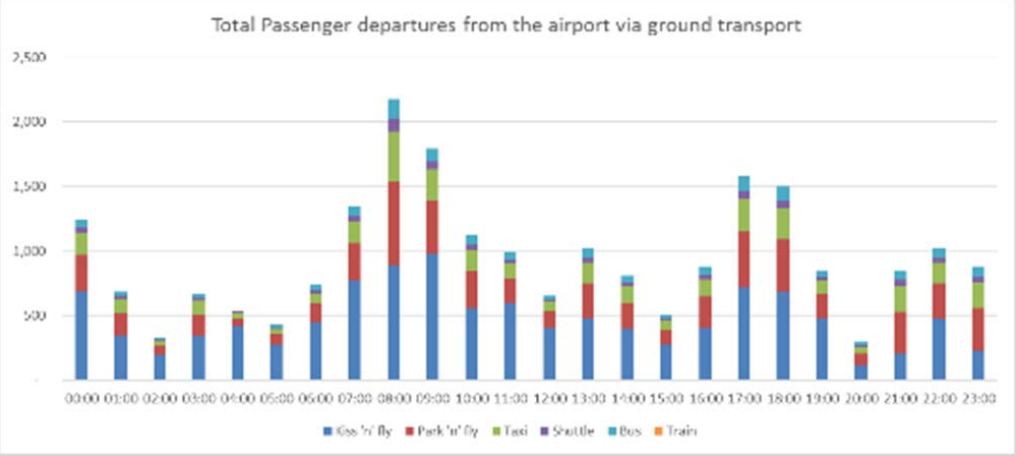


Figure 6-16 2030 total air arrivals – ground departure from the proposed airport



6.2.7 Traffic generation

The trips developed in section 6.2.6 are then assigned to vehicles entering the airport at the northern boundary point and onto the internal road network. The vehicle volumes across the day are shown in Figure 6-17 to Figure 6-22.

Figure 6-17 2030 passenger vehicles entering at the northern boundary of the proposed airport by mode

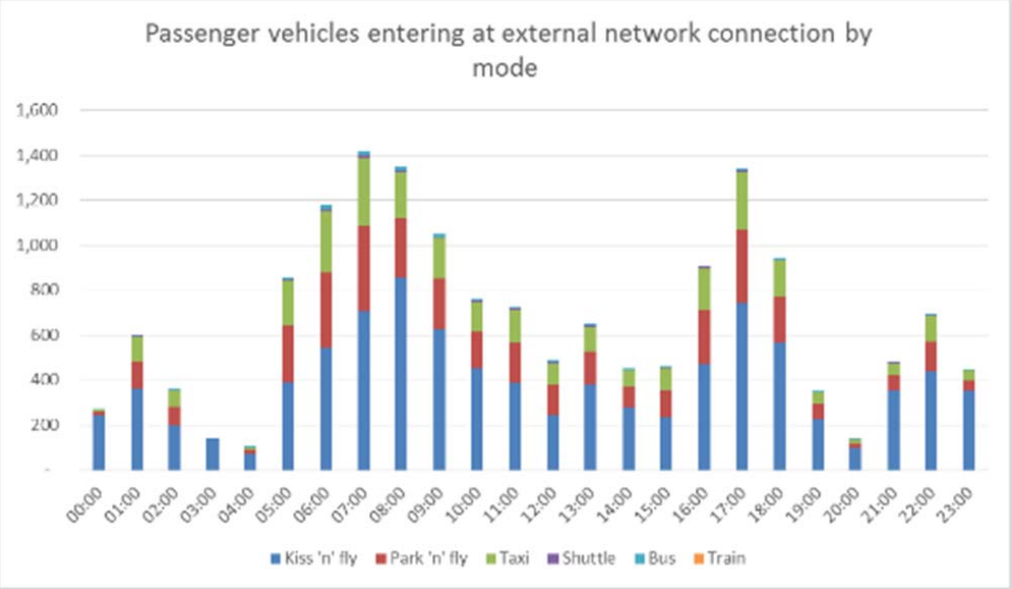


Figure 6-18 2030 passenger vehicles exiting at the northern boundary of the proposed airport by mode

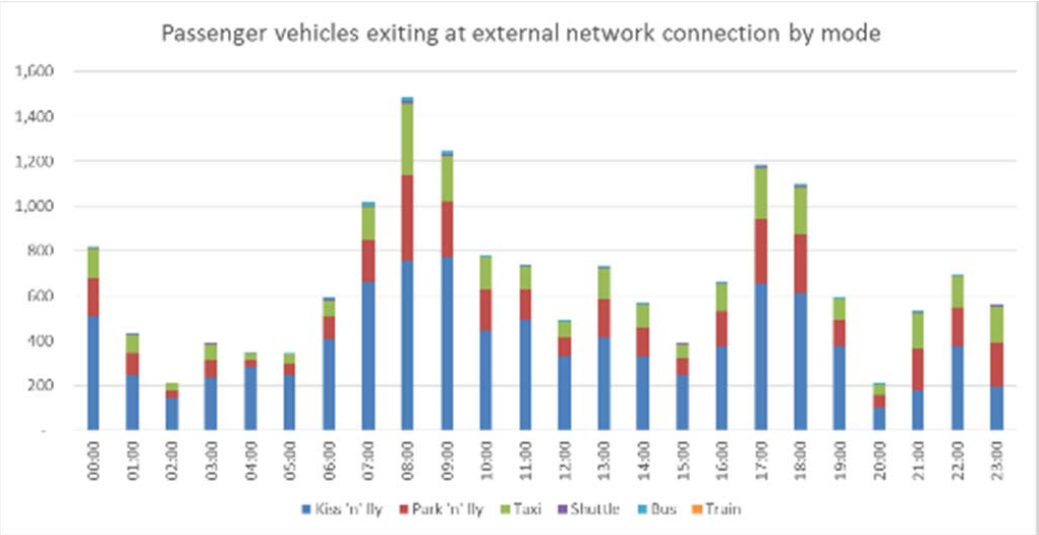


Figure 6-19 2030 passenger vehicles entering at the northern boundary of the proposed airport by vehicle type

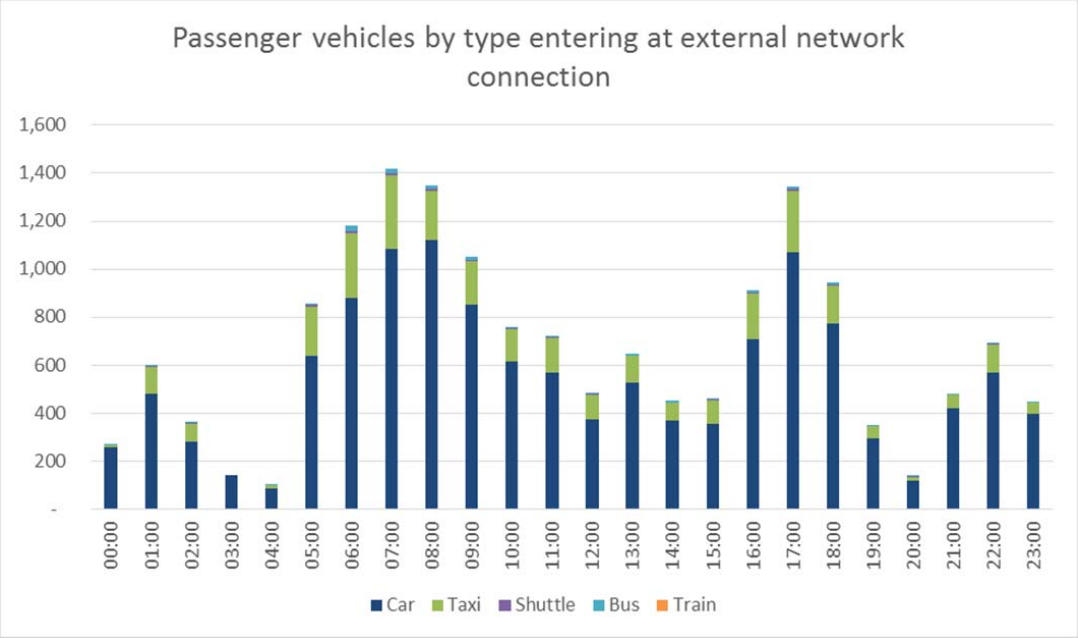


Figure 6-20 2030 passenger vehicles exiting at the northern boundary of the proposed airport by vehicle type

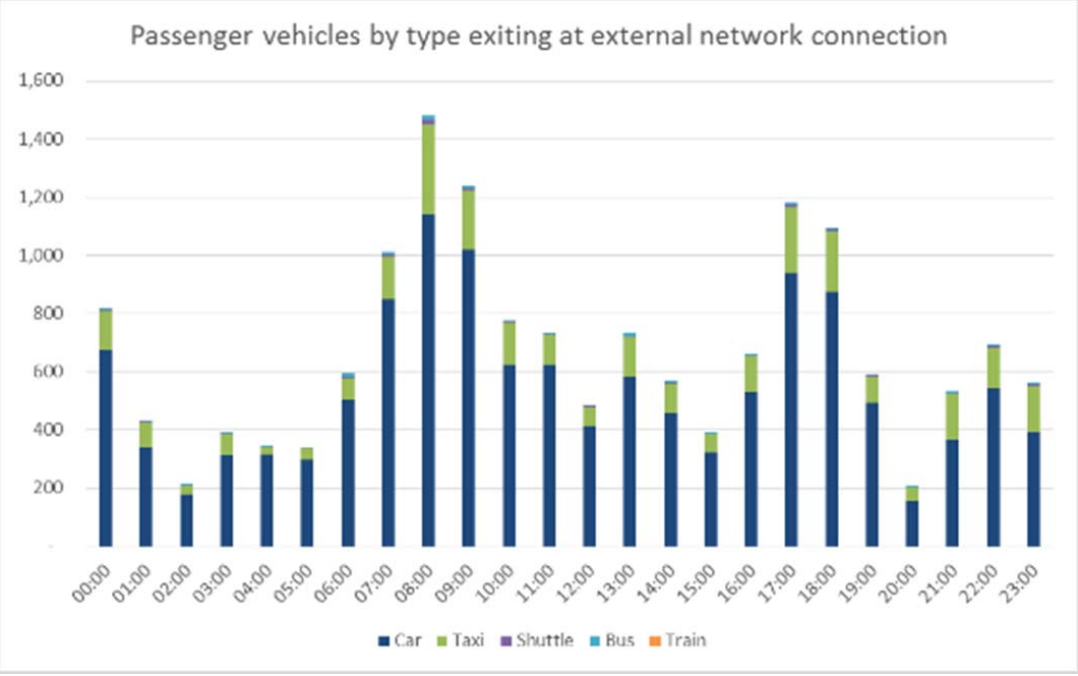


Figure 6-19 shows that the projected vehicle demand is 1,419 vehicles entering the proposed airport during the AM traffic peak hour (7:00 am to 8:00 am) and 1,346 vehicles entering the proposed airport during the PM peak hour (5:00 pm to 6:00 pm).

Figure 6-20 shows 1,481 vehicles leaving the proposed airport during the AM peak hour (8:00 am to 9:00 am) and 1,183 leaving the proposed airport during the PM peak hour (5:00 pm to 6:00 pm).

In addition to the vehicles arriving at the boundary of the proposed airport, the circulating movements of the taxis (as shown in Figure 6-10) are added into the traffic volumes to determine the internal traffic demand.

Figure 6-21 2030 passenger vehicles arriving at terminal and car park entrances

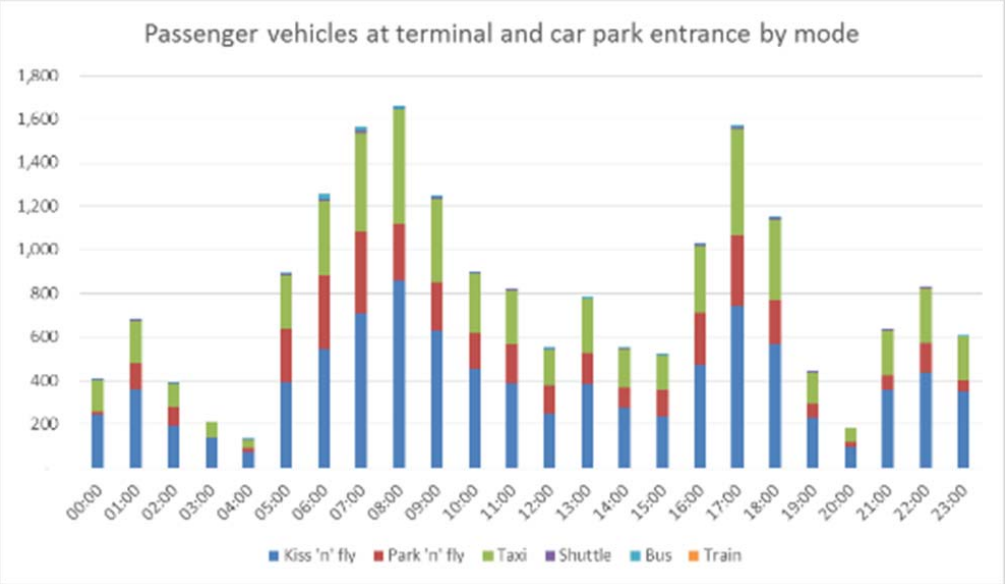


Figure 6-22 2030 passenger vehicles leaving the terminal and car park exits

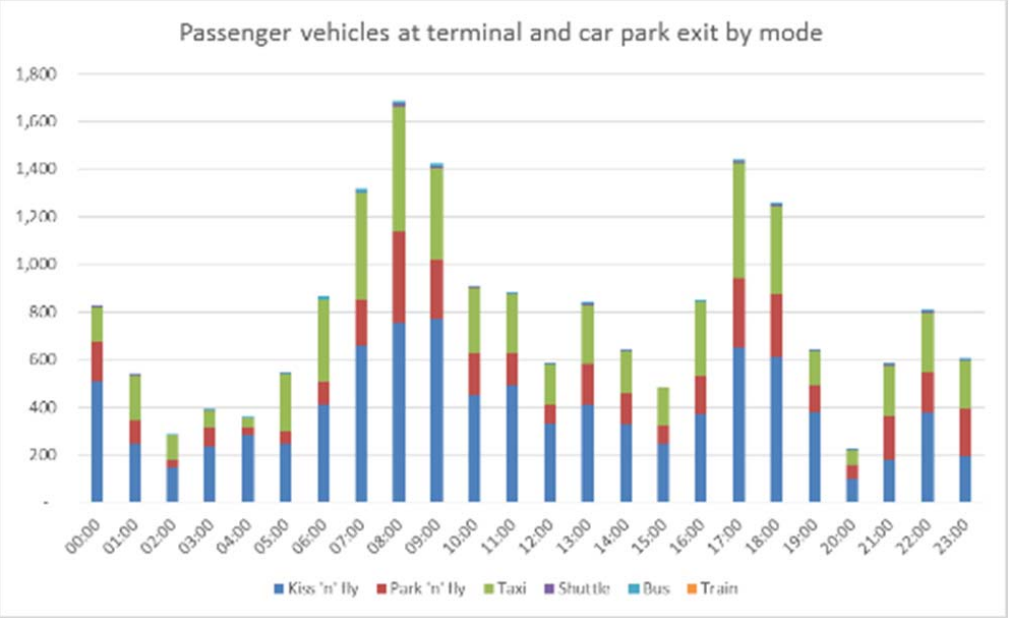


Figure 6-21 shows that the vehicle demand is 1,663 vehicles entering the terminal area in the AM peak hour (8:00 am to 9:00 am) and 1,571 vehicles entering the terminal area during the PM peak hour (5:00 pm to 6:00 pm).

Figure 6-22 shows that the vehicle demand is 1,690 vehicles leaving the terminal area of the airport during the AM peak hour (8:00 am to 9:00 am) and 1,441 vehicles leaving the terminal area of during the PM peak hour (5:00 pm to 6:00 pm).

6.3 Employee trip generation

Employee trip generation for the proposed airport has been assumed to be based on shifts determined on a synthetic basis and based on SALTM.

As discussed in Section 6.1, the employee trip generation is based on the number of passengers in 2031.

6.3.1 Total employee estimate

The number of employees required in 2031 can be estimated based on a ratio of employees per million annual passengers (MAP). A ratio of 750 employees per 1 MAP has been used for estimating employee trip generation.

The application of this ratio results in an employee level of approximately 8,730 for the 2031 airport which is a conservative assumption for Stage 1 operations.

Only airport-related employees are included in the traffic modelling. Non-aeronautical commercial operations could be allowed on the site, which could generate extra traffic, from workers and potentially customers. These potential operations are not part of the proposed action and their consequential traffic impacts have not been considered in the assessment.

6.3.2 On site employees

The 2011 Census (ABS) identifies that 15,296 people were employed at Sydney Airport within the airport boundary. Of these, 13,522 worked on census day, resulting in an employee on site ratio of 88 per cent.

The Census also identified that when the travel zones for Mascot directly north of the airport, are included (Qantas Headquarters and catering), the number of employees increases to 38,002 with 33,595 working on census day – also a ratio of 88 per cent.

The Airport Cooperative Research Program (ACRP) under the Transportation Research Board (TRB) has undertaken a benchmarking exercise for mode splits at USA and select international airports in the ACRP Report 4 – *Ground Access to Major Transports by Public Transportation* (2008).

This report reveals that for the USA (which has similar travel characteristics to Australia), airports that have public bus services only have low employee mode splits, while those served by either rail or staff shuttles have a higher public transport mode split. Table 6-5 shows a sample of mode splits from airports in the USA for workers.

Table 6-5 Airport employment characteristics – USA airports

Airport	Size (a)	Estimated number of employees on-site, typical	Estimated % of employees working	Estimated % of employees traveling during commute peaks	Estimated % of employee residences served by transit	Estimated % of employee residences served by transit	Other major employment centres
						Number of Centres	Number of Centres with Transit
Birmingham (AL)	S	n/a	50%	70%	0%	3	3
Boston	L	14,600	68%	78%	n/a	2	2
Chicago O'Hare	L	n/a	56%	48%	n/a	3	1
Dallas/Fort Worth	L	40,000	n/a	90%	70%	2	2
John Wayne	M	1,000	50%	70%	80%	0	n/a
Las Vegas	L	8,000	85%	30%	90%	0	n/a
Louisville	M	n/a	5%	10%	n/a	1	1
Omaha	M	2,500	45%	33%	0%	0	n/a
Sacramento	M	1,500	80%	25%	50%	0	n/a
Salt Lake City	L	n/a	75-80%	60%	75%	3	3
San Diego	L	3,000	97%	15%	n/a	0	n/a

(a) FAA hub size: S = small; M = medium; L = large.
Source: TCRP Report 83, Jacobs Consultancy, based upon data provided by individual airport operators.

From Table 6-5, where both airport employee values and percentage of employees working information is available, there is an average 71 percent of employees working. Averaging the USA and Sydney (Kingsford Smith) Airport data (88 per cent) results in an approximate 80 per cent of employees being on site.

For the purposes of the EIS, it has been assumed that 80 per cent of employees will be on-site on any given day to allow for changes in shift work. This results in the proposed airport having 6,983 employees on site on any day in 2031.

The shift profiles are shown in Table 6-6.

6.3.3 Employee shifts

The airport employees have been categorised into the following:

- airfield operations: 3 shifts of 8.5 hours.
- terminal support: 2 main shifts plus 2 split shifts
- office workers: 2 shifts offset by 1 hour.

Shift profiles of workers can be seen in Table 6-6.

Airfield operations

Airfield operations consist of the activities that keep the airfield operating safely such as aircraft control, site security, firefighters etc.

This also includes a component of terminal support for overnight operations.

This has been assumed to be a constant 4 per cent of employees undertaking this activity at any time based on the number of flights arriving and departing during the late night/ early morning periods.

Terminal support

Terminal support includes Customs and Border Protection, retail and dining and airside activities such as baggage handling and refuelling. These shifts are dependent on the number of passengers using the airport.

It has been assumed that there would be two (2) x seven (7) hour shifts with two additional ½ shifts of 4 hours.

Office workers

Office workers include back office support and administration for airfield, airline and terminal activities and a level of regular terminal activities. For the purposes of the EIS analysis, it has been assumed that flexible work practices apply with some employees starting in the hour between 7.00 and 8.00 am and the remainder commencing work between 9.00 and 10.00 am, with a 9-hour shift for each group.

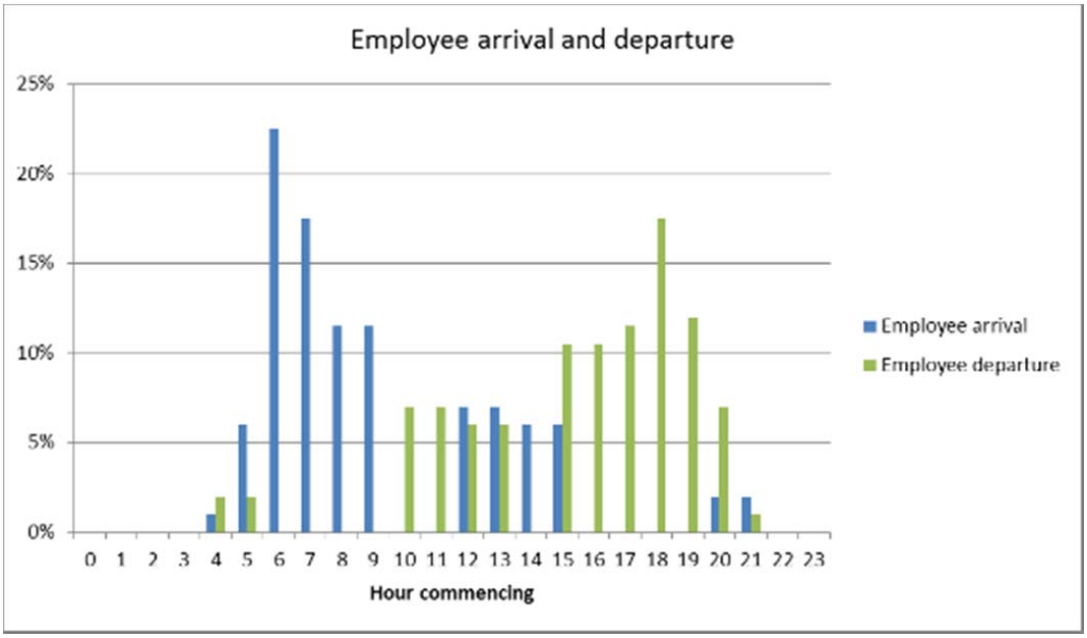
Table 6-6 WSA assumed Stage 1 shift profiles

Worker type	Start	Finish	Percent of total employees	No. of employees
Airfield and terminal overnight	21:00	05:00	2	140
Airfield day	05:00	13:00	3	210
Airfield afternoon	13:00	21:00	3	210
Terminal support morning	06:00	13:00	10	698
Terminal support afternoon	13:00	20:00	10	698
Terminal supplementary morning	06:00	11:00	14	978
Terminal supplementary afternoon	15:00	19:00	14	978
Office early start	07:00	17:00	21	1,467
Office later start	09:00	19:00	23	1,606
		Total	**100**	**6,983**

6.3.4 Employee arrival and departure profiles

A synthetic profile for employee arrivals and departures prior to and after their shifts has been created to allow for some early and late starts and finishes for employees. For each shift, 50 per cent of employees have been assumed to arrive in the hour before their shift starts and the remaining in the hour that the shift starts. A similar process has been developed for completion of shifts. This results in the profile shown in Figure 6-23.

Figure 6-23 Stage 1 operations employee arrival and departure profile – percentage



This translates into the volume of employees arriving and departing in each hour as shown in Figure 6-24.

Figure 6-24 Stage 1 operations employee arrival and departure profile - volume

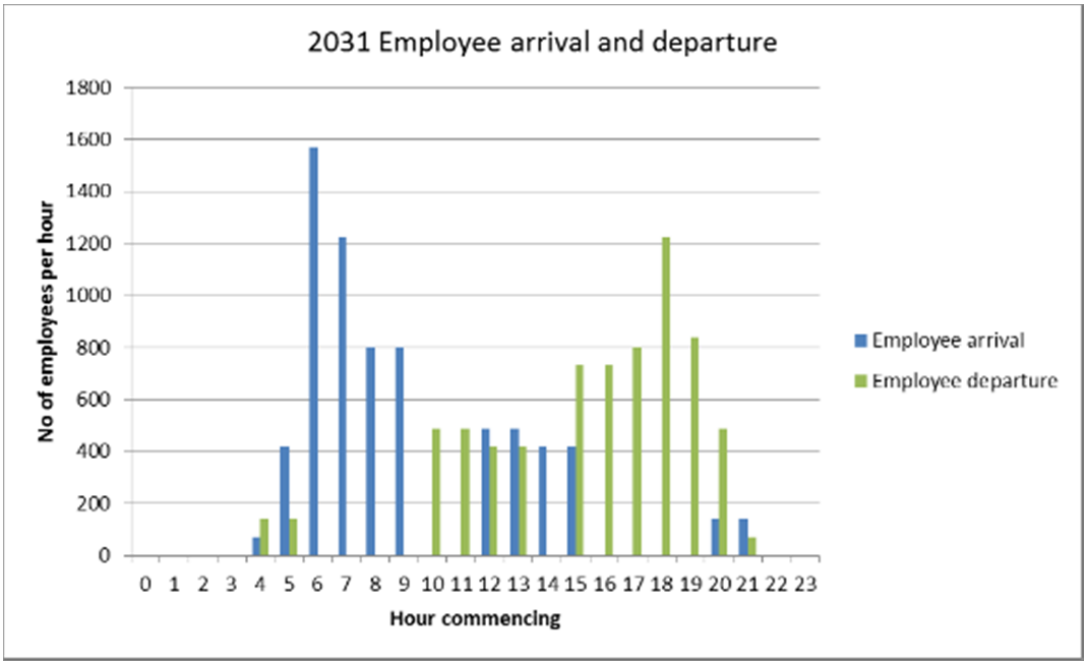
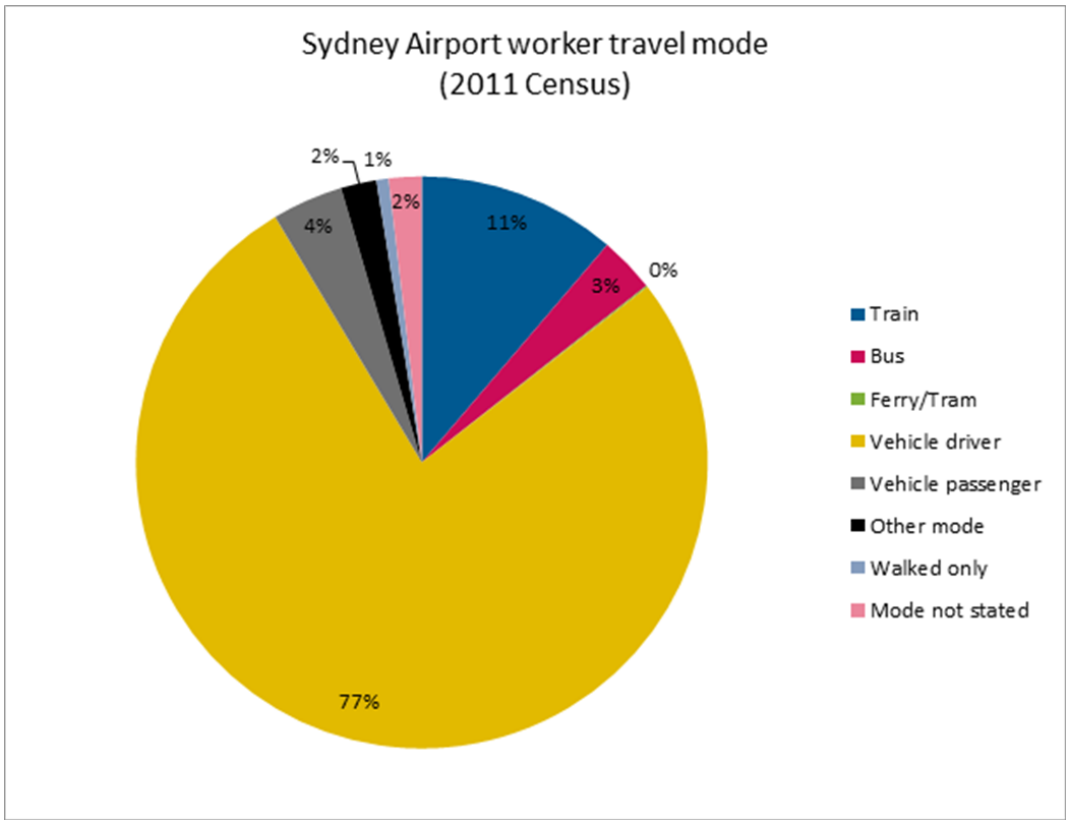


Figure 6-24 shows that the peak arrival for the AM peak period is 1,571 employees between 6:00 am and 7:00 am while the PM peak departure for employees is after the main transport network peak between 6:00 pm and 7:00 pm, with 1,222 employees leaving in this hour.

6.3.5 Mode split

The employee mode split has been determined using the Sydney Airport overall mode splits for journey to work and modifying it by reassigning the train mode to car based modes. The Sydney Airport mode splits are shown in Figure 6-25.

Figure 6-25 Sydney (Kingsford-Smith) Airport employee mode split



Source: Bureau of Transport Statistics 2011

Sydney Airport has a rail mode split of 11 per cent. As it is assumed that the proposed airport will not have a railway service until after 2031, these trips have been apportioned to other modes.

Additionally, as the proposed airport is relatively isolated from the surrounding development, it has been assumed that no employees would use public transport in the early hours of the morning to arrive at the airport due to service limitations.

An evaluation of the existing mode splits for employment in areas surrounding the airport site shows the limited use of public transport for overall workplace travel (Table 6-7).

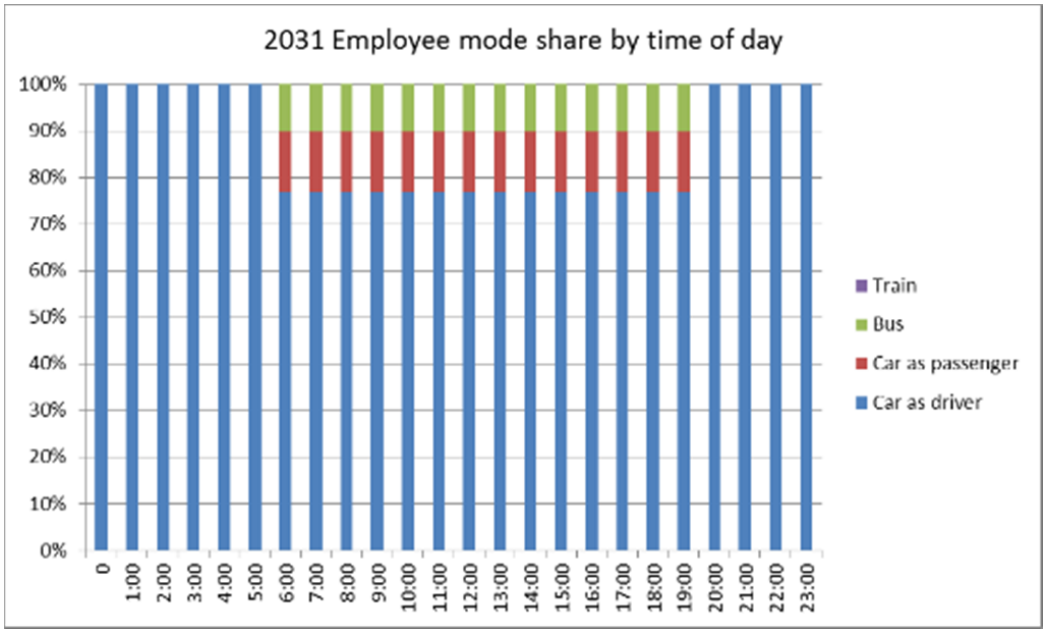
Table 6-7 Employee mode split for areas adjacent to WSA in 2011

LGA	Population	Car Driver	Car Passenger	Public Transport	Other
Liverpool	180,143	64	5.8	12.4	17.8
Penrith	178,467	64.7	5.5	10.7	19.1
Camden	56,720	69	4.6	6.8	19.6
Fairfield	187,766	63	7.4	13.1	16.5
Campbelltown	145,967	60.1	5.7	17.1	17.1
Blacktown	301,099	60.5	5.9	17.6	16
Holroyd	99,163	57.5	5.5	20.4	16.6
Average	**164,189**	**62.7**	**5.8**	**14.0**	**17.5**
Population weighted average		**62.2**	**5.9**	**14.6**	**17.2**

Source: Transport for NSW Journey to Work browser

The assumed mode split by time of day is shown in Figure 6-26.

Figure 6-26 Stage 1 operations assumed employee mode split by time of day



Using the distributions applied in the previous sections, the employee trips have been assigned to the transport modes. These are shown in Figure 6-27 and Figure 6-28 for arrivals and departures respectively.

Figure 6-27 Stage 1 operations employee arrivals by mode by time of day

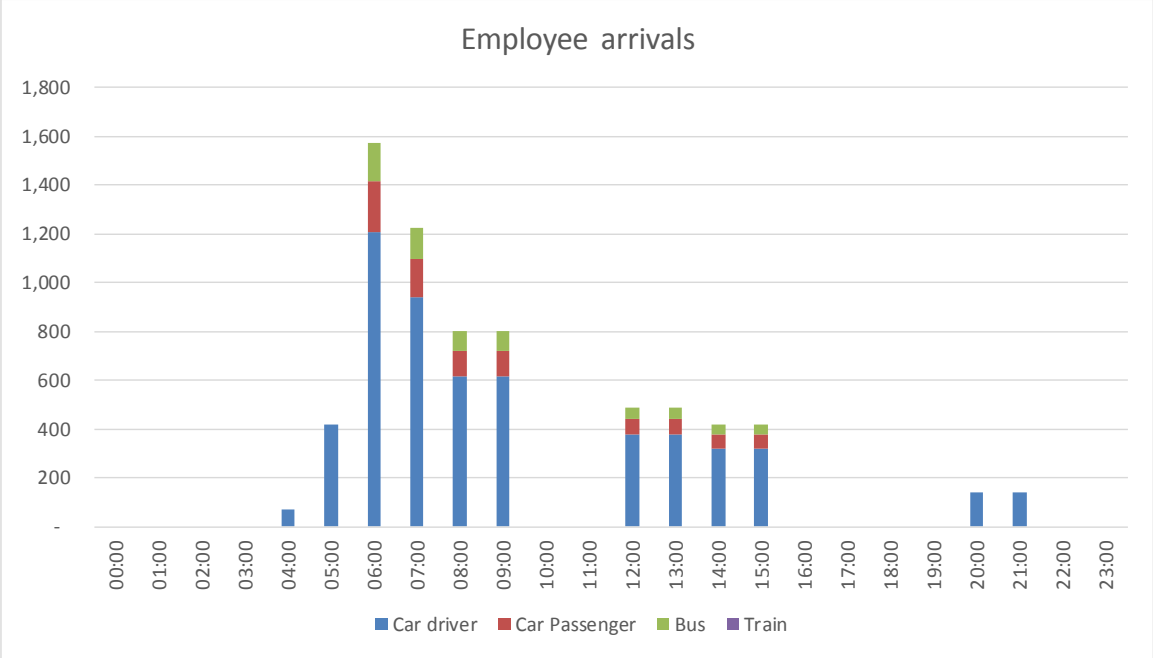


Figure 6-28 Stage 1 operations employee departures by mode by time of day

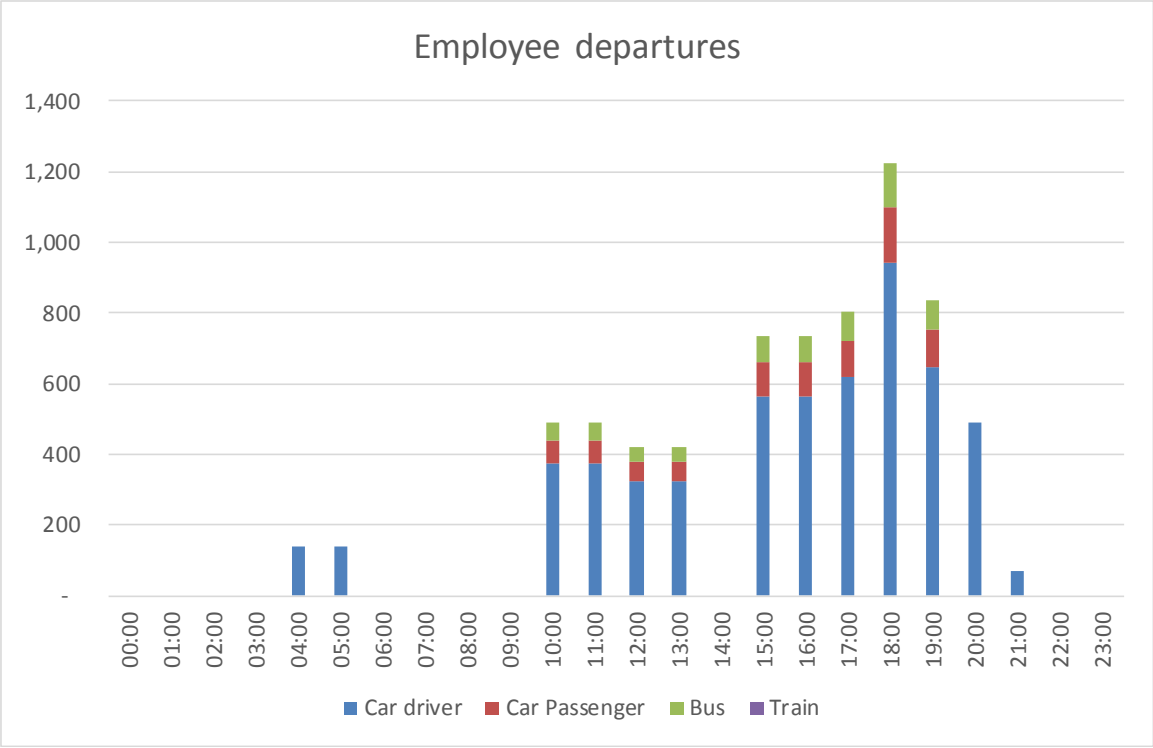


Figure 6-27 and Figure 6-28 shows that the majority of airport employees are expected to drive to work at the airport site with only a small number using public transport.

6.3.1 Traffic generation

The traffic generation for employees is shown in Figure 6-29 and Figure 6-30.

Figure 6-29 Stage 1 operations employee vehicle arrivals by mode

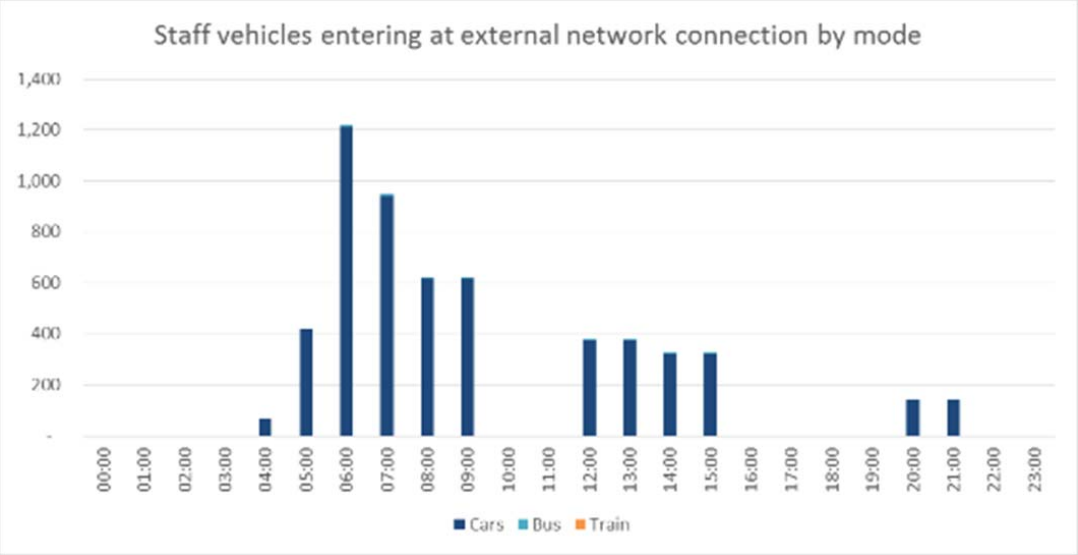


Figure 6-30 Stage 1 operations employee vehicle departures by mode

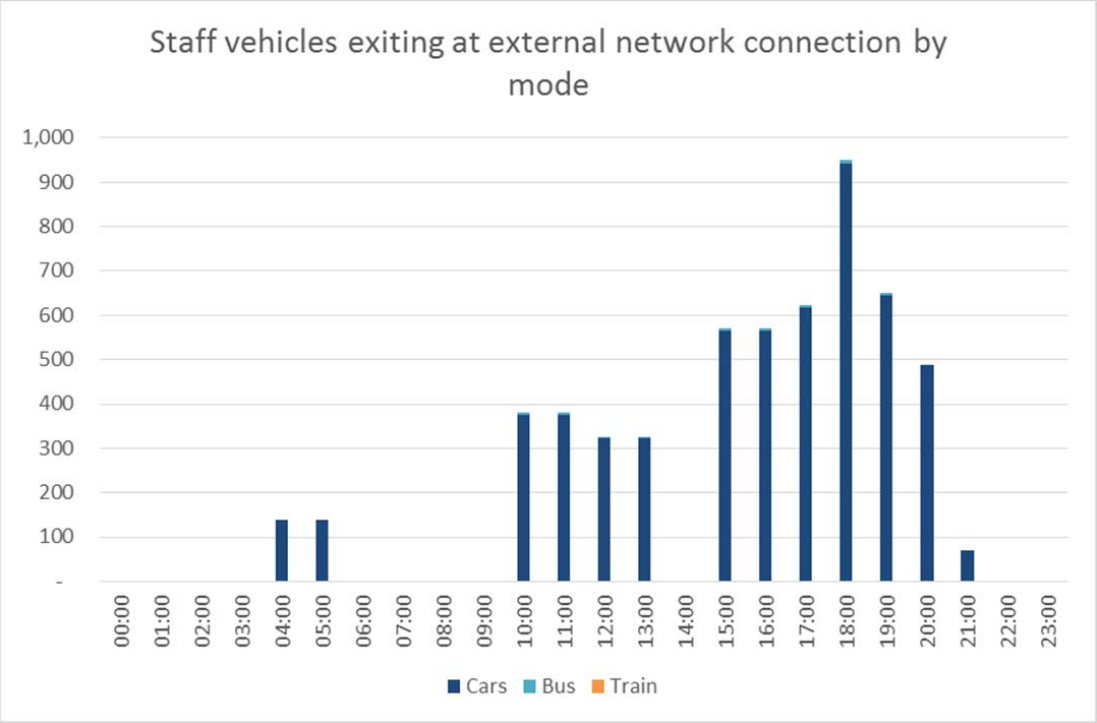


Figure 6-29 and Figure 6-30 show that the employee traffic generation peaks are outside the nominal main traffic peaks (7:00 am – 9:00 am and 4:00 pm - 6:00 pm as used in STM3) for both the arrival and departure of employees.

6.4 Combined air passenger and employee trip generation

The total trip generation for air passengers and employees based on the total trips for each hour are shown in Figure 6-31 and Figure 6-32.

Figure 6-31 Total arrival trip generation by mode

Figure 6-32 Total departure trip generation by mode

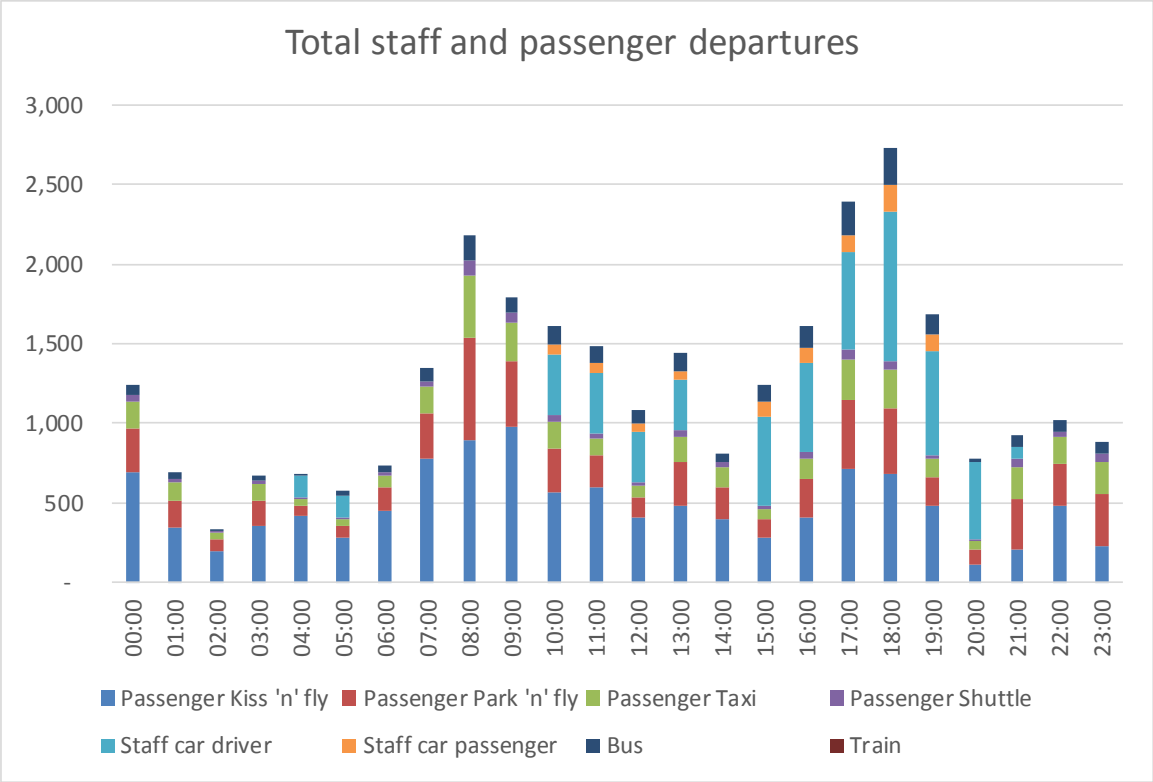
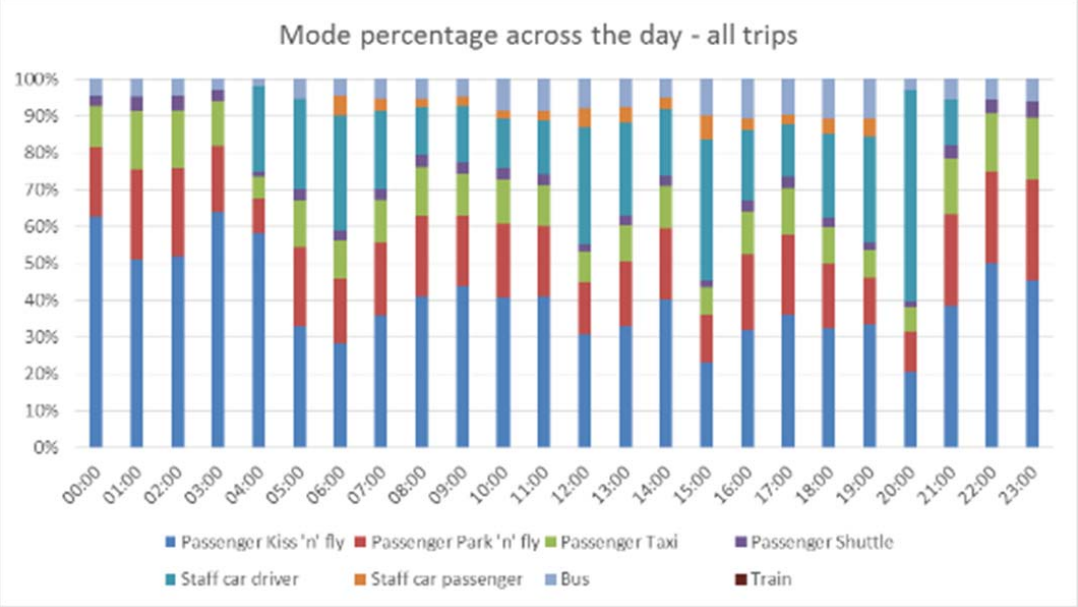


Figure 6-31 shows that the peak trip generation to the proposed airport occurs between 6:00 am and 7:00 am and is 3,134 trips. Furthermore, the trip generation between 7:00 am and 8:00 am of 3,122, signifying an AM peak for trip generation extending over a two-hour period, with a similar level of trip generation.

Figure 6-32 shows that the peak trip generation from the proposed airport occurs between 6:00 pm and 7:00 pm and is 2,725 trips.

When the actual mode splits across the day are determined based on the preceding sections, the resultant average mode split is as shown in Figure 6-33.

Figure 6-33 Mode split across the day



6.5 Total air passenger and employee traffic generation

The trips identified in Sections 6.2 and 6.3, converted into traffic trips to and from the proposed airport via the connection to the external transport network, are shown in Figure 6-34 and Figure 6-35.

Figure 6-34 Traffic generation to the main entrance of the proposed airport by vehicle type

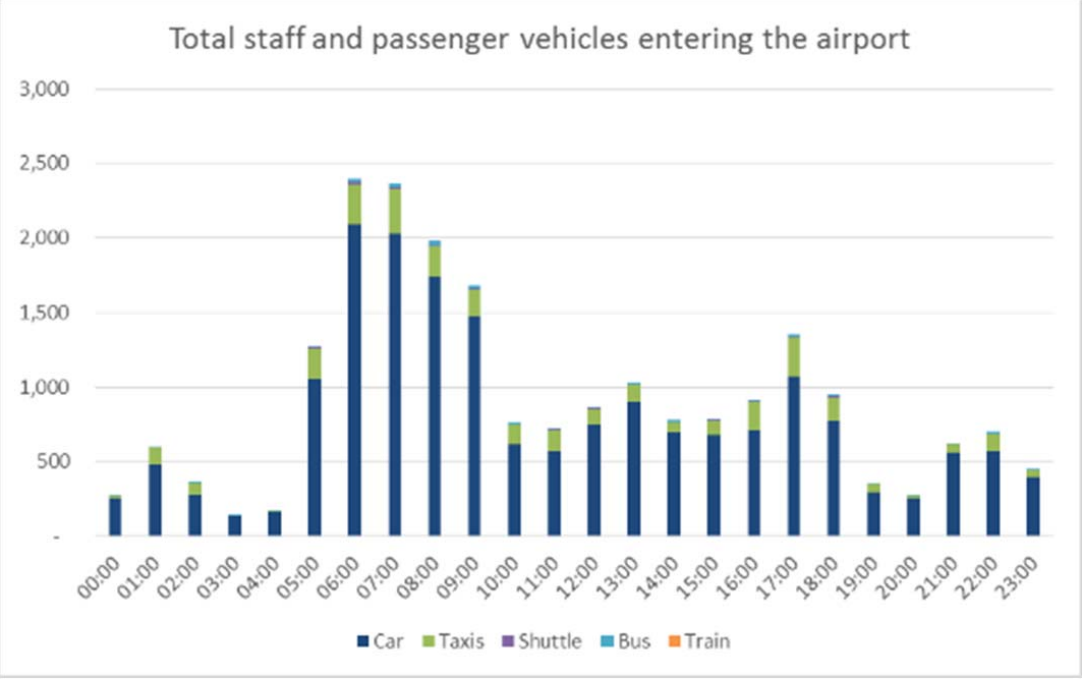


Figure 6-35 Traffic generation from the main entrance of the proposed airport by vehicle type

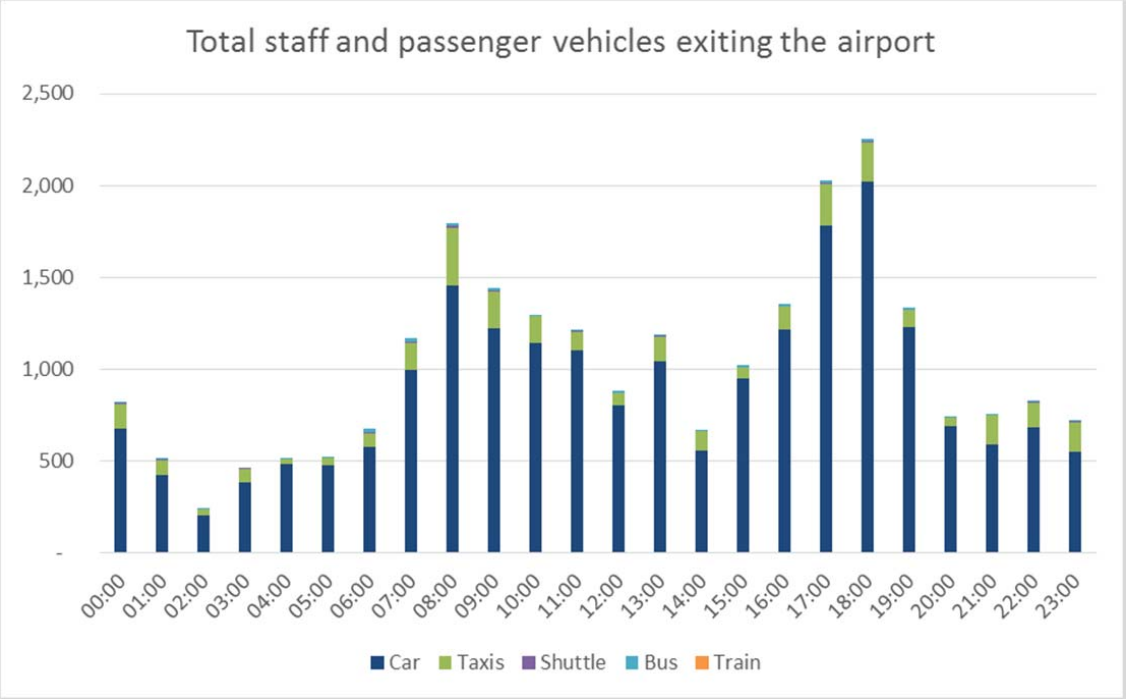


Figure 6-34 shows that the peak vehicle demand to the proposed airport is between 6:00 am and 7:00 am and is 2,397 vehicles per hour.

Figure 6-35 shows that the peak vehicle demand away from the proposed airport is between 6:00 pm and 7:00 pm and is 2,254 vehicles per hour.

6.6 Freight trip generation

Freight demand has been provided for air freight and for the fuel depot. No demand estimates for airport consumables (e.g. food, retail items) or predictions of waste removal quantities from the proposed airport terminals are available as it is not possible to determine these items without a detailed terminal plan.

6.6.1 Air freight

The freight demand for air cargo at the proposed Stage 1 airport is estimated to be 220,000 tonnes. This level of freight demand has been assumed for this assessment.

In order to turn these cargo loads into freight trips, it has been assumed that the cargo freight arrives using the proportions of heavy rigid trucks, semi-trailers and B-Doubles as shown in Table 6-8.

Each freight cargo truck carrying mass and its percentage of the fleet is shown in Table 6-9.

Table 6-8 Stage 1 operations freight vehicle expansion factors

Vehicle type	Percentage of vehicle fleet	Number of car equivalents (pcu)	Cargo mass carried (tonnes)
Heavy Rigid Truck (12.5 metres long)	65	2	8.5
Semi-Trailer (19 metres long)	25	3	25
B-Double (23 -26 metres long)	10	5	33

The following conservative assumptions have been made in determining the hourly freight movements:

- freight movements occur on only 300 days per year (assumed six days per week for 50 weeks per year);
- deliveries to / from the airport are spread evenly over a 12-hour period per day; and
- each truck makes only one delivery or pick up – i.e. trucks do not do a delivery and pick up in a single two-way movement

The daily distribution and hourly movements are shown in Table 6-9.

Table 6-9 Stage 1 operations two-way freight truck movements

Vehicle type	2031 Annual movements	2031 Daily movements	2031 Hourly movements	2031 Car equivalents (pcu) per hour
Heavy Rigid Truck (12.5 metres long)	16,824	56	4.67	9.35
Semi-Trailer (19 metres long)	2,200	7	0.61	1.83
B-Double (23 -26 metres long)	667	2	0.19	0.93

6.6.2 Fuel deliveries

It has been estimated that by Stage 1 operations, approximately 43 B-Doubles of fuel per day would be required to serve the operations at the proposed airport.

Based on the expansion factors used in section 6.6.1, this would result in two B-Doubles per hour, or 10 passenger car units (pcus) per hour entering the site and the same number exiting the site. These volumes are minimal in comparison to the volumes generated by other airport activities.

6.7 Total airport traffic generation estimate

The traffic generation calculations presented in this section are inserted into the traffic model to assess their impact. Traffic profiles throughout the day, as presented in this section have been converted to STM3 time periods. The figures are presented in Table 6-10 for representative one-hour periods, which are not necessarily consistent with the overall peak hours reported elsewhere in this section, with a 24-hour total.

Table 6-10 Total modelled traffic to/from the proposed airport for Stage 1 operations

2030	AM peak hour	Interpeak hour	PM peak hour	Evening hour	24 hour
Vehicles accessing					
Passengers	1,383	687	907	484	15,901
Employees	786	285	746	153	5,595
Freight	5	5	5	0	66
Total accessing	**2,175**	**977**	**1,658**	**638**	**21,562**
Vehicles egressing					
Passengers	1,248	758	746	507	15,879
Employees	-	235	588	188	5,611
Freight	5	5	5	0	66
Total egressing	**1,254**	**999**	**1,339**	**695**	**21,556**

Note that the analysis excludes the traffic to and from the proposed airport generated by associated commercial development and freight traffic for consumables.

The slight discrepancy in accessing and egressing totals is due to park-and-fly trips where access and egress profiles are calculated separately and external taxi trips where the inbound and outbound occupancy rates differ.

6.8 Airport traffic distribution

The traffic generated from the proposed airport was distributed using STM3, incorporating output from SALTM (Sydney Airport Landside Model). STM3 calculates traffic distribution from first principles, by using the land use inputs combined with the generalised costs of travel from origin to destination zone. SALTM was built to assess the future landside transport needs of Sydney (Kingsford Smith) Airport. An adaptation of SALTM has been used to provide a more robust assessment of the trip distribution at WSA and has been incorporated into STM3. As such, this source is considered the best available for the proposed airport traffic generation.

7. Operational impact assessment

7.1 Background traffic growth

As a result of existing and future planned developments in Western Sydney, there is expected to be a considerable amount of development growth in coming years, largely comprised of:

- South West Priority Land Release Area
- Western Sydney Employment Area
- Western Sydney Priority Growth Area
- Greater Macarthur Land Release Investigation Area
- smaller growth centres

An analysis has been carried out of the number of trips originating in each of the SA3 statistical areas shown in Figure 7-1 within approximately 10 km of the airport site.

Figure 7-1 Statistical areas in the vicinity of the airport site

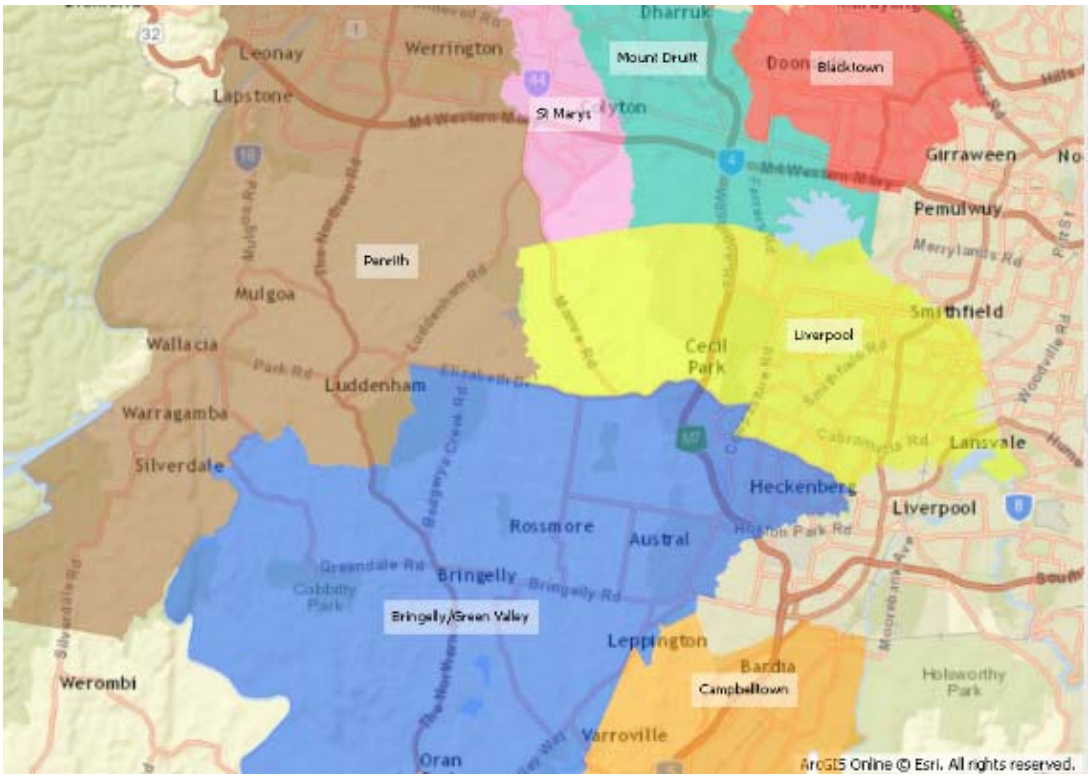
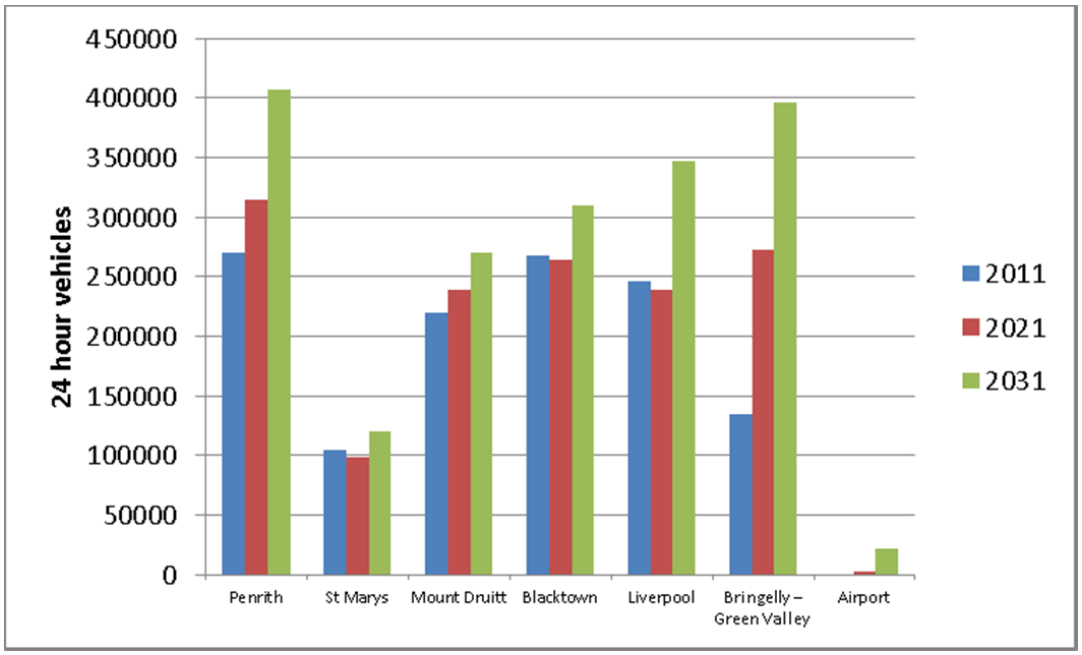


Figure 7-2 provides a summary of the number of trips in the vicinity of the proposed airport, and shows the expected growth to 2031. It suggests that the proposed airport would be a very small component of overall travel demand in 2031.

Figure 7-2 Vehicle movements originating within surrounding SA3 (24 hour)



Data source: STM3 model outputs and estimates prepared for this EIS

7.2 Future road network performance

The vehicle movements generated by WSA in addition to the existing trips in the STM3 model are presented in Table 6-10. For modelling purposes, it is assumed that all passengers, airport workers and freight would access the proposed airport via the northern side of the site, either using the M12 or Elizabeth Drive.

Figure 7-3 and Figure 7-4 show the changes in traffic volumes for Stage 1 operations, comparing the Without Airport and With Airport scenarios. The differences are in pcu for the 2-hour peak periods.

Note that the impacts of the volume changes are shown in terms of Level of Service (Table 7-1) and volume/capacity plots (Figure 7-6 and Figure 7-7) with a discussion following these figures in Section 7.3.

The M12 is included in both the 'With Airport' and Without Airport scenarios.

Figure 7-3 and Figure 7-4 show:

- that compared to the 'without airport' scenario, the proposed airport is predicted to generate an increase in traffic volumes on:
  - Elizabeth Drive
  - M12
  - The Northern Road
  - Luddenham Road
  - Mamre Road

Figure 7-3 Traffic volume difference plot Stage 1 operations 'With Airport' –'Without Airport' AM Peak

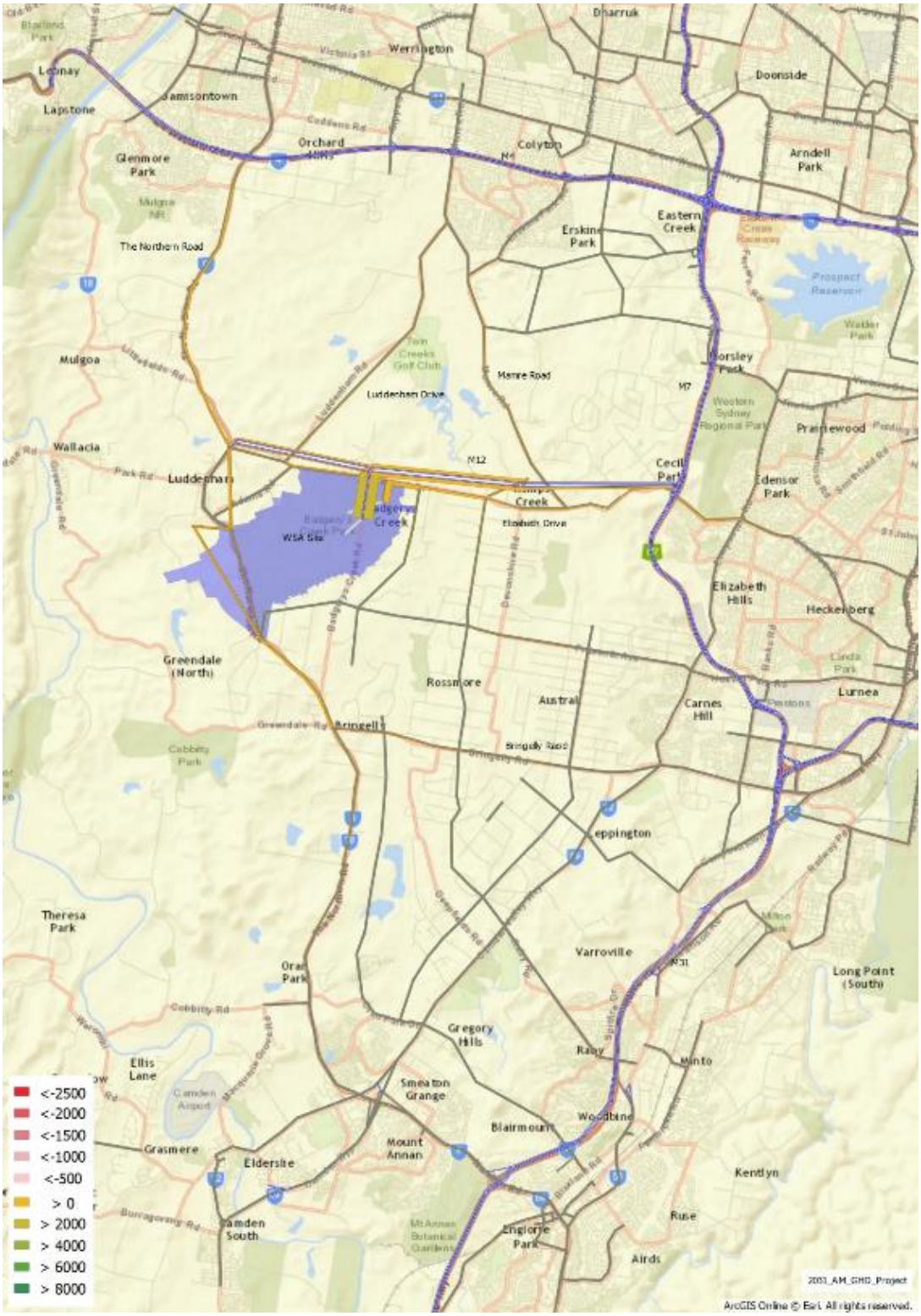
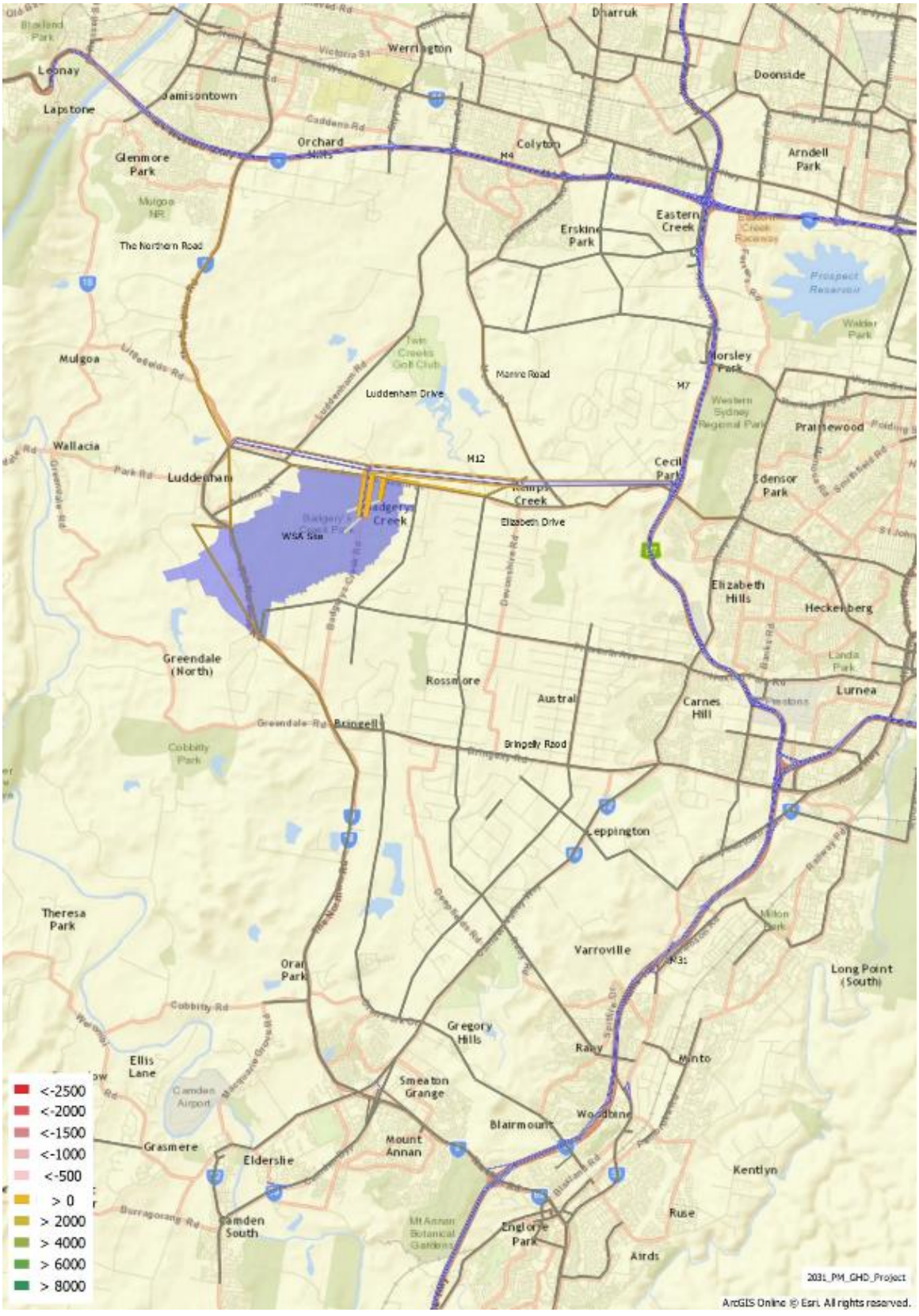


Figure 7-4 Traffic volume difference plot Stage 1 operations 'With Airport' – 'Without Airport' PM Peak



An analysis has been carried out on the mid-block level of service for the 'Without Airport' and the 'With Airport' scenarios. The Level of Service is shown illustratively in Figure 7-6 and Figure 7-7 for the AM and PM peaks respectively. A summary of the Level of Service at key links in the network is provided in Table 7-1, with a map of the location of the key links provided in Figure 7-5.

Figure 7-5 Location of Tabulated Level of Service output

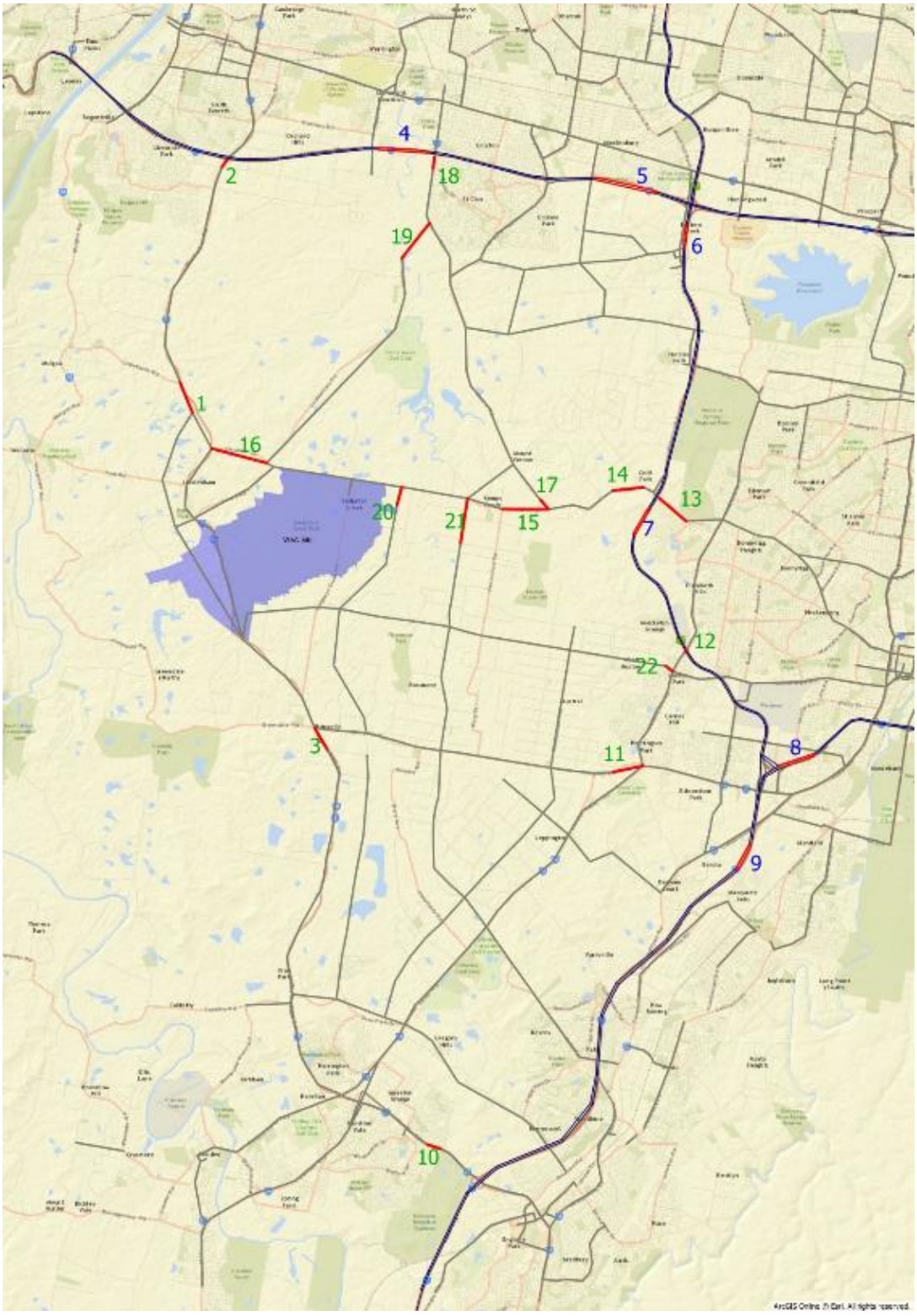


Table 7-1 Level of Service for Stage 1 operations With and Without Western Sydney Airport

Id	Road	Location	Baseline (Without WSA)				With WSA			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd
1	The Northern Road	North of Elizabeth Drive	C	C	C	C	C	**D**	**D**	C
2	The Northern Road	South of M4	F	F	F	F	F	F	F	F
3	The Northern Road	South of Bringelly Road	C	C	C	C	C	C	C	C
4	M4	West of Mamre Road	D	C	C	D	D	C	C	D
5	M4	West of M7	E	C	C	E	E	C	C	E
6	M7	South of M4	E	E	F	D	E	**F**	F	D
7	M7	South of Elizabeth Drive	E	D	D	D	E	D	D	D
8	M5	East of M7	F	D	E	F	F	D	E	F
9	M31	South of Campbelltown Road	D	C	C	D	D	C	C	D
10	Narellan Road	North of Tramway Drive	D	F	D	D	D	F	D	D
11	Bringelly Road	West of Cowpasture Road	C	C	C	C	C	C	C	C
12	Cowpasture Road	At M7	D	D	D	D	D	D	D	D
13	Elizabeth Drive	East of M7	E	E	E	E	**F**	E	E	**F**
14	Elizabeth Drive	West of M7	E	B	D	B	**F**	B	**E**	B
15	Elizabeth Drive	West of Mamre Road	A	A	A	A	A	A	A	A
16	Elizabeth Drive	East of the Northern Road	C	C	C	C	C	**B**	C	C
17	Mamre Road	North of Elizabeth Drive	D	B	C	C	**C**	B	C	C
18	Mamre Road	South of M4	E	C	F	C	E	C	F	C
19	Luddenham Drive	West of Mamre Road	C	A	A	B	**B**	**B**	**B**	B
20	Lawson Road	South of Elizabeth Drive	B	A	A	B	**C**	A	A	B
21	Western Road	South of Elizabeth Drive	C	B	B	C	C	B	B	C
22	Fifteenth Avenue	West of Cowpasture Road	B	A	B	B	B	A	B	B
23	M12	West of M7	C	A	B	B	C	**B**	B	**C**
24	M12	West of Mamre Road	A	A	A	A	**B**	A	A	**B**
25	M12	East of the Northern Road	A	A	A	A	**B**	A	A	A

Note: Bold text has been used to identify a change in LoS from the base case – whether this is an improvement or deterioration.
Refer Figure 7-5 for the location ID of various roads.

Figure 7-6 Stage 1 operations AM Peak Volume/Capacity – 'Without Airport' (Left), 'With Airport' (Right)

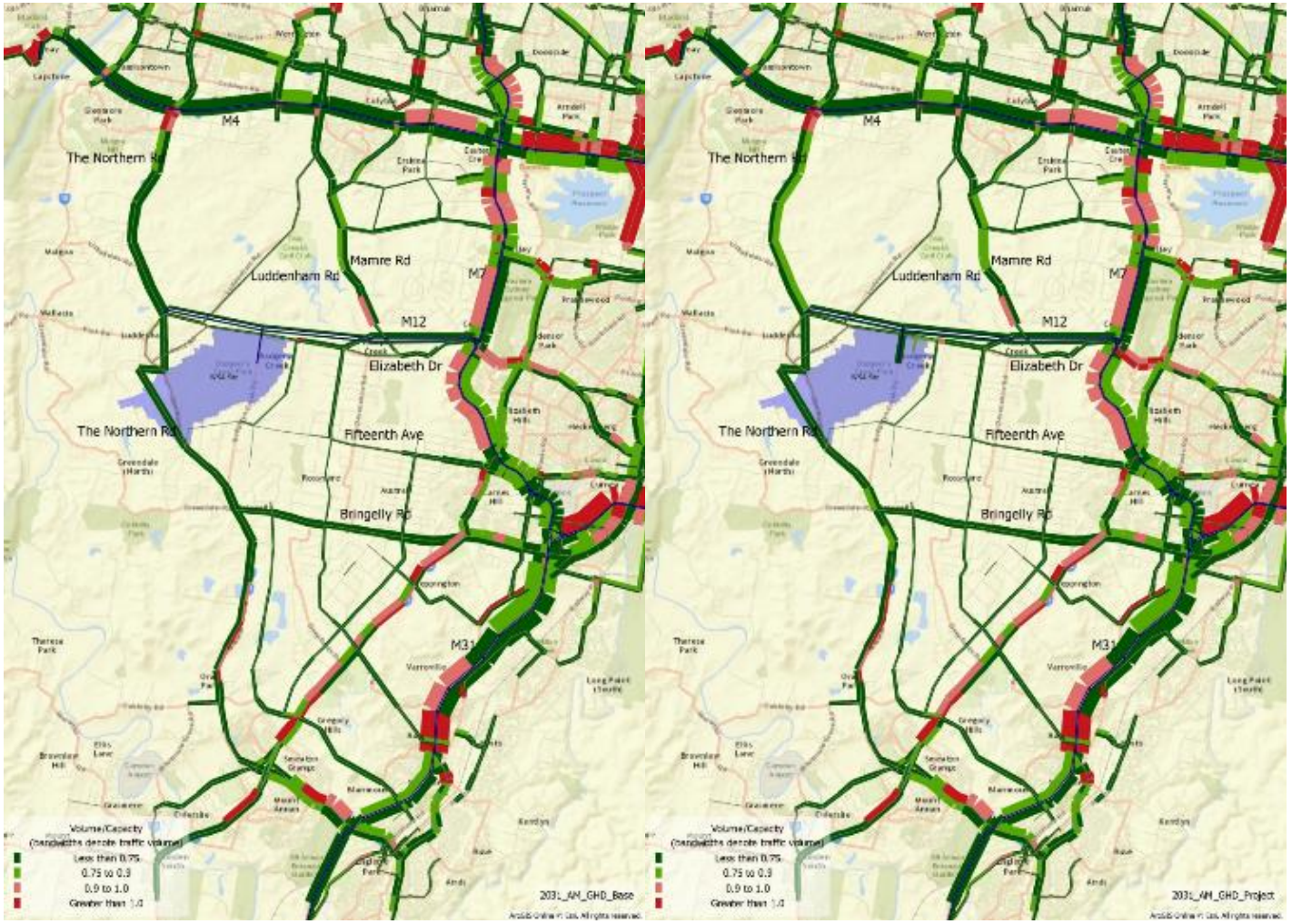
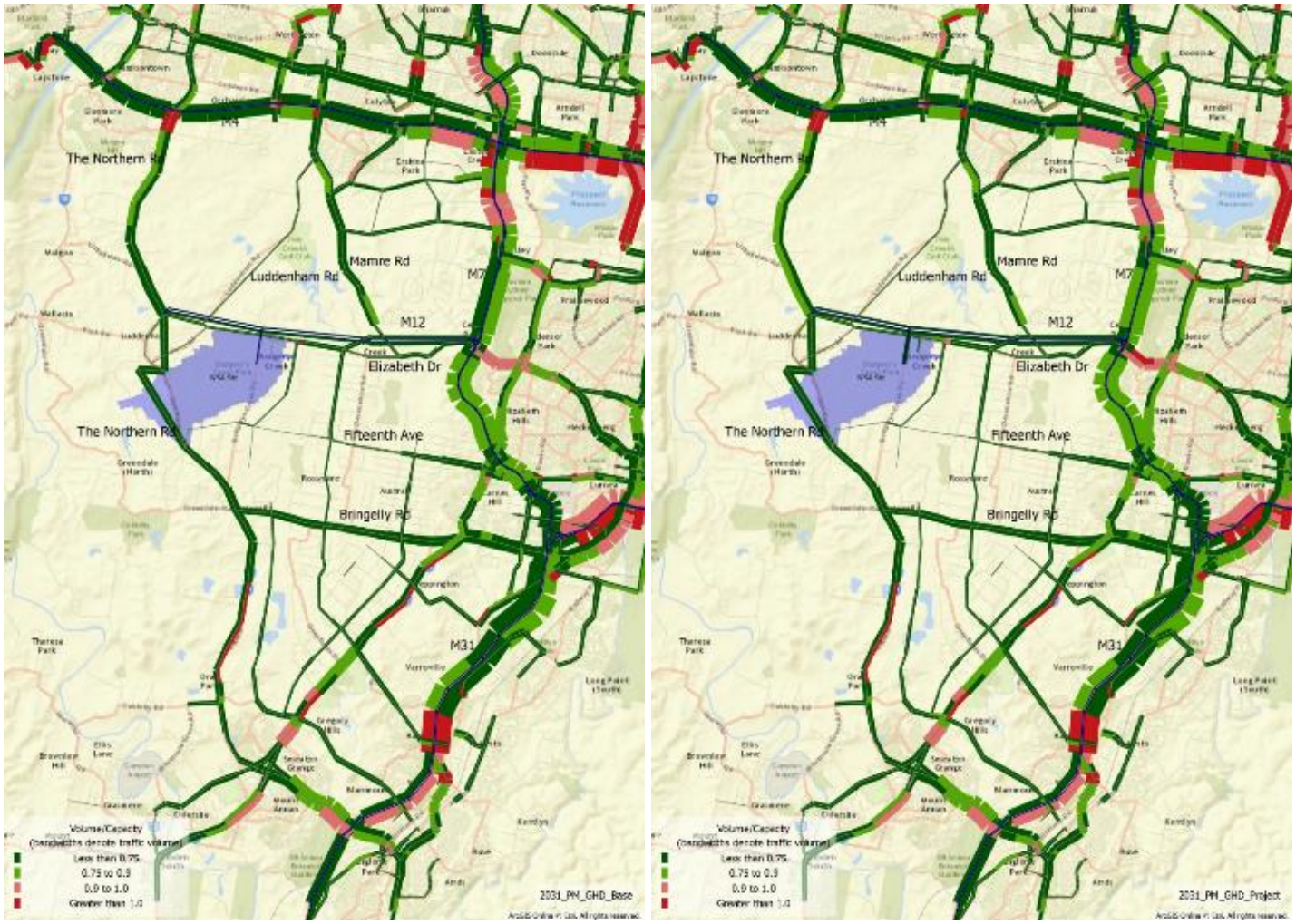


Figure 7-7 Stage 1 operations PM Peak Volume/Capacity – 'Without Airport' (Left), 'With Airport' (Right)



7.3 Impacts on roads and access

The road upgrades identified as part of the WSIP have been developed to support the proposed airport. The upgrades are included in both the 'Without Airport' scenarios and the 'With Airport' scenarios. As such, the impacts evaluated are solely attributable to the presence of the airport.

The introduction of the proposed airport would have the following effects on the capacity of the strategic road network, as shown in Figure 7-6 and Figure 7-7.

Motorway Network

Traffic demands do not appreciably change on the motorway network, with the exception of:

- an increase from LoS E to LoS F on the M7 southbound, south of the M4; and
- increases from LoS A/B on the M12. The M12 is still well within capacity in the 'With Airport' scenario

Arterial Road Network

Traffic volumes increase on Elizabeth Drive and the Northern Road as a result of the airport. This increases LoS in some locations:

- Elizabeth Drive:
  - From E to F, east of the M7. The trip generation from the airport exacerbates the congestion that already exists at this location in the 'Without Airport' scenario. This section of Elizabeth Drive is not being upgraded as part of the M12 scheme and no relief to this section is conferred by the M12; and
  - from D/E to E/F, west of the M7.
- Mostly, The Northern Road is still within capacity in the 'With Airport' scenario. There are changes in LoS in the following locations:
  - from C to D, north of Elizabeth Drive; and
  - LoS F on The Northern Road south of the M4 is unchanged between the Without Airport (existing conditions) and the With Airport case. There is predicted to be congestion both with and without the airport, but the additional demand from the airport exacerbates the predicted congestion.

Collector/Local Roads

- An overall neutral effect is predicted on Luddenham Drive with some improvement and deterioration in LoS at different locations. Overall it is still well within capacity in the With Airport scenario.
- A slight improvement of LoS on Mamre Road from D to C north of Elizabeth Drive. This may be due to the redistribution of background traffic away from the airport due to greater congestion on surrounding roads.

Overall, Stage 1 operations would not significantly impact the capacity of the surrounding transport system.

7.4 Key findings

The following key findings have been developed concerning passenger and employee trip generation and freight trip generation:

- daily passenger, employee and freight vehicle trip generation of 21,562 vehicles to the proposed airport and 21,556 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 6:00 am and 7:00 am and is 2,397 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 pm and 7:00 pm and is 2,254 vehicles per hour;
- daily freight vehicle trip generation of 66 trucks to / from the airport (equivalent to 145 pcu).

The traffic modelling shows that Stage 1 operations would not significantly impact the capacity of the surrounding road transport system. This is primarily because the substantial package of road improvements proposed as part of the WSIP, in addition to those identified in the Western Sydney Employment Area, Western Sydney Priority Growth Area and South West Priority Land Release Area, would have sufficient capacity to cater for the expected airport passenger and employee traffic demand in 2031.

The public transport and walking and cycling systems proposed by the NSW Government and local councils would also have sufficient capacity to cater for the expected airport passenger and employee demand.

As such, no transport mitigation measures are considered to be required for the Stage 1 airport development.

Part B – Assessment of the long term airport development

8. Airport facilities and road network conditions

Key details of the long term airport development are provided in Section 1.1 and more comprehensively in the project description section of Volume 1 of the EIS. A principal component of the long term airport development would be the development of a second, parallel runway in the southern area of the site and related airside and landside facilities sufficient to service an estimated 82 million passengers per year and 61,500 employees. The EIS assessment assumes 2063 as the appropriate year to analyse the potential impacts of the long term airport development on traffic and transport conditions.

8.1 Airport access

The mode splits for the long term development have been mediated on the capacity of the airport access motorway from the proposed M12 motorway The proposed access corridor within the airport site is 100 metres wide, with capacity for six traffic lanes, two bus lanes and a 40 metre rail reserve in which a future rail link could be constructed. The functional capacity of this motorway is 5,100 cars per hour over the 3 lanes to provide a poor Level of Service D. As part of the airport concept development, it has been identified that this forecast level is predicted to be achieved based on current airport passenger volumes in about 2050 and investment in rail infrastructure would be required beyond this point (if not already provided) to enable the airport to reach the desired 82 MAP outlined above. Beyond 2050, it has been assumed that some, limited additional access roadway capacity is made available, but overall parking levels remain stagnant limiting traffic growth.

All trip and traffic generation estimates used in this assessment are based on this assumption.

8.2 Road network improvements

The assumed road network for the 2063 assessment year is generally consistent with the 2031 model, with the addition of the proposed Castlereagh Highway and the proposed Outer Sydney Orbital. The Castlereagh Highway would provide a new link between Bells Line of Road at Kurrajong and the north-western section of the M7 Motorway near Dean Park. This new road link will provide two traffic lanes in each direction along the entire corridor. The Outer Sydney Orbital has been included in the network for assessment purposes, however, this proposed road is still subject to investigation by the NSW Government and no construction timeframe has been announced.

8.3 Public transport

The public transport system assessed in the modelling for the long term airport development is similar to the initial stage development with the exception that a rail link to the Sydney Trains network will be introduced.

Error! Reference source not found. broadly indicates how rail could approach the airport site. A potential final rail alignment would be determined by governments following the joint Scoping Study on Rail Needs for Western Sydney.

Figure 8-1 **Potential rail alignment options connecting to the airport site**

8.4 Pedestrian and cycling facilities

Future planned walking and cycling links in the vicinity of the airport site are identified in the South West Priority Land Release Area Structure Plan and the BWSEA Structure Plan.

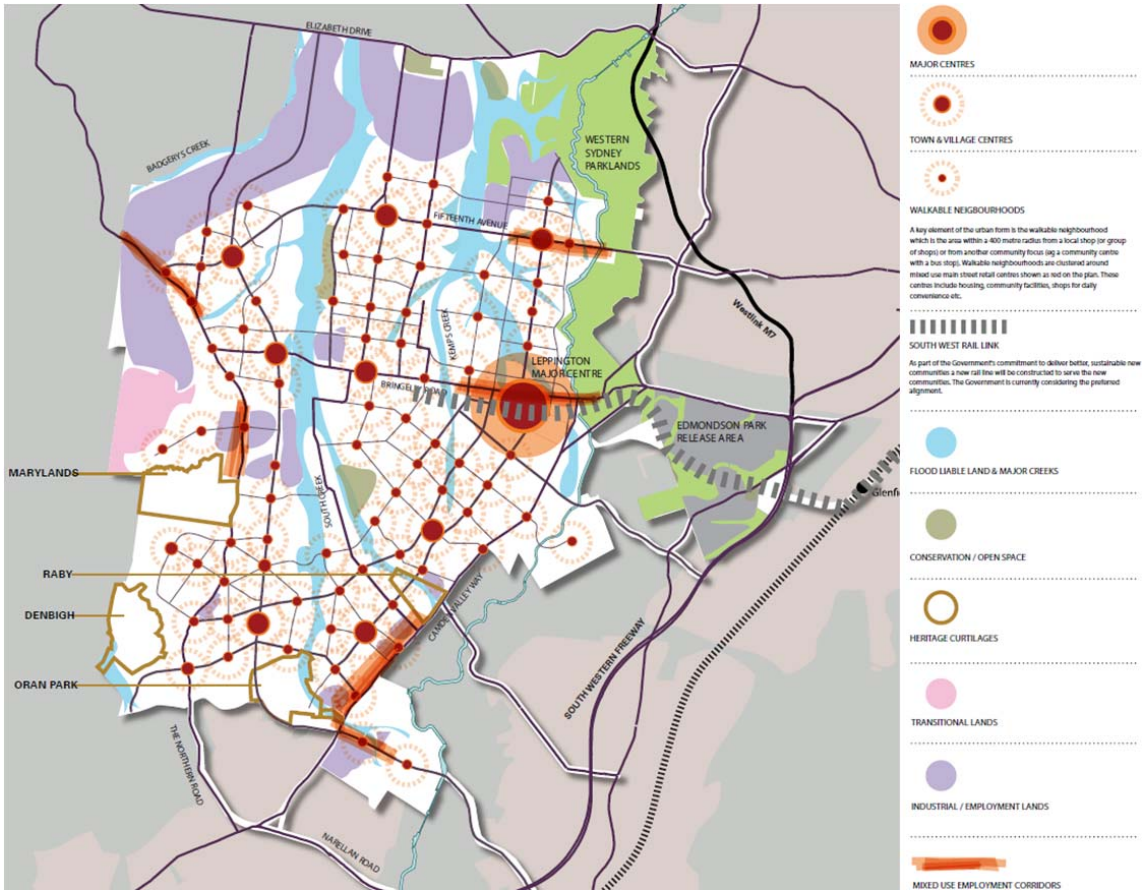
8.4.1 South West Priority Growth Area

The definition of the South West Priority Growth Area has been amended by the NSW Government. It now includes parts of the former BWSEA north of Elizabeth Drive and excludes southern parts of the area shown in **Error! Reference source not found.**. This change has not impacted the South West Priority Growth Area Structure Plan at time of writing.

The South West Priority Growth Area Structure Plan is shown in **Error! Reference source not found.**, which identifies key road corridors, major centres and local centres. The Structure Plan also shows walkable neighbourhoods, which is the area within a 400 metre radius from a local shop (or group of shops) or from another community focus (e.g. a community centre with a bus stop).

Although the Structure Plan does not specifically identify cycling and walking paths, it is likely that cycle and walking paths will be provided along these road corridors. Key road links in the vicinity of the airport site identified in the Structure Plan include The Northern Road and Elizabeth Drive.

Figure 8-2 South West Priority Growth Area Structure Plan



Source: http://growthcentres.planning.nsw.gov.au/LinkClick.aspx?fileticket=DIxdhdNT1b8%3d&tabid=91

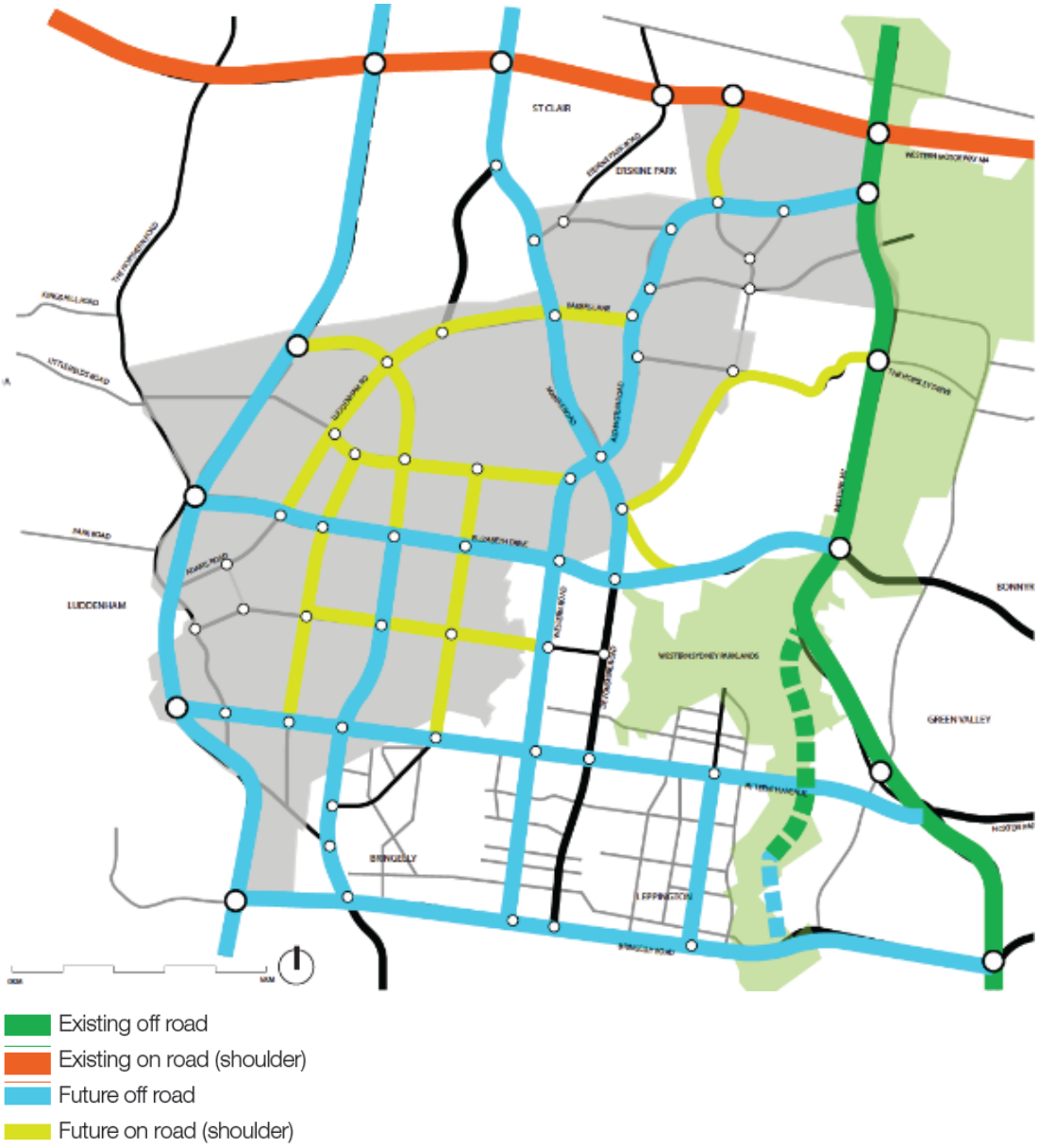
8.4.2 Western Sydney Employment Area

The advent of the Western Sydney Priority Growth Area has meant that some land formerly designated as part of the Broader Western Sydney Employment Area to the north of Elizabeth Drive now resides within the Western Sydney Priority Growth Area. This change has not led to an update of the proposed strategic bicycle network planning as detailed here, at time of writing.

The proposed strategic bicycle network for the BWSEA, provided from the *BWSEA Transport Planning Preliminary Analysis Exhibition* draft report (GHD 2013) is shown in Figure 8-3. The cycle routes have been defined as shoulder or off-road cycle paths. Off road routes will involve the provision of dedicated cycle ways or shared paths alongside roads or within reserves. Shoulder routes allow for widening of carriageways so that cyclists can travel on road with a safe separation from moving vehicles.

The *BWSEA Transport Planning Preliminary Analysis Exhibition* draft report states that pedestrians will be provided for on all routes, with pedestrian paths provided on both sides of roads with active land uses. In addition, the majority of off road cycle routes would also be paths shared with pedestrians, with some paths separated at locations with high levels of activity near employment centres.

Figure 8-3 Proposed BWSEA bicycle network



Source: Broader Western Sydney Employment Area Transport Planning Preliminary Analysis Exhibition Draft (GHD 2013

9. Trip generation

9.1 Introduction

The methodology for determining the trip generation for air passengers and employees for the long term development of the proposed airport uses the same processes as discussed in Chapter 6 which should be referred to for the analytical methods applied within this chapter.

The long term concept for the proposed airport is based on the year 2063, when forecast annual passenger movements of approximately 82 million and an employee level of approximately 61,500 are assumed.

9.2 Passenger trip generation

9.2.1 Flight profiles

The passenger flight profile for the site has been determined based on a synthesised profile the number of daily and peak hour passenger flights, as shown in Table 9-1.

Table 9-1 Daily passenger flight movements 2063

Design Day Passenger Air Traffic Movements	2063
Domestic passenger flights	576
International passenger flights	430
Total	**1006**

Source: LEK Airport Demand Summary April 2015

Additionally, the number of flights per peak hour has been determined as shown in Table 9-2.

Table 9-2 Peak hour flight movements 2063

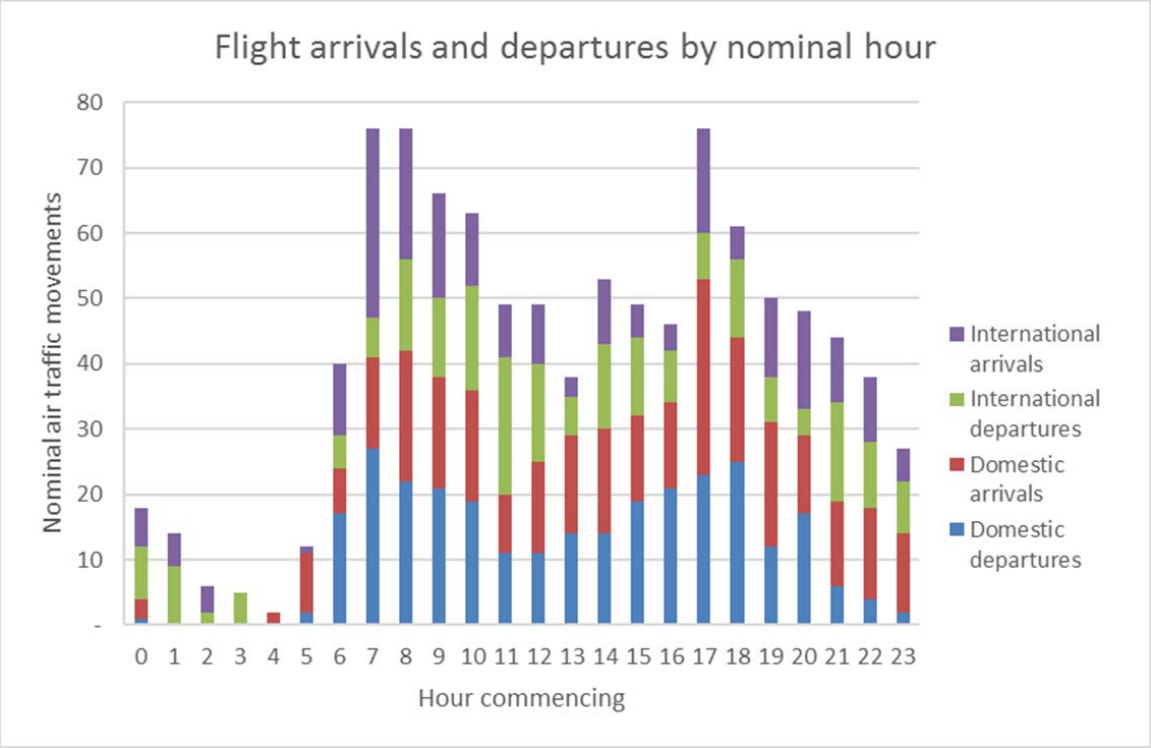
Peak hour flights	No flights	% of daily total
Arrivals (Domestic and International)	40	3.9
Departures (Domestic and International)	36	3.5
Total	**76**	**7.5**

Source: LEK Airport Demand Summary March 2015

Airports with 24-hour operations (including Kuala Lumpur, Hong Kong and Los Angeles) were examined to determine the ratio of arriving and departing flights by hour. It was found that similar sized airports with 24-hour operation have limited overnight flights between 2100 and 0500 hours. This operational profile has been assumed to apply to the proposed airport and is shown in Figure 9-1.

Tables relating to the figures in section 9.2 are provided in Appendix D.

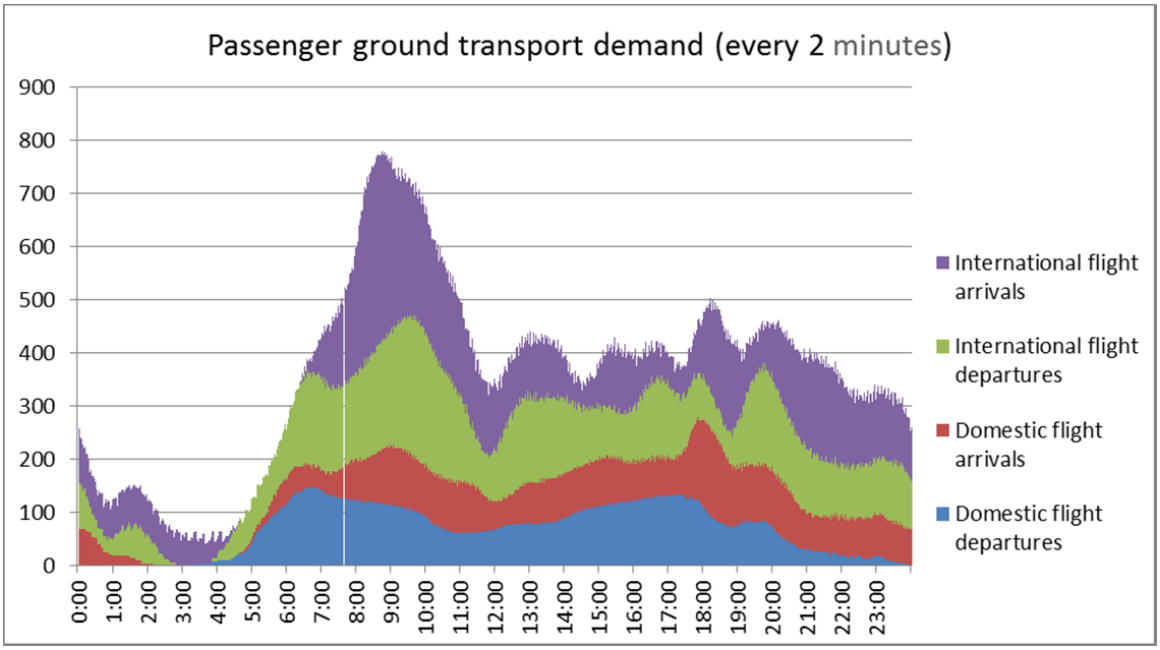
Figure 9-1 2063 daily flight profile



9.2.2 Passenger arrival profiles

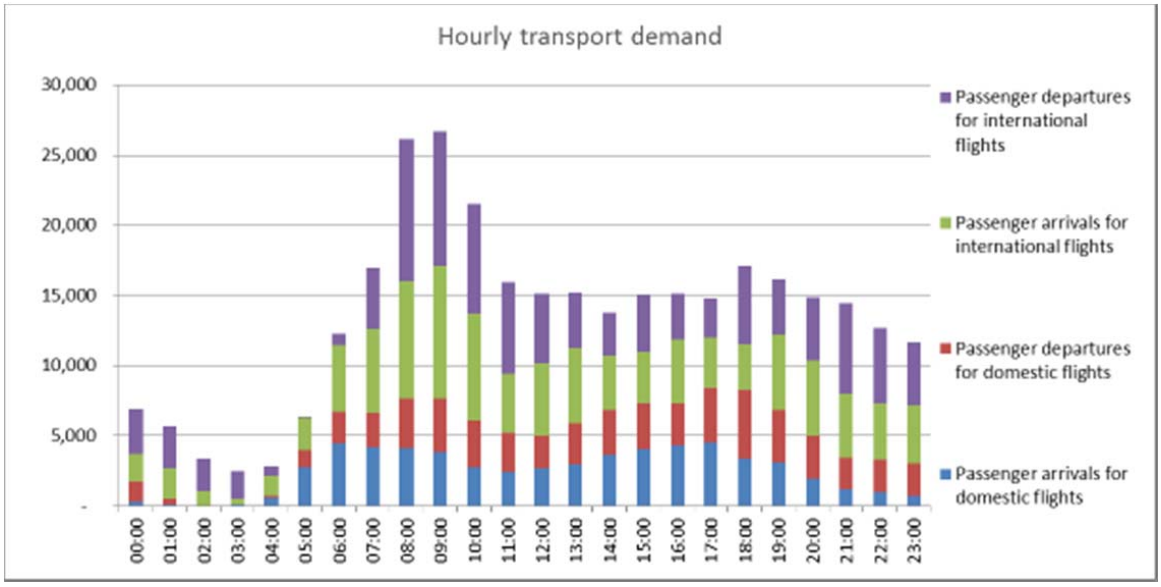
The two-minute interval passenger profile for 2063 is shown in Figure 9-2.

Figure 9-2 Two minute ground passenger transport demand - 2063



When this is converted into hourly volumes, the peak hourly demand is shown in Figure 9-3.

Figure 9-3 2063 ground transport demand per hour



9.2.3 Ground transportation modes

The departing and arriving passengers at the proposed airport would use various modes of travel. These have been assigned as the following modes:

- kiss ‘n’ fly;
- park ‘n’ fly;
- taxi;
- shuttles;
- bus;
- rail; and
- other modes.

For a description of these modes refer to section 6.2.4.

9.2.4 Mode split

The approach used within this analysis varies from the SALTM model, as the SALTM model is a 4-step transport model that determines transport mode splits based on travel times and origin/destination pairs. As the modelling undertaken for the concept plan requires the capacity of the proposed access road network to be a constraint, the mode split proportions are required to be an input. The proportions used for each mode are shown in Figure 9-3.

Table 9-3 2063 assumed mode split

Modes	2063 Mode split			
	Domestic		International	
	Drop off	Pick up	Drop off	Pick up
Kiss and Fly	22%	22%	26%	26%
Park and Fly	20%	20%	18%	18%
Taxi	20%	20%	20%	20%
Shuttle	5%	5%	5%	5%
Bus	13%	13%	13%	13%
Rail	20%	20%	18%	18%

9.2.5 Dwell times

For each transport mode, there is a range of dwell times based on the mode type and trip purpose. For example, an international Kiss 'n' fly pickup trip may involve arriving prior to the flight's arrival at the proposed airport, allowing enough travel time to cater to the variability in the external road network and the passengers being collected passing through the border. In comparison, a bus vehicle will have a nominated dwell time at each stop.

The nominated dwell times for each mode are shown in Table 9-4.

Table 9-4 2063 assumed dwell times by mode

Mode	Dwell time (minutes)			
	Domestic		International	
	Drop off	Pick up	Drop off	Pick up
Kiss and Fly	6	16	120	44
Park and Fly	-	-	-	-
Taxi	16	16	16	16
Shuttle	30	30	30	30
Bus	3	3	3	3
Rail	3	3	3	3

9.2.6 Mode distribution

Using the values identified in the previous sections, each passenger has been assigned to a transport mode. The hourly demand is shown in Figure 9-4 to Figure 9-7.

These passenger demands are then agglomerated into passenger entries and exits from the airport as shown in Figure 9-8 and Figure 9-9.

Figure 9-4 2063 domestic air departures – ground arrival to the proposed airport

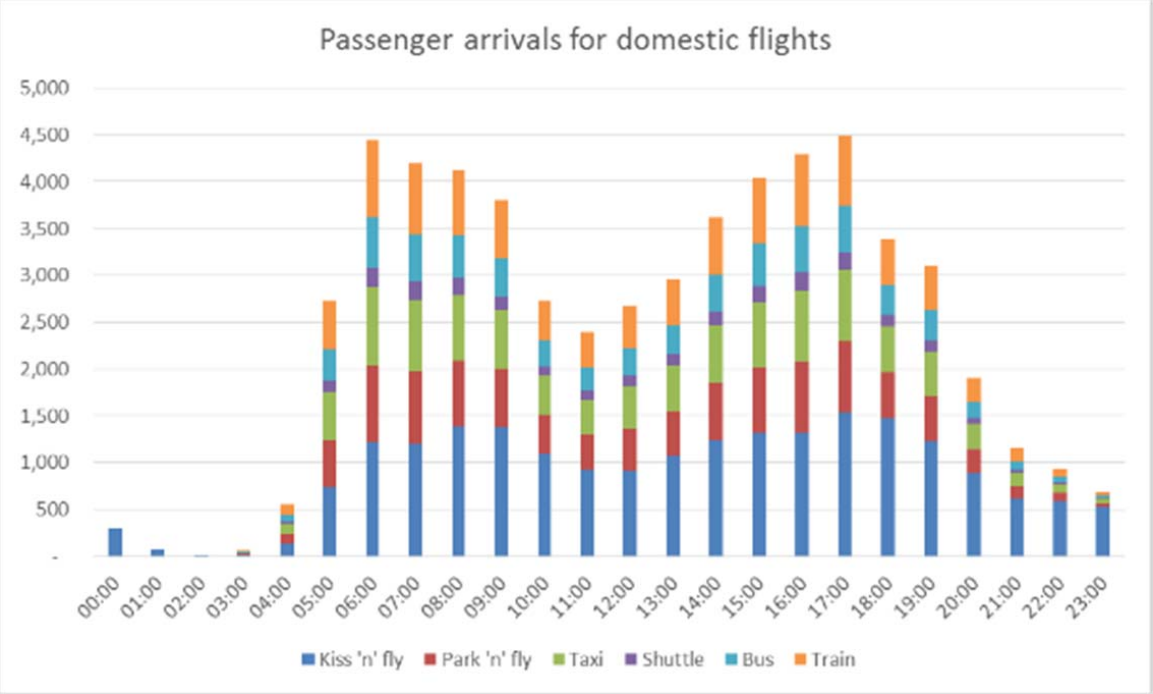


Figure 9-5 2063 domestic air arrivals – ground departure from the proposed airport

Figure 9-6 2063 international air departures – ground arrival to the proposed airport

Figure 9-7 2063 international air arrivals – ground departure from the proposed airport

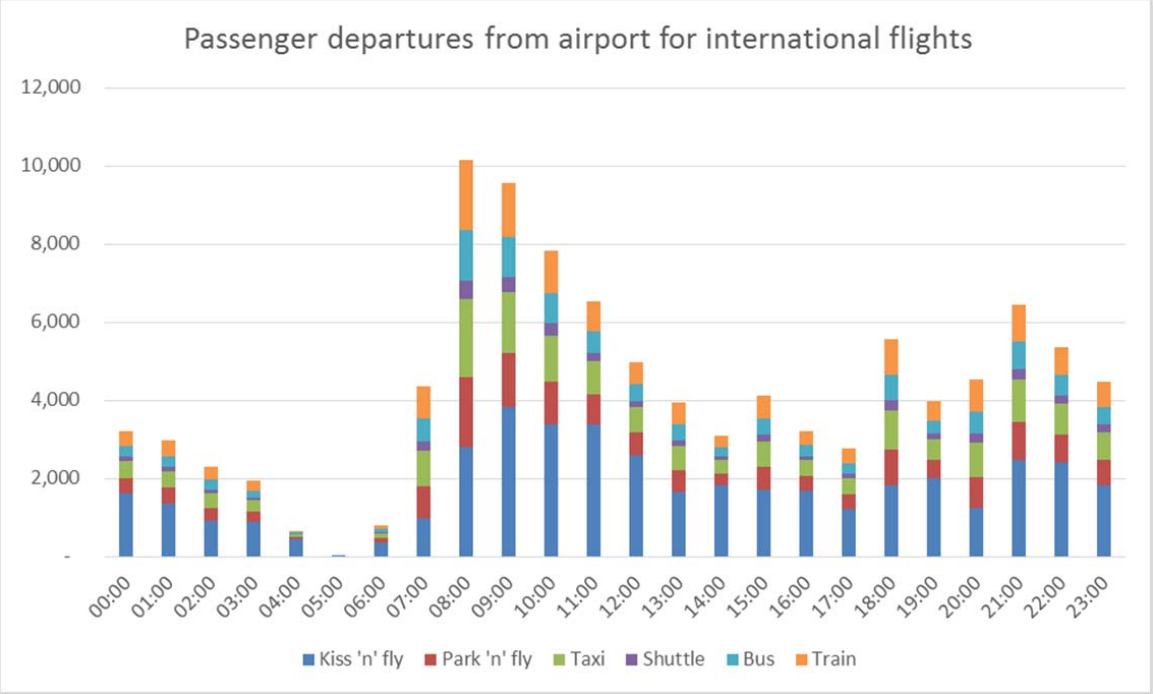


Figure 9-8 2063 total air departures– ground arrival to the proposed airport

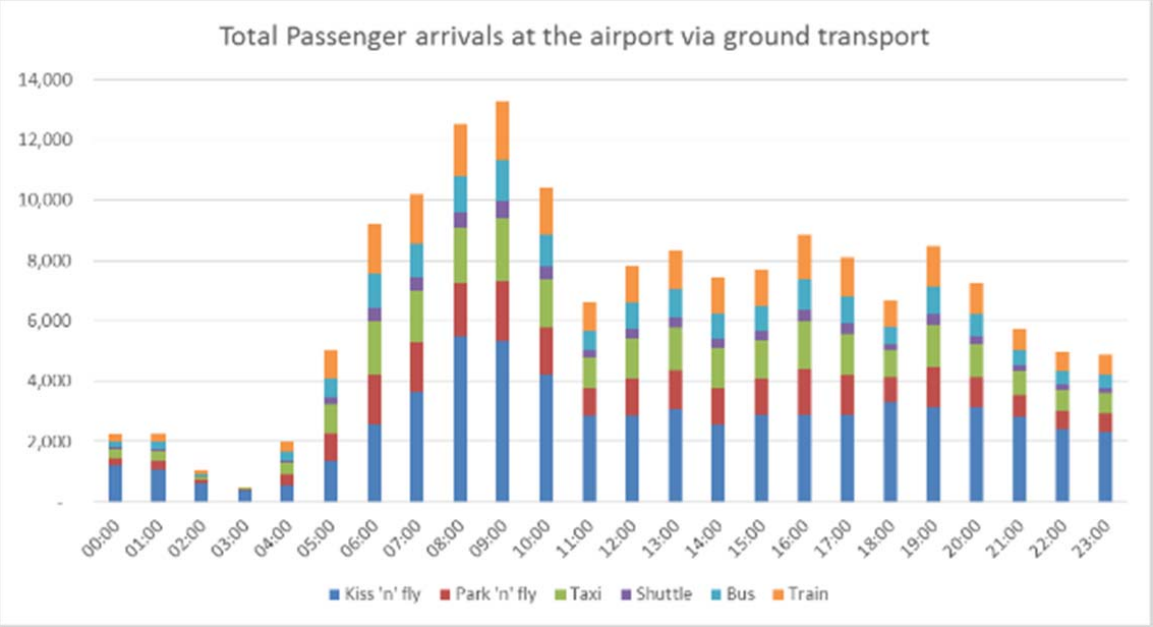
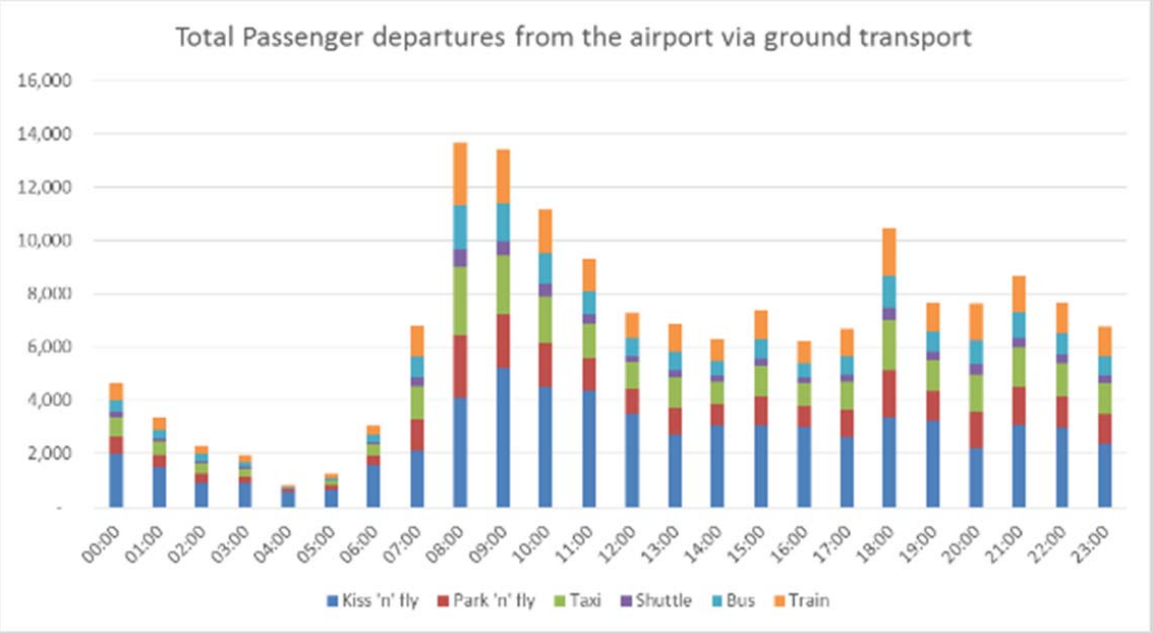


Figure 9-9 2063 total air arrivals – ground departure from the proposed airport



9.2.7 Traffic generation

The trips developed in section 9.2.6**Error! Reference source not found.** were assigned to vehicles entering the proposed airport at the northern boundary point and onto the internal road network. The vehicle volumes across the day are shown in Figure 9-10 to Figure 9-11.

Figure 9-10 Passenger vehicles entering at the northern airport boundary by mode

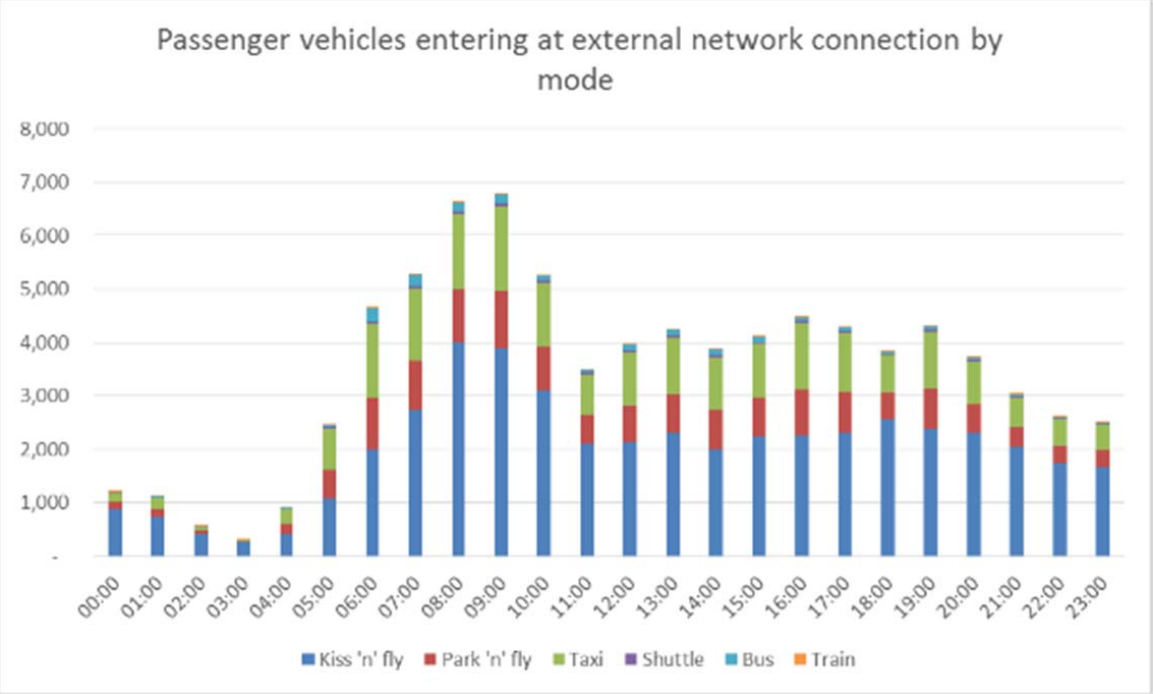


Figure 9-11 Passenger vehicles exiting at the northern airport boundary by mode

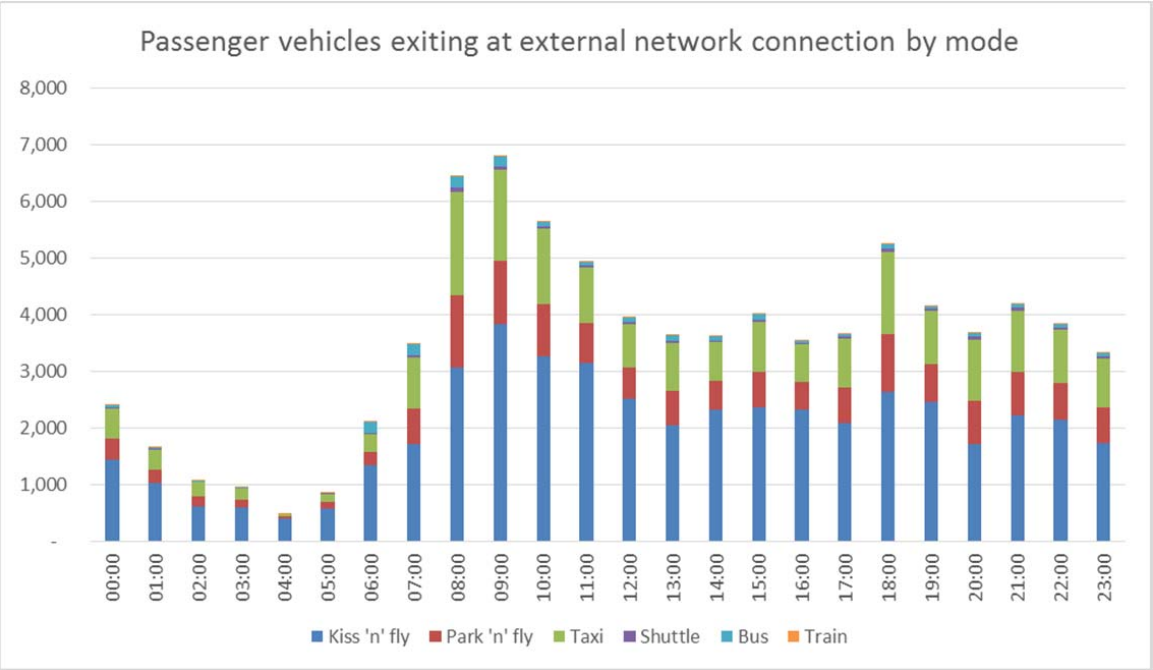


Figure 9-12 Passenger vehicles entering at the northern boundary by vehicle type

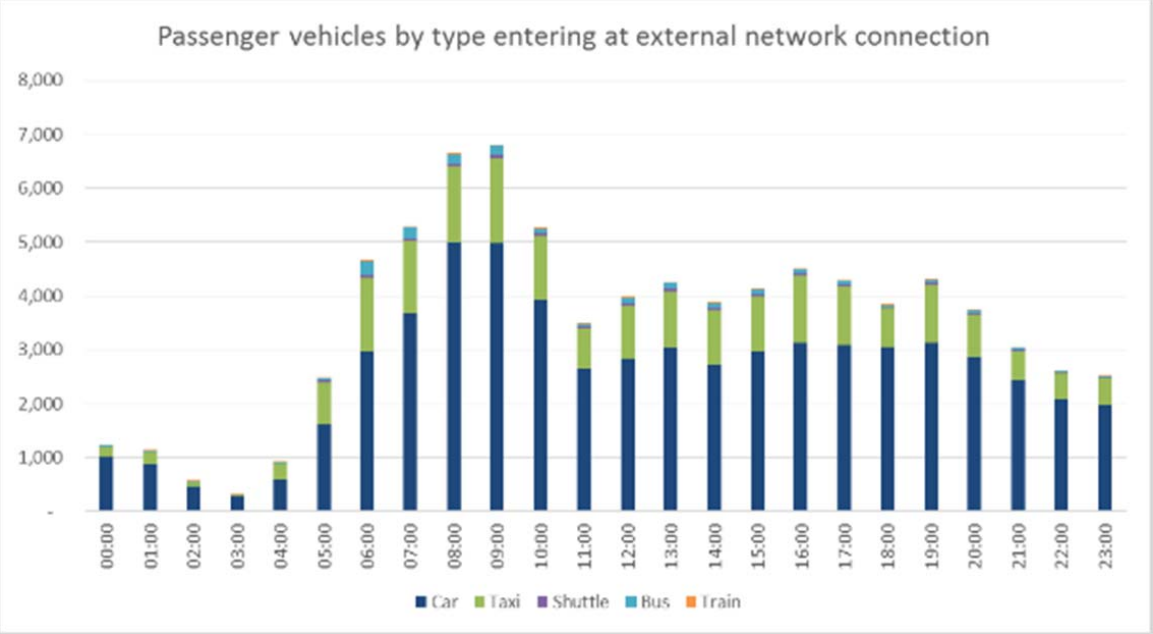


Figure 9-13 Passenger vehicles exiting at the northern boundary by vehicle type

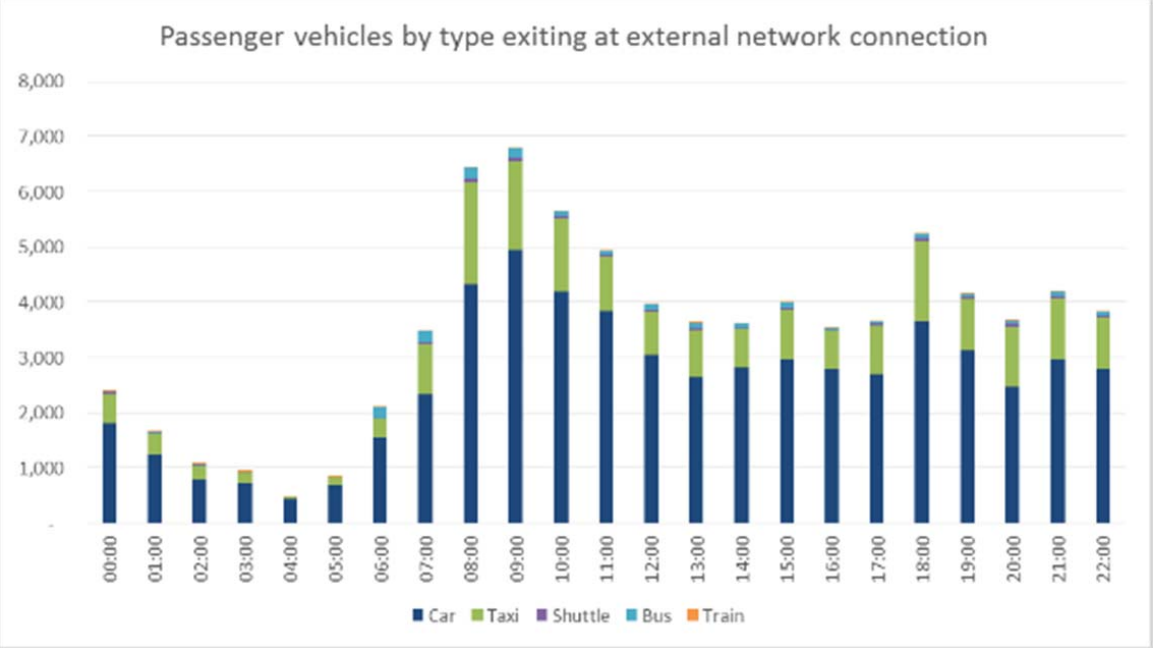


Figure 9-12 shows that 6,782 passenger vehicles are predicted to enter the proposed airport during the peak hour between 9:00 am and 10:00 am and 4,479 vehicles are predicted to enter during the peak hour between 4:00 pm to 5:00 pm on the external road network.

Figure 9-13 shows that there is predicted to be 6,795 passenger vehicles leaving the proposed airport during the peak hour between 9:00 am to 10:00 am and 5,242 vehicles leaving the

proposed airport during the peak hour between 6:00 pm to 7:00 pm on the external road network.

In addition to the passenger vehicles arriving at the northern boundary, the circulating movements of the taxis (as developed in 6.2) are added to the volumes to determine the internal traffic demand.

9.3 Employee trip generation

Employee trip generation has been determined using the same methods as outlined in section 6.

In 2063, a value of 82 million annual passenger movements has been used for the analysis. This results in a total staffing requirement of 61,500. Applying the same 80 per cent staff on site ratio as in section 6.3.2, 49,200 staff will be on site in any one day.

Table 9-5 shows how the staff have been broken into the 10 employee groups.

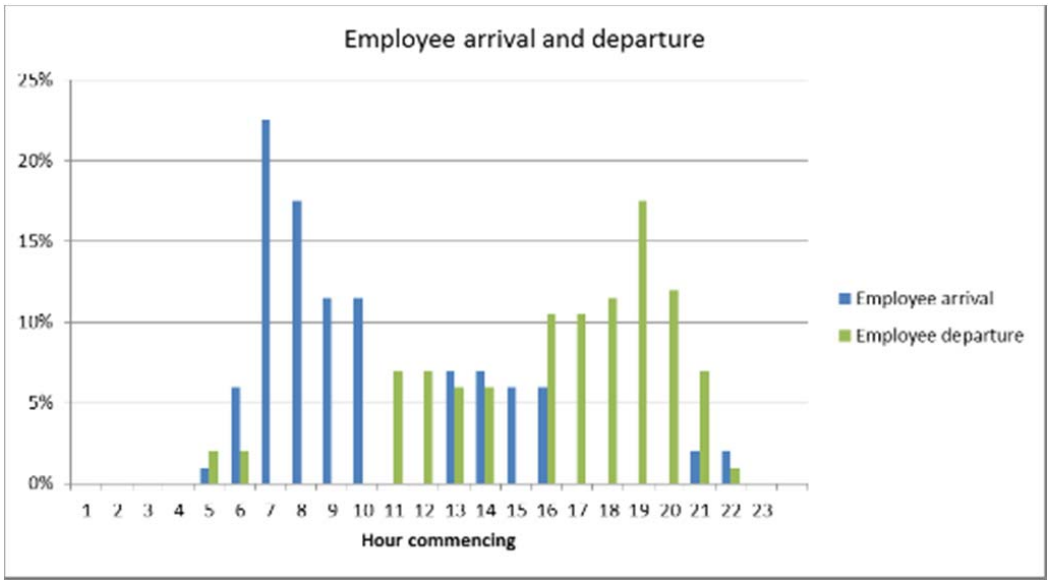
Table 9-5 WSA assumed 2063 shift profiles

Worker type	Start	Finish	Percent of total employees	No of employees on site
Airfield and terminal overnight	21:00	05:00	2	984
Airfield day	05:00	13:00	3	1,476
Airfield afternoon	13:00	21:00	3	1,476
Terminal support morning	06:00	13:00	10	4,920
Terminal support afternoon	13:00	20:00	10	4,920
Terminal supplementary morning	07:00	11:00	14	6,888
Terminal supplementary morning	15:00	17:00	14	6,888
Office early start	07:00	17:00	21	10,332
Office later start	09:00	19:00	23	11,316
		Total	**100**	**49,200**

9.3.1 Arrival and departure profiles

A synthetic profile for employee arrivals and departures prior to and after their shifts has been created to allow for some early and late starts and finishes for employees. For each shift, 50 percent of employees have been assumed to arrive in the hour before their shift starts and the remainder in the hour that the shift starts. A similar process has been developed for completion of shifts. This results in the profile shown in Figure 9-14.

Figure 9-14 2063 employee arrival and departure profile - percentage



This translates into the volume of employees arriving and departing in each hour as shown in Figure 9-15.

Figure 9-15 2063 employee arrival and departure profile - volume

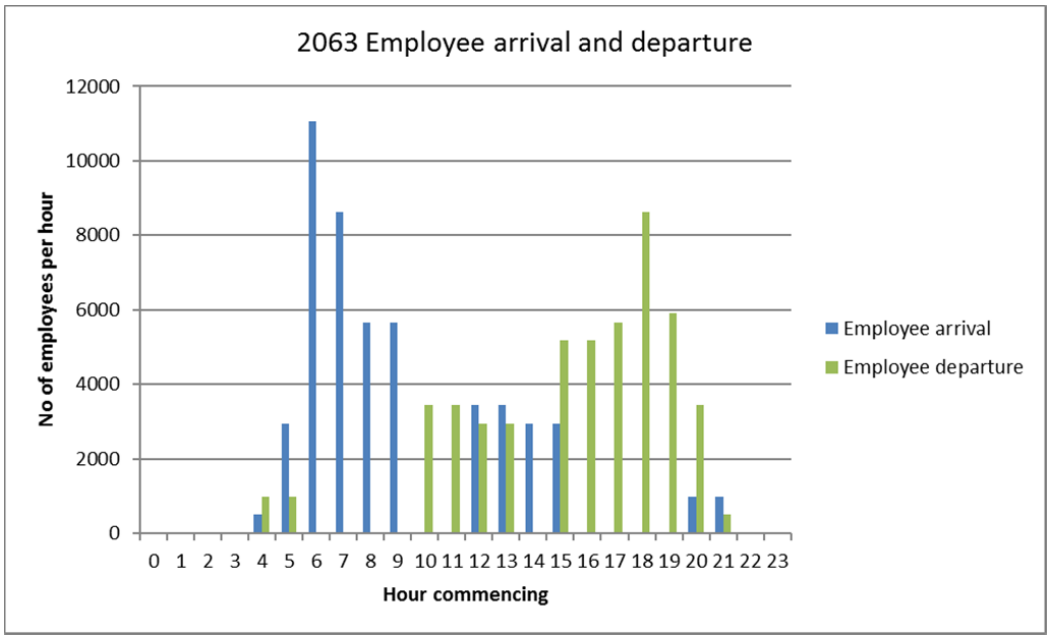


Figure 9-15 shows that the number of employee arrivals for the AM peak period is 11,070 employees and the PM peak departure for employees is after the main transport network peak between 6.00 pm and 7.00 pm, with 8,610 employees leaving in this hour.

9.3.2 Mode split

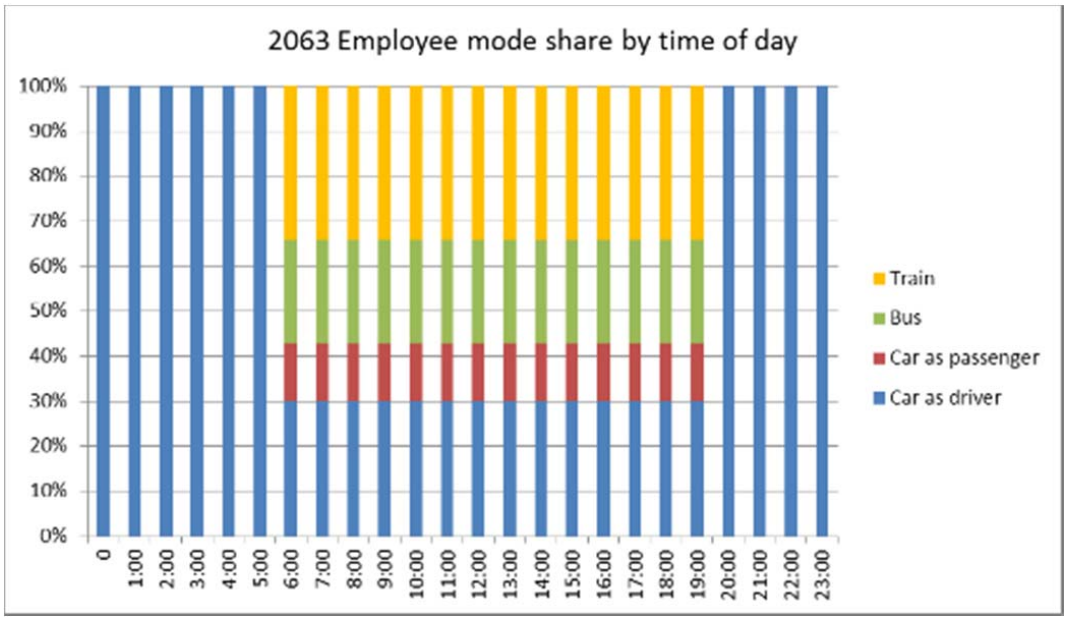
The employee mode spilt for the long term development was determined in the following way:

- a base mode split based on section 6.3.5 was determined, with the addition of a railway through the airport site;
- the mode split for car modes was modified down based on the capacity of a potential staff car park when the access road reaches its nominal capacity;

- workers arriving between 8.00 pm and 6.00 am are assumed to solely use cars, due to the assumed lack of public transport provision for counter-peak travel from residential areas in Western Sydney; and
- distributing the staff trips to bus and rail modes.

The resulting employee mode splits are shown in Figure 9-16.

Figure 9-16 2063 assumed employee mode split by time of day



Using the distributions applied in the previous sections, the employee trips have been assigned to the transport modes. These are shown in Figure 9-17 and Figure 9-18 for arrivals and departures respectively.

Figure 9-17 2063 employee arrivals by mode by time of day

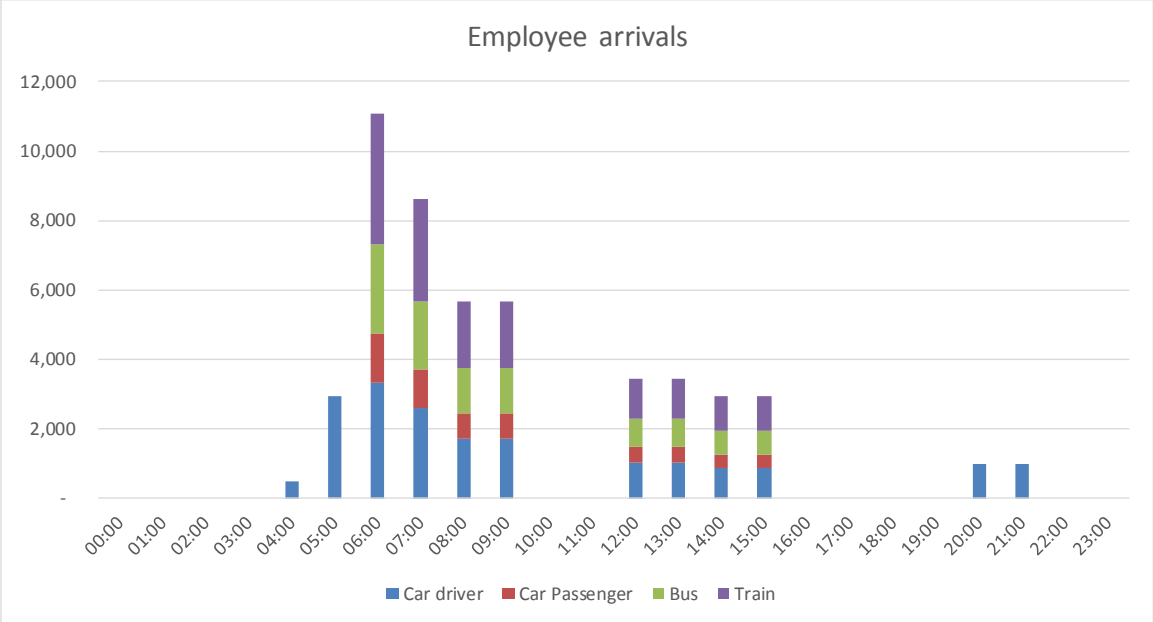


Figure 9-18 2063 employee departures by mode by time of day

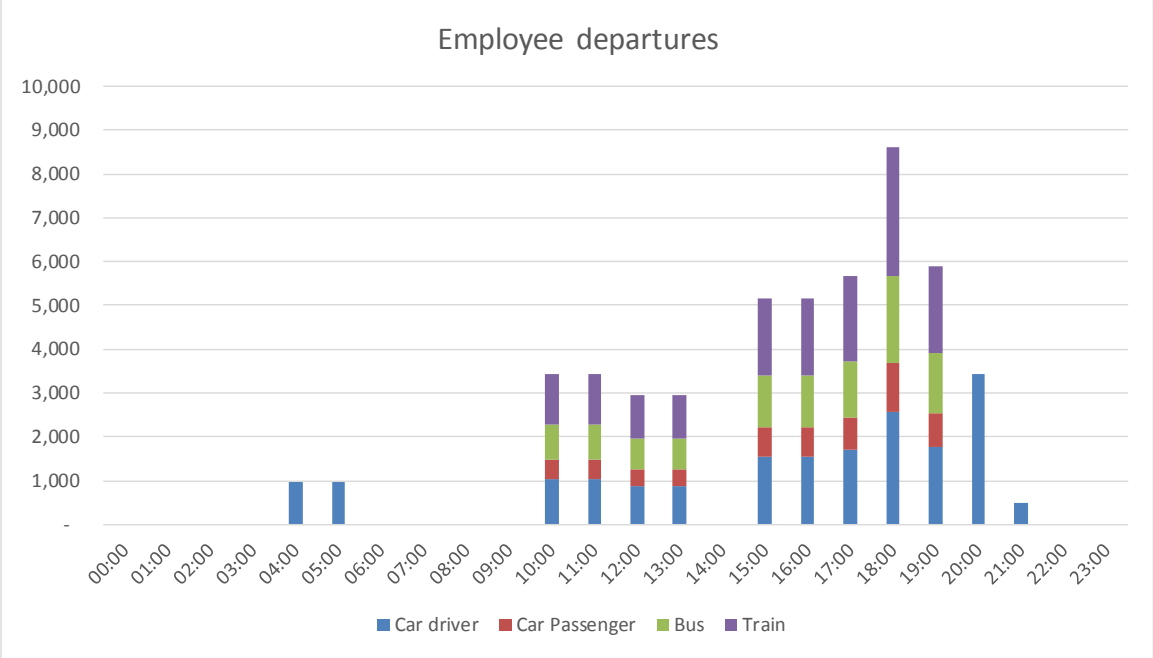


Figure 9-17 shows that the AM peak hour arrival volume for employees is 11,070 during the 6:00 am to 7:00 am period, with the approximately equal volumes arriving as car drivers and train passengers.

Figure 9-18 shows that the PM peak hour departure volume for employees is 8,610 during the 6:00 pm to 7:00 pm period, with trains being the primary vehicle mode for departures.

9.3.3 Traffic generation

The traffic generation for employees is shown in Figure 9-19 and Figure 9-20.

Figure 9-19 2063 employee vehicle arrivals by mode

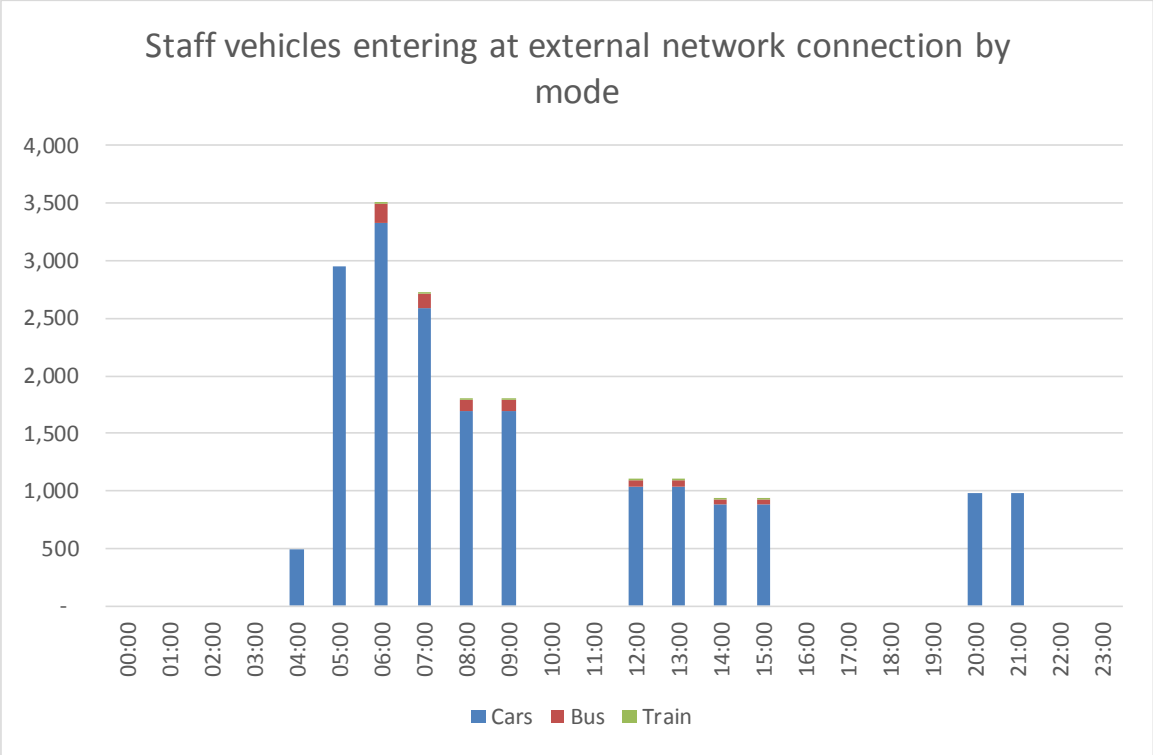


Figure 9-20 2063 employee vehicle departures by mode

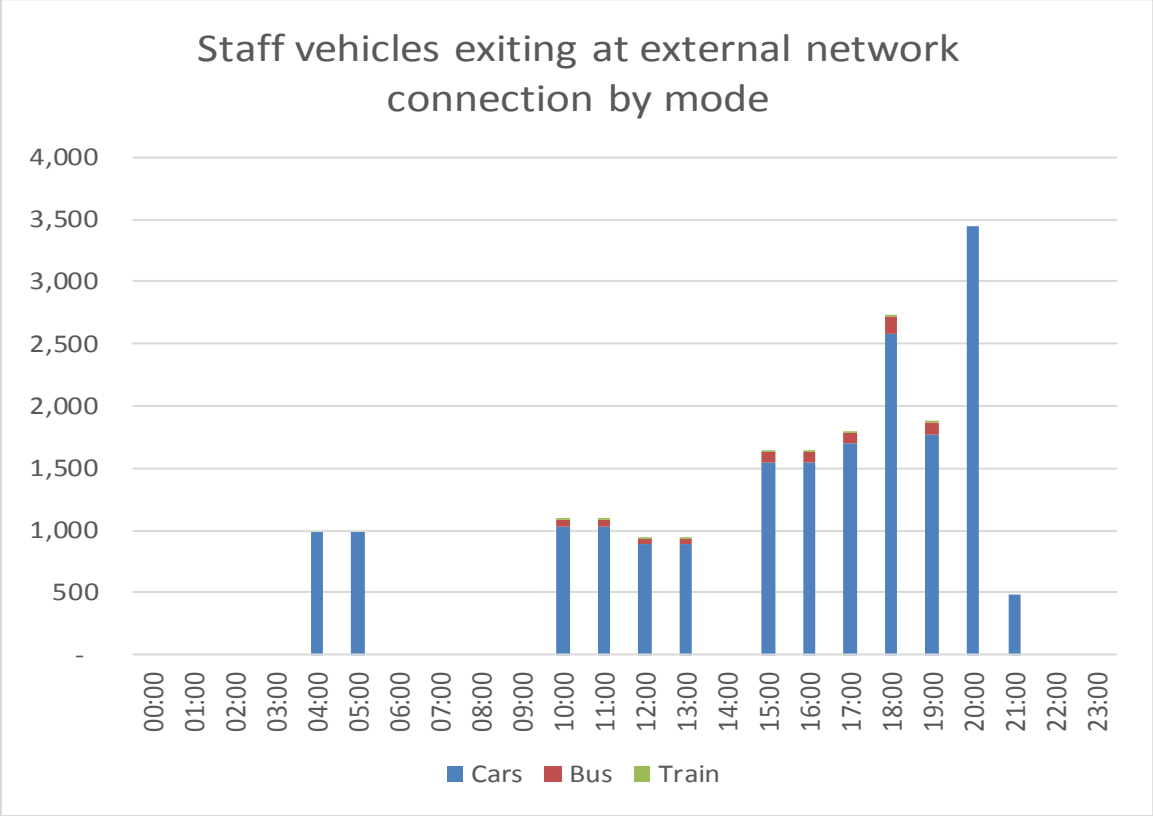


Figure 9-19 and Figure 9-20 show that the peak employee traffic volumes occur outside the traffic peaks for the surrounding road network for both the arrival and departure of employees.

9.4 Combined air passenger and employee trip generation

The total passenger and employee trip generation for 2063 based on the total trips for each hour is shown in Figure 9-21 and Figure 9-22.

Figure 9-21 2063 total trip generation by mode

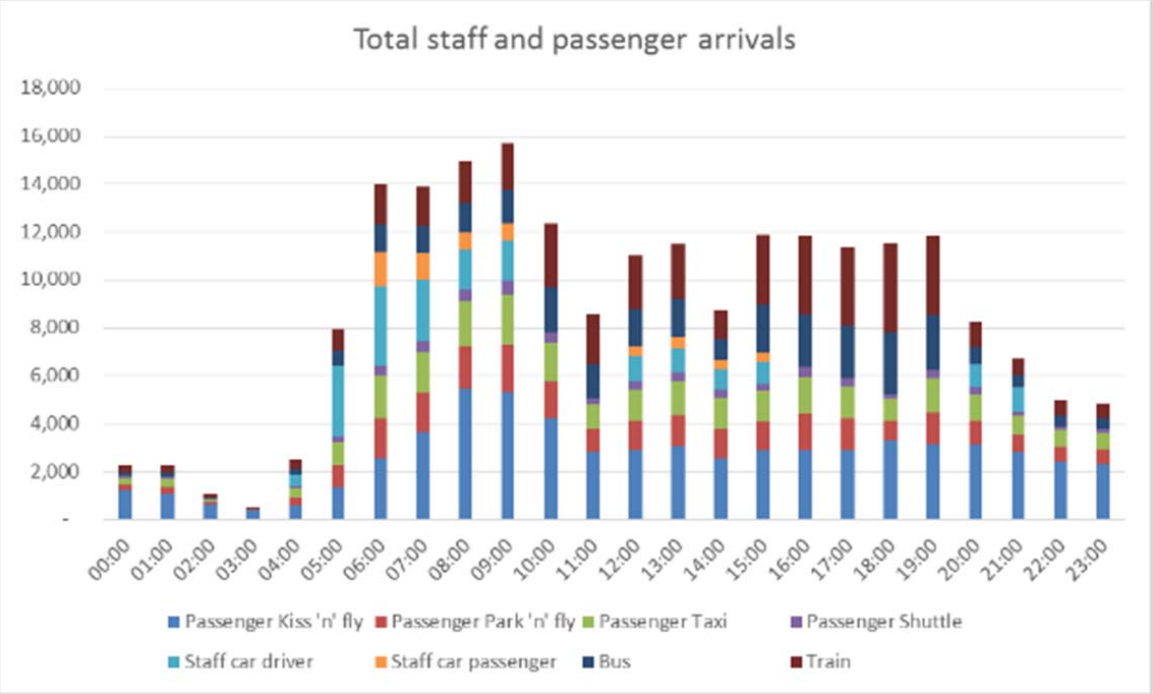


Figure 9-22 2063 total trip generation by mode

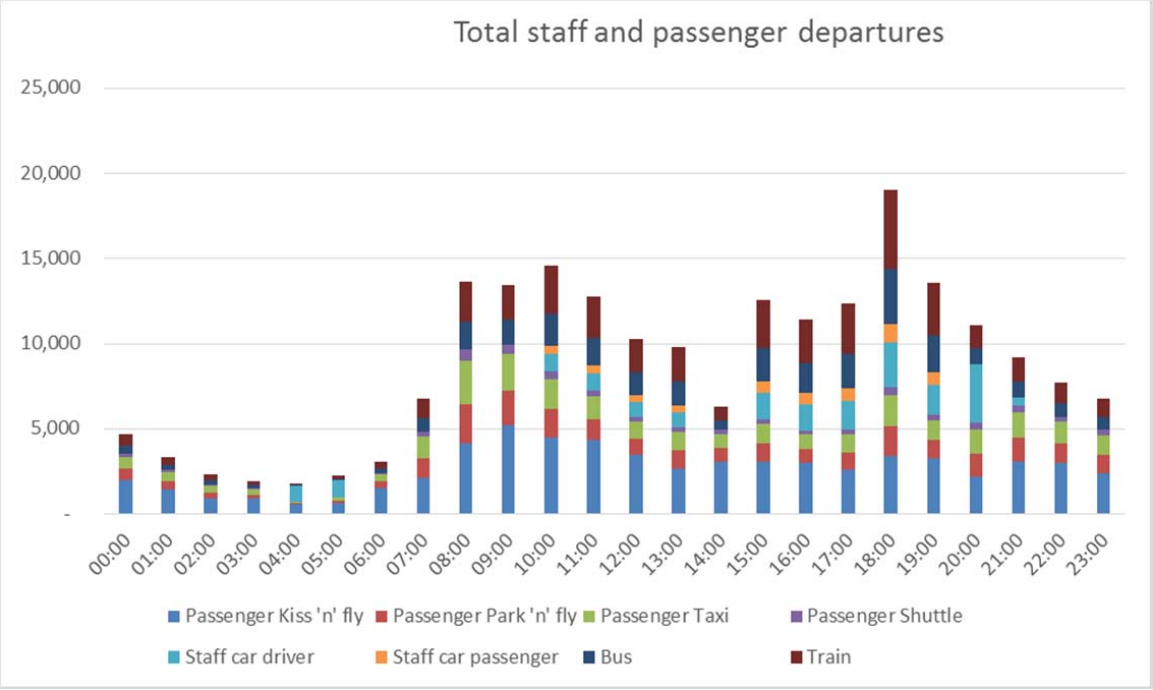
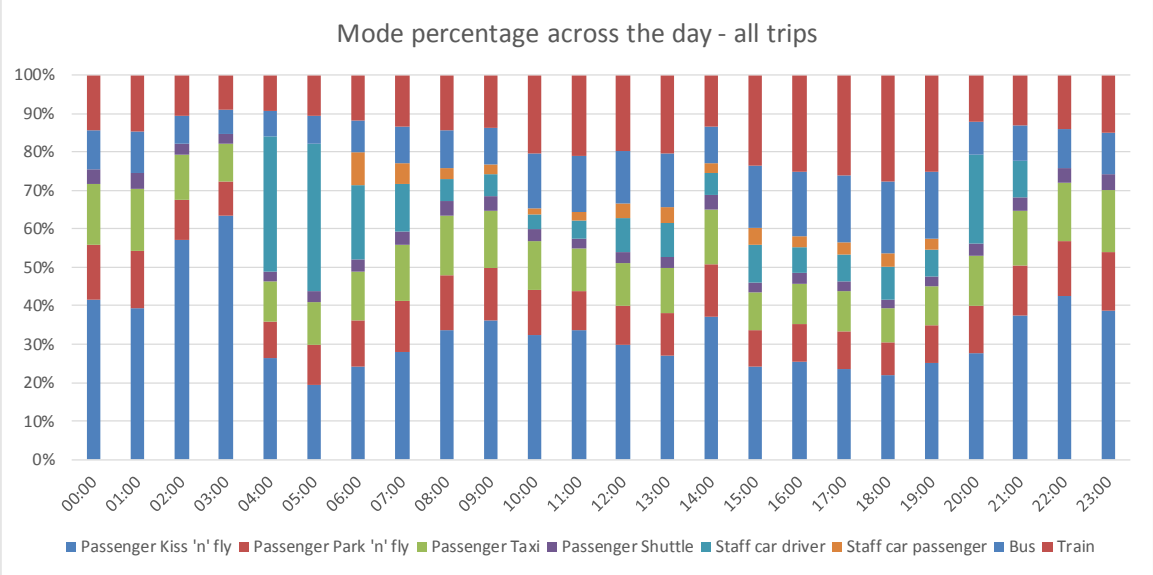


Figure 9-21 shows that the peak trip generation to the proposed airport occurs between 9:00 am and 10:00 am and is 15,721 trips.

Figure 9-22 shows that the peak trip generation from the proposed airport occurs between 6:00 pm and 7:00 pm and is 19,050 trips.

When the actual mode splits across the day are determined based on the preceding sections, the revealed mode split is as shown in Figure 9-23.

Figure 9-23 2063 mode split across the day



9.5 Total air passenger and employee traffic generation

The trips identified in sections 9.2 and 9.3 converted into traffic trips to and from the proposed airport are shown in Figure 9-24 to Figure 9-27.

Figure 9-24 2063 total traffic generation by mode

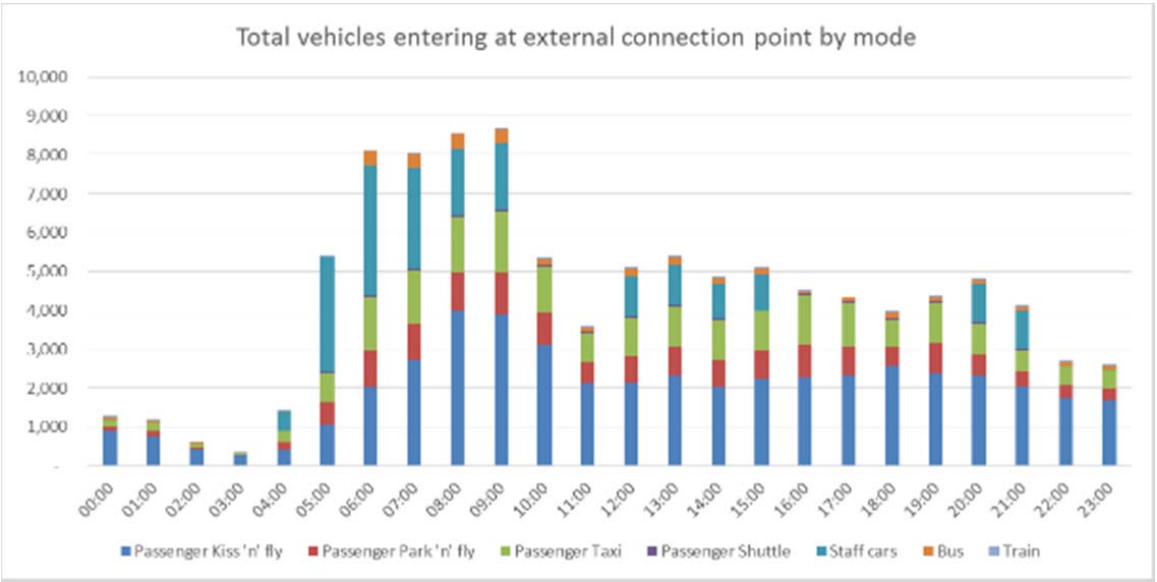


Figure 9-25 2063 total traffic generation by mode

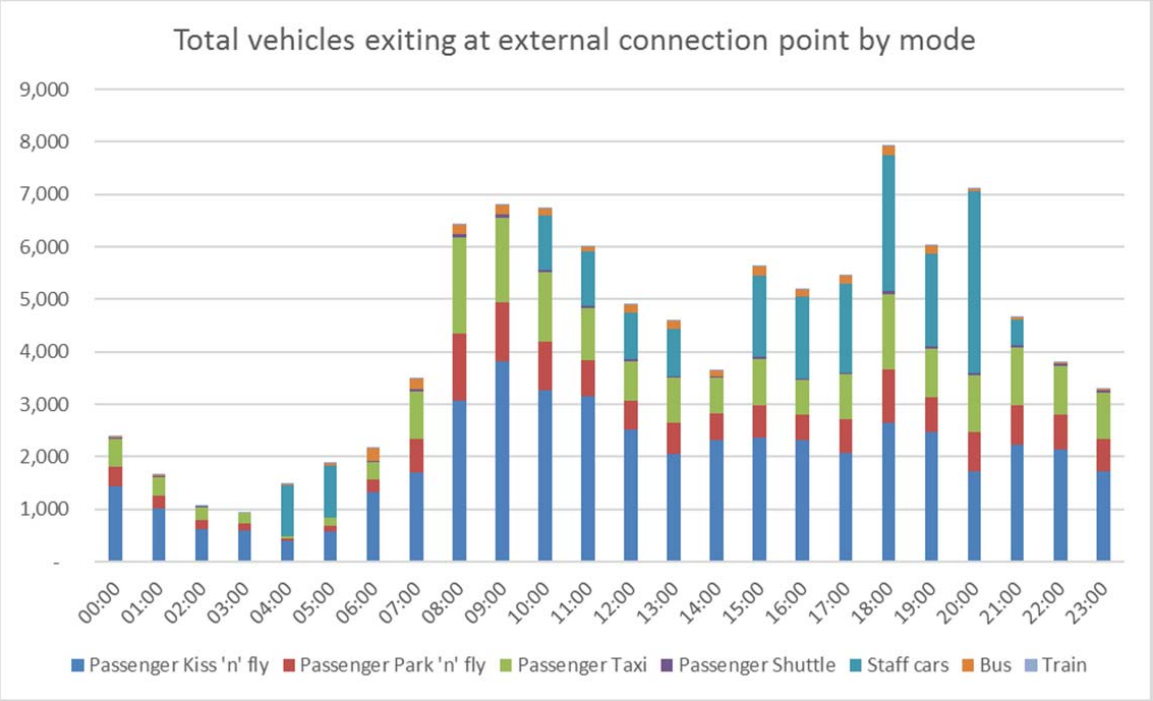


Figure 9-26 2063 total traffic generation to the main airport entrance by vehicle type

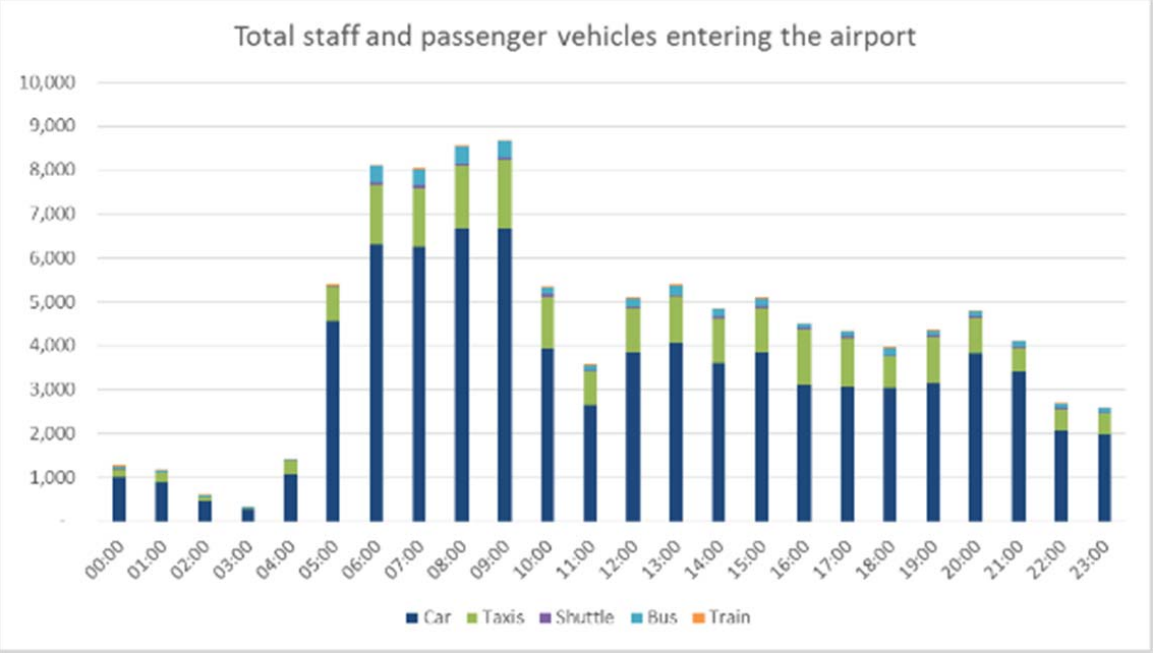


Figure 9-26 shows that the peak vehicle demand to the proposed airport is between 9:00 am and 10:00 am and is 8,567 vehicles per hour.

Figure 9-27 2063 total traffic generation from the main airport entrance by vehicle type

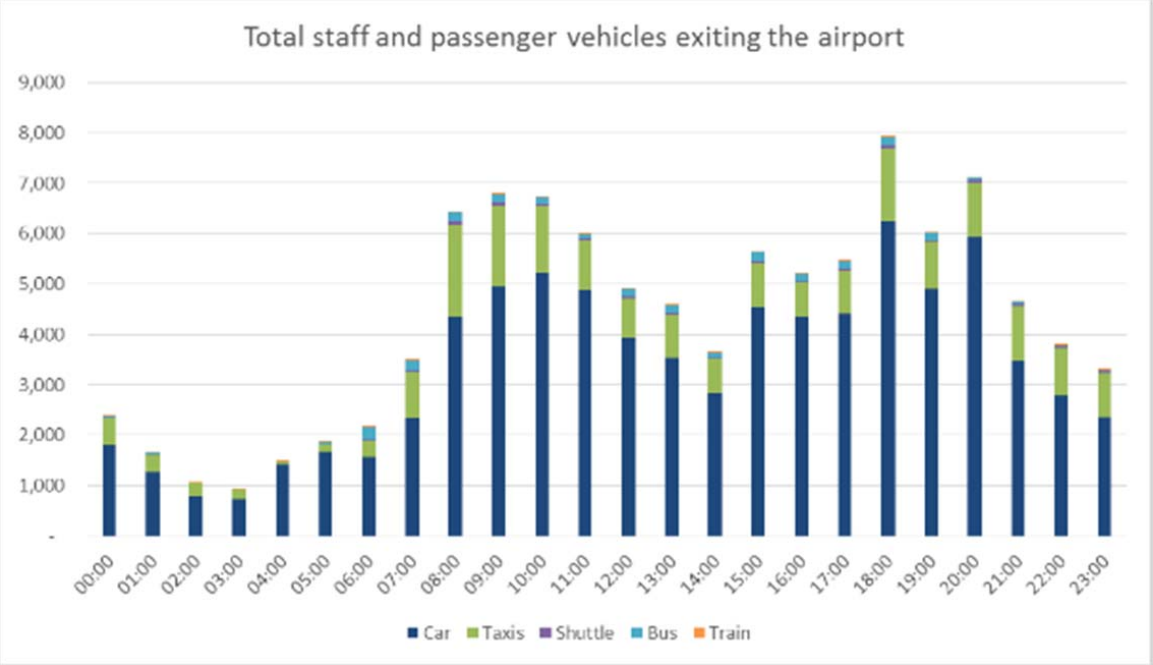


Figure 9-26 shows that the peak vehicle demand to the proposed airport is between 9.00 am and 10.00 am and is 8,567 vehicles per hour.

Figure 9-27 shows that the peak vehicle demand away from the proposed airport is between 6:00 pm and 7:00 pm and is 7,957 vehicles per hour.

9.6 Freight trip generation

Freight demand has been provided for air freight to the proposed airport.

No delivery demand for airport consumables (e.g. food, retail items) or waste removal from the terminals at the proposed airport was available as both the location of these facilities within the terminal and the access arrangements are unknown at the time of writing. It is not possible to determine these items without a detailed terminal plan.

9.6.1 Air freight

The freight demand for air cargo is estimated to be 1,800,000 tonnes in 2063.

In order to turn these cargo loads into freight trips, it has been assumed that the cargo freight arrives using the proportions of heavy rigid trucks, semi-trailers and B-Doubles as shown in Table 9-6 2063 freight vehicle expansion factorsTable 9-6.

Each freight vehicle type, its carrying mass and percentage of the fleet are shown in Table 9-7.

Table 9-6 2063 freight vehicle expansion factors

Vehicle type	Percentage of vehicle fleet	Number of car equivalents (pcu)	Cargo mass carried (tonnes)
Heavy Rigid Truck (12.5 metres long)	65	2	8.5
Semi-Trailer (19 metres long)	25	3	25
B-Double (23 -26 metres long)	10	5	33

It is anticipated that a fuel pipeline to the proposed airport will be completed by 2063, reducing the number of B-Double movements each day.

Table 9-7 2063 two-way freight truck movements

Vehicle type	2063 Annual movements	2063 Daily movements	2063 Hourly movements	2063 Car equivalents (pcu) per hour
Heavy Rigid Truck (12.5 metres long)	137,647	458.82	38.24	76.47
Semi-Trailer (19 metres long)	18,000	60.00	5.00	15.00
B-Double (23 -26 metres long)	5,455	18.18	1.52	7.581

9.7 Total traffic trip generation estimate

The traffic generation calculations presented in this section are inserted into the traffic model to assess their impact. Traffic profiles throughout the day, as presented in this section, have been converted to STM3 time periods. The figures are presented in Table 9-8 for representative one-hour periods, which are not necessarily consistent with the overall peak hours reported elsewhere in this section, with a 24-hour total.

Table 9-8 Total modelled traffic to/from the proposed airport in 2063

2063	AM peak hour	Interpeak hour	PM peak hour	Evening hour	24-hour
Vehicles accessing					
Passengers	5,944	4,597	4,290	2,400	83,534
Employees	2,250	815	3,728	685	19,220
Freight	45	45	45	3	537
Total accessing	**8,239**	**5,456**	**8,063**	**3,088**	**103,291**
Vehicles egressing					
Passengers	4,958	4,762	3,728	2,605	83,534
Employees	-	672	1,681	806	19,557
Freight	45	45	45	3	537
Total egressing	**5,002**	**5,479**	**5,454**	**3,414**	**103,628**

Note that the analysis excludes the trips to and from the proposed airport generated by associated commercial development or freight traffic for consumables.

The slight discrepancy in accessing and egressing totals is due to park-and-fly trips where access and egress profiles are calculated separately and external taxi trips where the inbound and outbound occupancy rates differ.

9.8 Airport traffic distribution

The traffic generated at the proposed airport was distributed using STM3, incorporating output from SALTM. STM3 calculates traffic distribution from first principles, by using the land use inputs combined with the generalised costs of travel from origin to destination zone. SALTM was built to assess the future landside transport needs of Sydney (Kingsford Smith) Airport. An adaptation of SALTM has been used to provide a more robust assessment of the trip distribution from WSA and has been incorporated into STM3. As such, this source is considered the best available for predicting the traffic generated by the proposed airport.

10. Operational impact assessment

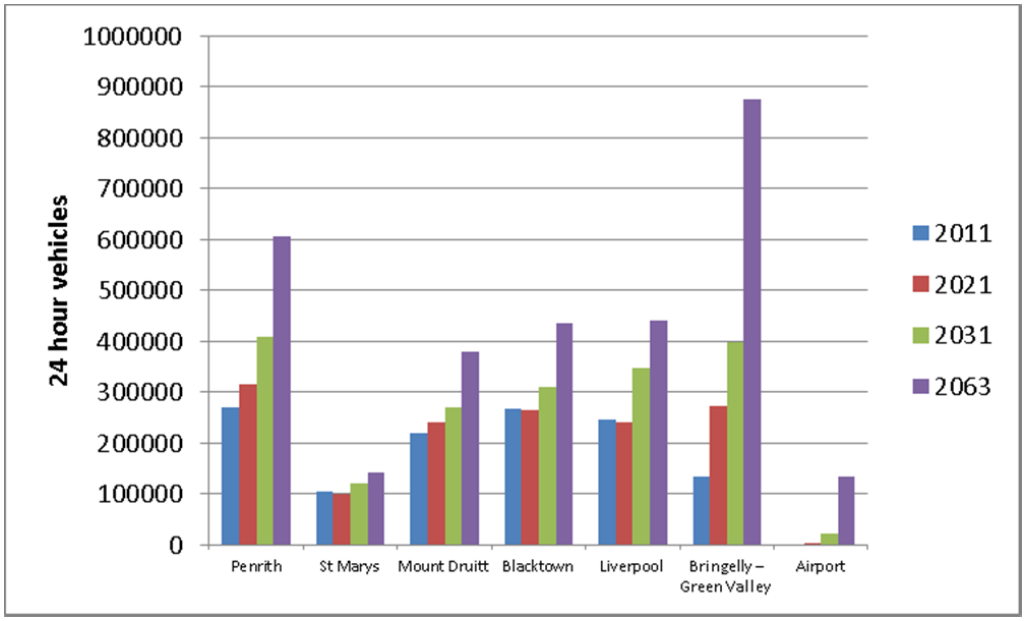
10.1 Background traffic growth

As a result of existing and future planned developments in Western Sydney, there is expected to be a considerable amount of development growth in the coming decades, largely comprised of:

- South West Priority Land Release Area
- Western Sydney Employment Area
- Western Sydney Priority Growth Area
- Greater Macarthur Land Release Investigation Area
- smaller growth centres.

Figure 10-1 provides a summary of the magnitude of trip making in the vicinity of the proposed airport and shows the expected growth to 2063. The data in Figure 10-1 assume a South West Rail Link extension from Leppington to St Marys via the proposed airport is operational.

Figure 10-1 Vehicle movements originating within SA3 (24 hour)



Source: STM3 Model outputs and estimates prepared for this EIS

Figure 10-1 shows that the proposed airport represents a very small component of overall trip demand in 2031, but rises substantially between 2031 and 2063. Nevertheless, Figure 10-1 shows a more substantial increase in trip demand is forecast over the next half a century, in particular in the Greater Macarthur Land Release Investigation Area (Bringelly/Green Valley). Although the proposed airport is projected to produce approximately 103,000 trips per day in each direction by 2063, trip making from other areas are expected to grow substantially too.

For modelling purposes, it is assumed that all passengers and workers at the proposed airport would access the airport site from the north of the site, with passengers accessing the airport from the M12 and staff and freight accessing the site from Elizabeth Drive.

10.2 Future road network performance

Figure 10-2 and Figure 10-3 show the changes in traffic volumes in the 2063 AM Peak, between the 'Without Airport' and 'With Airport' scenarios. Figure 10-2 shows the absolute difference with colour-coded bandwidths. The differences are in pcu for the 2-hour peak periods.

Figure 10-3 shows the percentage difference in volumes using colour coding. Note that if the absolute difference is less than 50 vehicles (for the two hour modelled period), the colour is set to grey for legibility, as this reduces the element of 'model noise' shown.

Figure 10-2 to Figure 10-8 show the Outer Sydney Orbital passing through the airport site. This is because the model software renders roads in straight lines. In reality, the Outer Sydney Orbital is not going to pass through the airport site.

Figure 10-4 and Figure 10-5 show the same data but for the 2063 PM peak.

Figure 10-2 to Figure 10-5 and the underlying data show how traffic volumes change as a result of the additional airport traffic demand and are discussed in Section 10.3.

Note that the impacts of the volume change are shown in terms of Level of Service (Table 10-1) and volume/capacity plots (Figure 10-7 and Figure 10-8) with a discussion following these figures.

Motorways

- With the airport, traffic volumes on the M12 near the entrance to the airport increase by between 1,000 and 3,000 vehicles per hour compared to the Without Airport scenario.
- With the airport, traffic volume increases on the M7 near the M12 are predicted to increase by less than 20% of Without Airport volumes.
- With the airport, the Outer Sydney Orbital takes less than 1,000 additional vehicles per hour to and from the north of Elizabeth Drive compared to the Without Airport scenario.
- With the airport, traffic volumes do not change substantially on the Outer Sydney Orbital to the south of Elizabeth Drive compared to the Without Airport scenario because only north facing ramps are assumed at the Elizabeth Drive interchange. Furthermore, no interchange is present between the M12 and Outer Sydney Orbital.
- With the airport, traffic volume increases on the rest of the motorway network are less than 10% of the 'Without Airport' volumes.

Arterial Roads

- With the airport, The Northern Road has traffic volume increases of up to 40%, although this equates to less than 1,000 pcu per hour.
- Elizabeth Drive carries a substantial amount of airport traffic. The greatest increase is inbound towards the airport in the AM peak and outbound in the PM peak. The changes in predicted traffic volumes compared to the Without Airport scenario next to the airport entrance are approximately 1220 pcu per hour in the AM peak and 910 pcu per hour in the PM peak. In the counter-peak direction, a reduction in demand is shown. This is due to drivers re-routeing trips that would have used Elizabeth Drive if the airport was not there, by choosing another route due to the localised congestion.

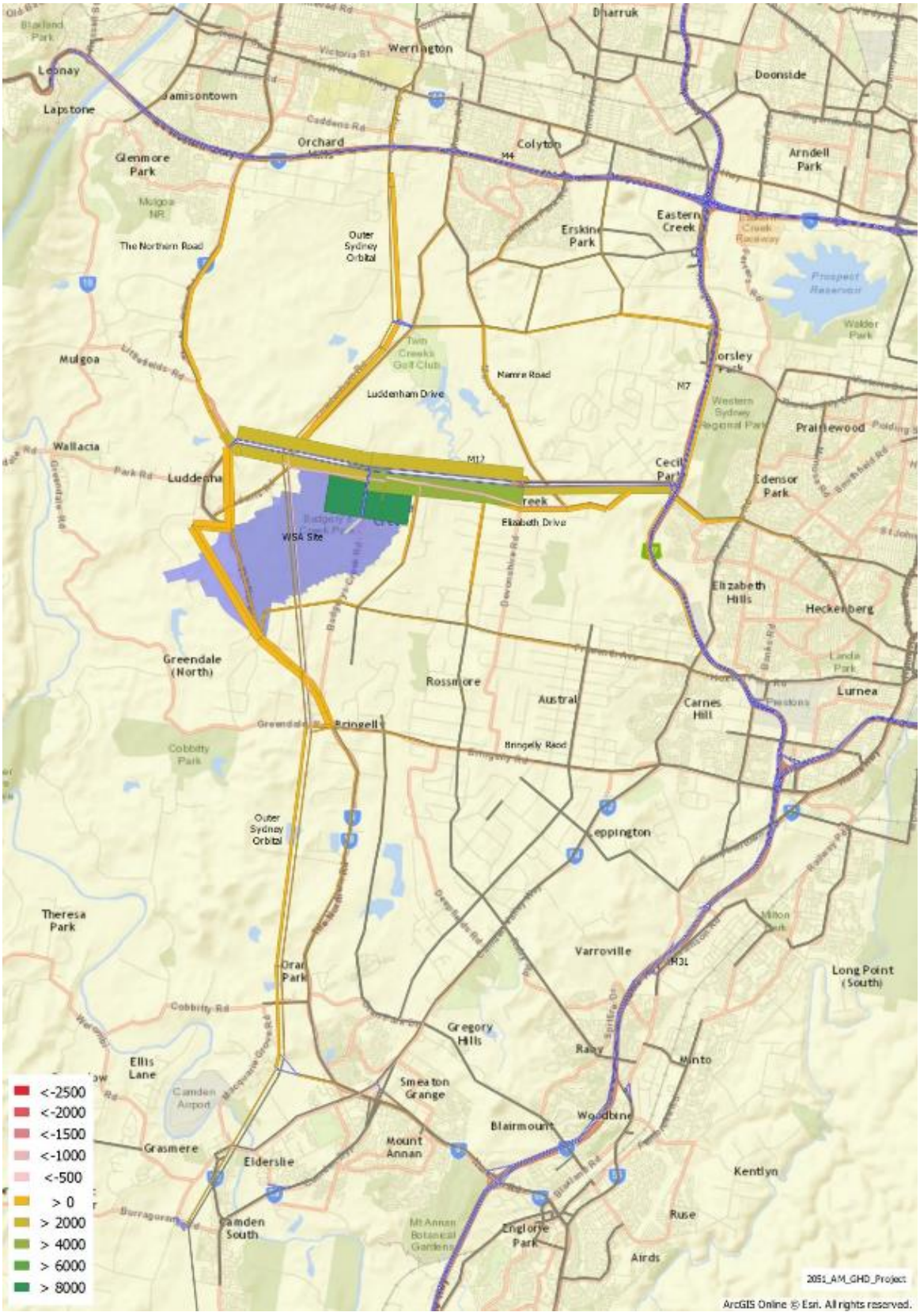
Local Roads

- With the airport, Luddenham Road experiences traffic volume increases of between 40 and 60% (southbound in the AM peak and northbound in the PM peak) compared to the

Without Airport scenario, which represents an increase of at most approximately 200 pcu per hour.

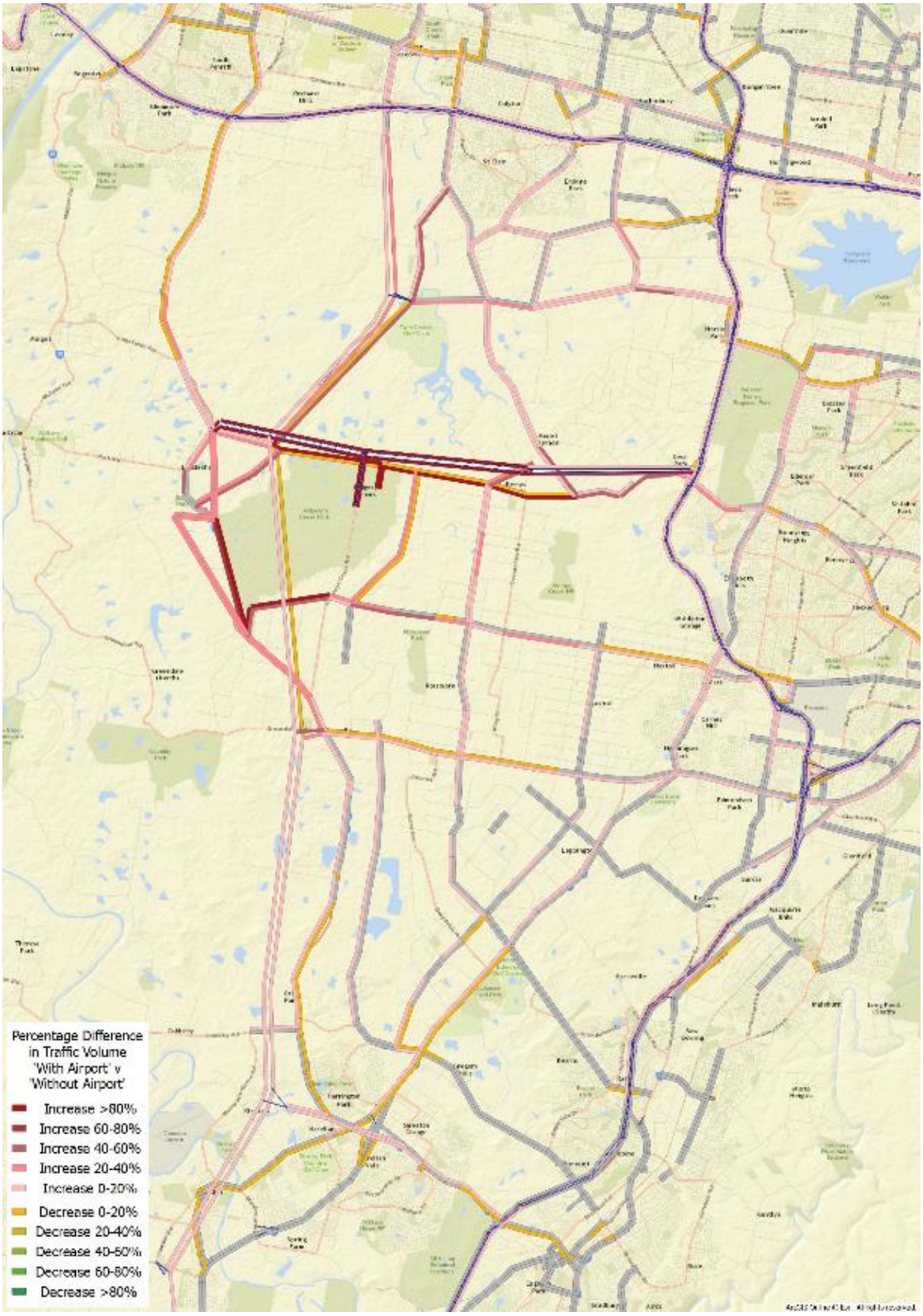
- With the airport, Mamre Road traffic volumes generally increase by less than 20% compared to the Without Airport scenario, which equates to less than 100 pcu per hour.
- The proposed airport is predicted to increase the volume of traffic on the north-south routes in the study area, such as Lawson Road and Western Road.

Figure 10-2 2063 AM Peak Traffic Volume Difference plot



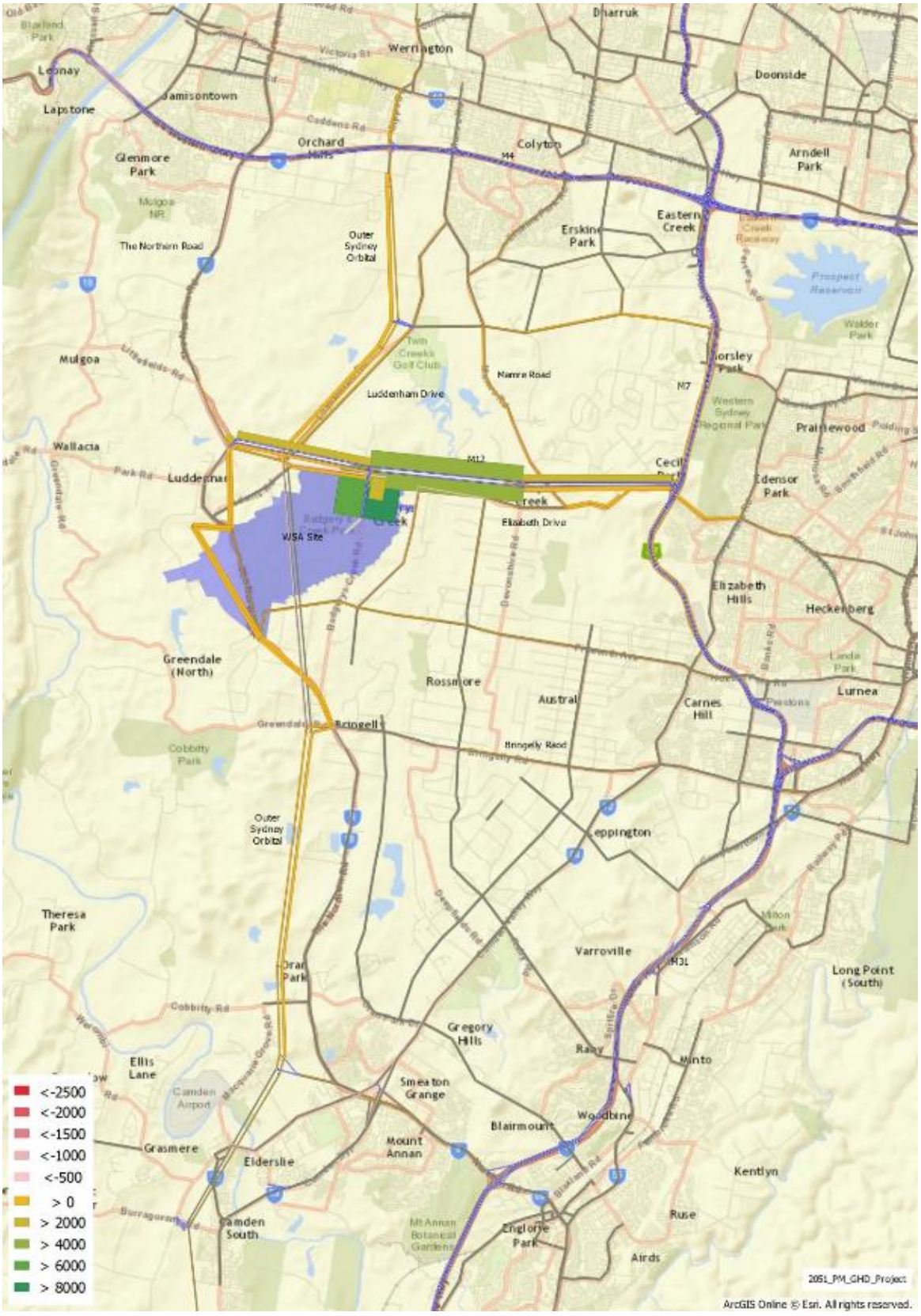
Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

Figure 10-3 2063 AM Peak Traffic Volume Percentage Difference Plot



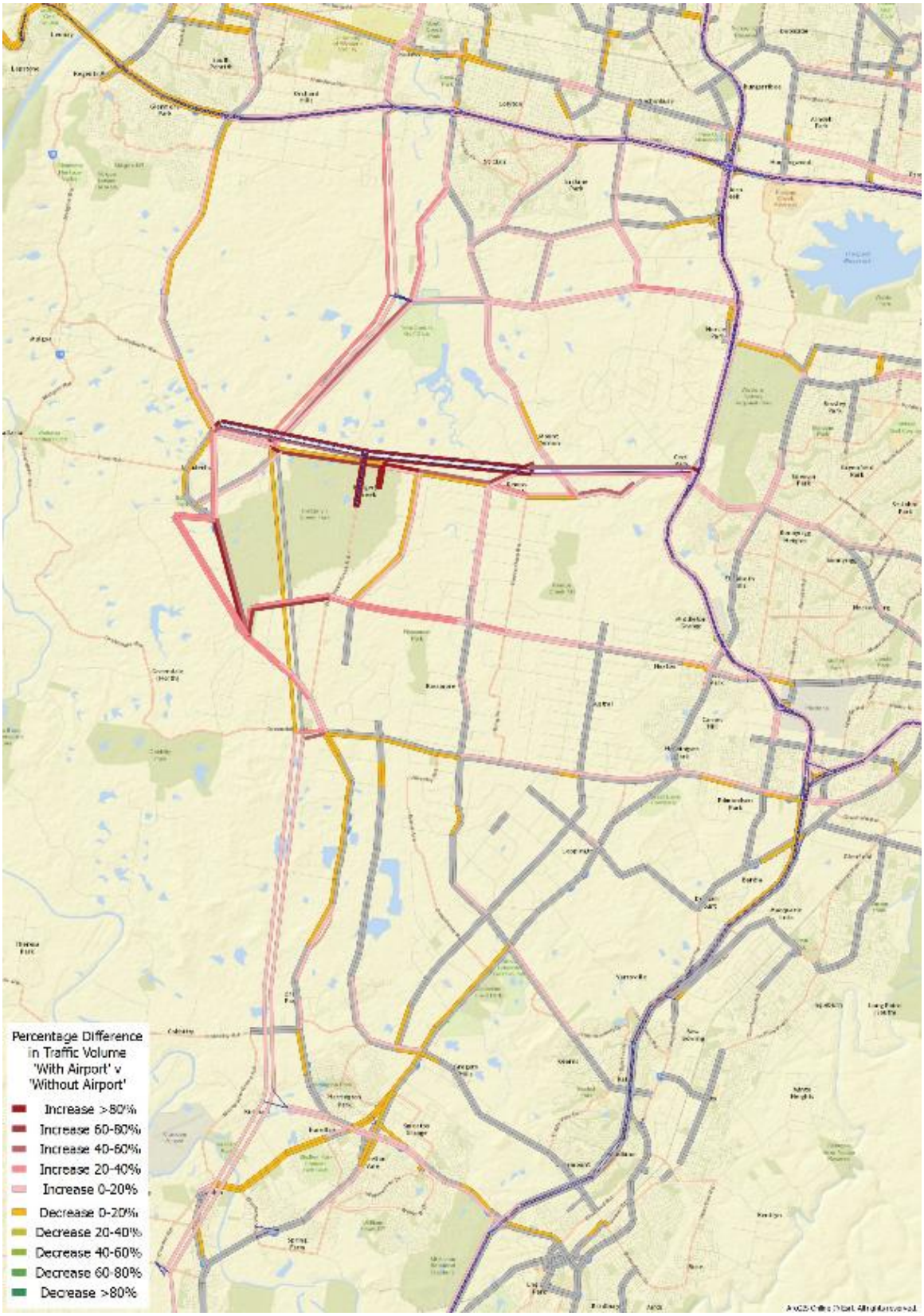
Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

Figure 10-4 2063 PM Peak Traffic Volume Difference plot



Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

Figure 10-5 2063 PM Peak Traffic Volume Percentage Difference Plot



Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

10.3 Impacts on roads and access

An analysis has been carried out on the mid-block level of service for the 'Without Airport' and the 'With Airport' scenarios. The Level of Service is shown illustratively in Figure 10-6, Figure 10-7 and Figure 10-8 for the AM and PM peaks respectively, which show the differences in volume/capacity for without (left) and with the proposed airport (right). A summary of the Level of Service at key links in the network is provided in Table 10-1, with a map of the location of the key links provided in Figure 10-6.

Figure 10-6 Location of tabulated Level of Service output

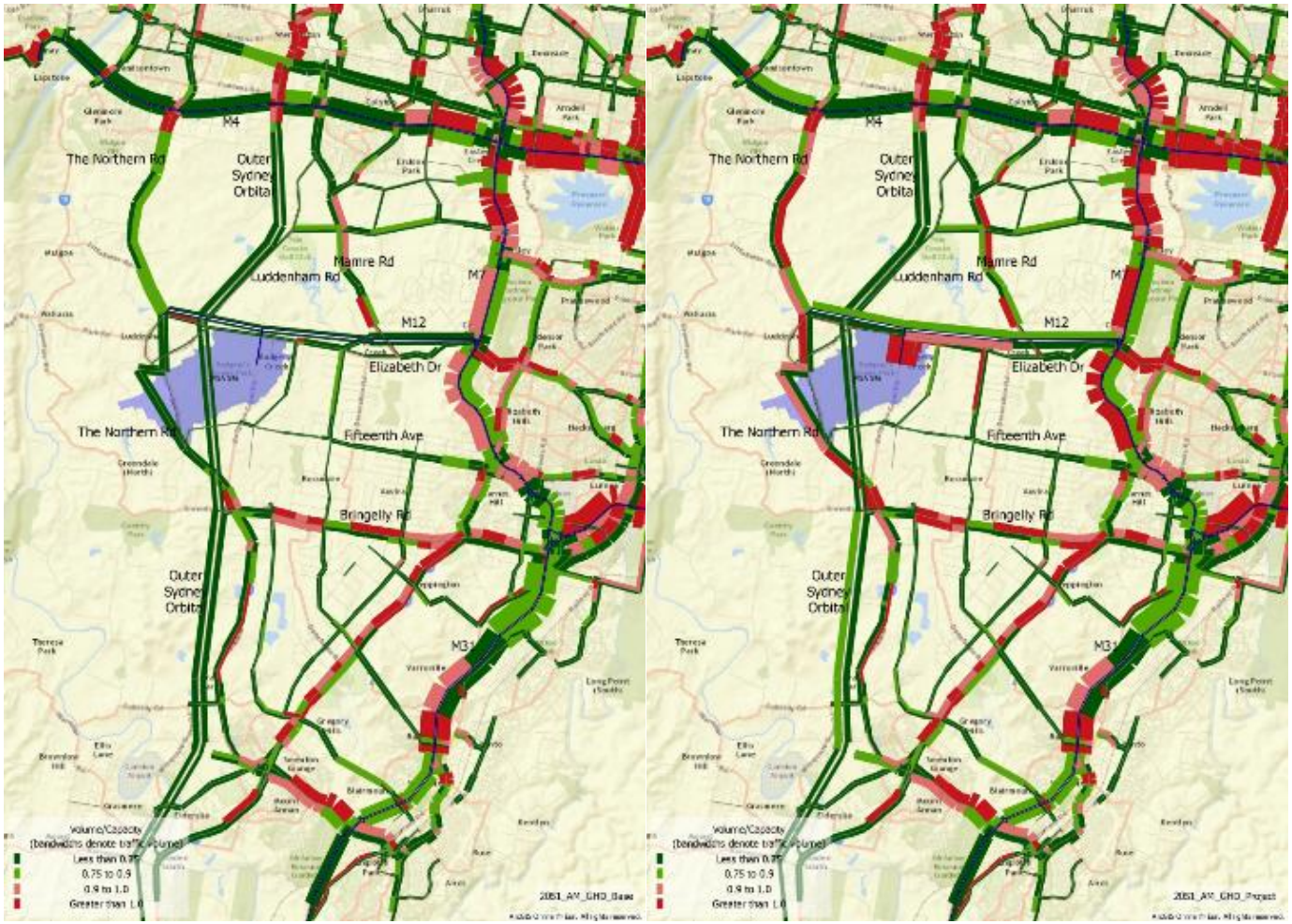
Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

Table 10-1 Level of Service for 2063 With and Without Airport

Id	Road	Location	Without Airport				With Airport			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd	Nbd/Ebd	Sbd/Wbd
1	The Northern Road	North of Elizabeth Drive	D	D	D	C	**E**	D	**C**	**D**
2	The Northern Road	South of M4	F	F	F	F	F	F	F	F
3	The Northern Road	South of Bringelly Road	D	C	C	D	**E**	C	C	D
4	M4	West of Mamre Road	D	C	C	D	D	C	C	D
5	M4	West of M7	F	D	D	F	F	D	D	F
6	M7	South of M4	F	F	F	E	F	F	F	**F**
7	M7	South of Elizabeth Drive	E	D	D	D	**F**	D	**E**	**E**
8	M5	East of M7	F	E	E	F	F	E	**F**	F
9	M31	South of Campbelltown Road	D	D	D	D	D	D	D	D
10	Narellan Road	North of Tramway Drive	E	F	E	E	E	F	E	E
11	Bringelly Road	West of Cowpasture Road	E	E	D	F	E	E	D	F
12	Cowpasture Road	At M7	F	D	E	E	F	**E**	E	E
13	Elizabeth Drive	East of M7	F	F	F	F	F	F	F	F
14	Elizabeth Drive	West of M7	F	C	F	C	F	**D**	F	C
15	Elizabeth Drive	West of Mamre Road	A	A	A	B	A	**B**	A	B
16	Elizabeth Drive	East of the Northern Road	F	C	D	E	F	**E**	**E**	**F**
17	Mamre Road	North of Elizabeth Drive	E	B	C	C	**F**	**C**	**D**	**D**
18	Mamre Road	South of M4	E	D	F	D	E	D	F	D
19	Luddenham Road	West of Mamre Road	B	B	A	B	B	**C**	**B**	**C**
20	Lawson Road	South of Elizabeth Drive	C	A	B	C	**D**	A	B	C
21	Western Road	South of Elizabeth Drive	D	C	C	D	**F**	C	C	**E**
22	Fifteenth Avenue	West of Cowpasture Road	C	C	C	C	C	C	C	C
23	M12	West of M7	C	B	C	C	**D**	**C**	**D**	**D**
24	M12	West of Mamre Road	A	A	A	A	**D**	**E**	**D**	**E**
25	M12	East of the Northern Road	A	A	A	A	**D**	**C**	**B**	**B**
26	Outer Sydney Orbital	North of Elizabeth Drive	C	C	C	C	C	C	C	C
27	Outer Sydney Orbital	South of Elizabeth Drive	C	B	B	B	C	B	B	B

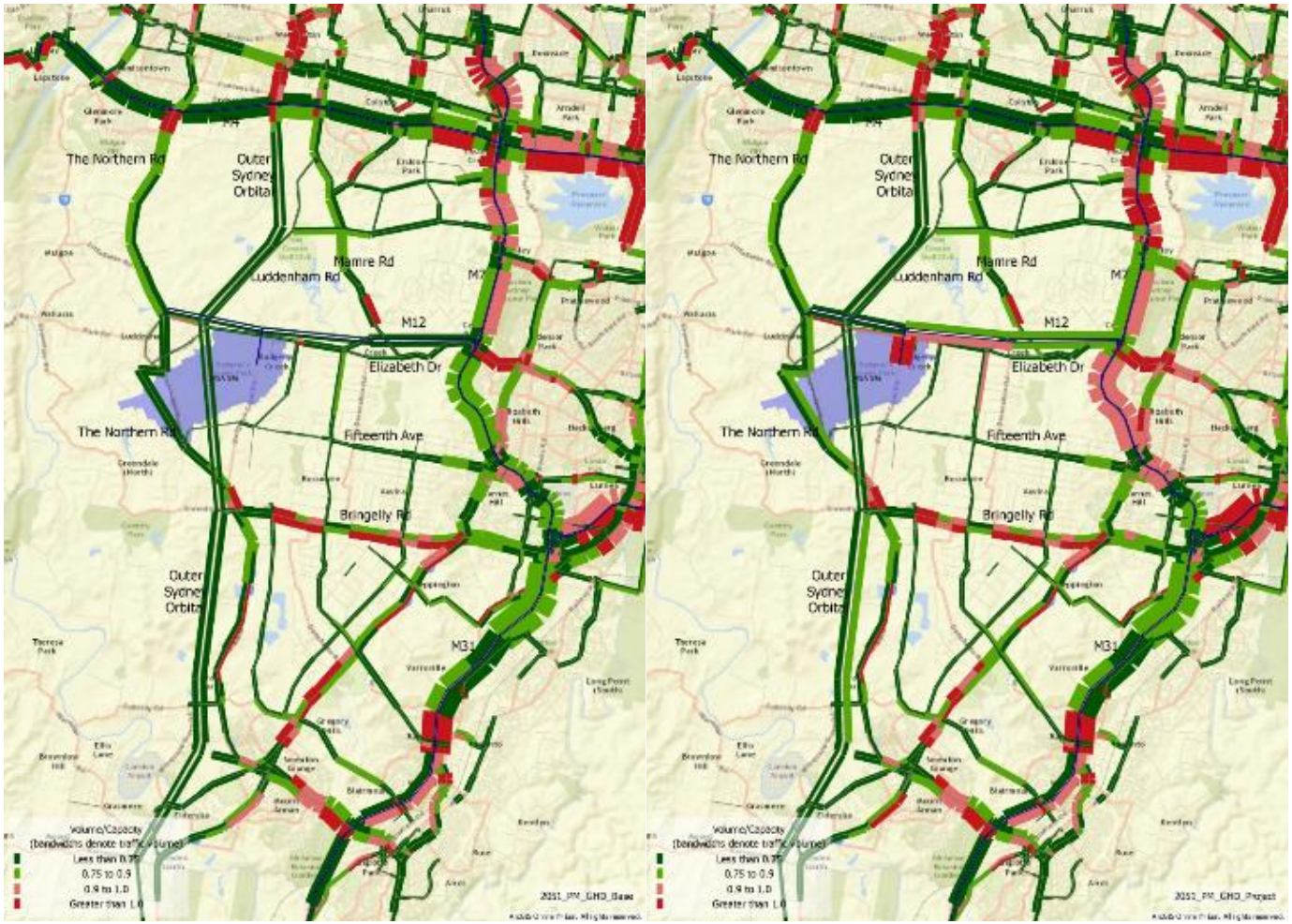
Note: Bold text has been used to identify a change in LoS from the base case – whether this is an improvement or deterioration.
Refer Figure 10-6 for the location ID of various roads.

Figure 10-7 2063 AM Peak Volume/Capacity – 'Without Airport' (Left), 'With Airport' (Right)



Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

Figure 10-8 2063 PM Peak Volume/Capacity – 'Without Airport' (Left), 'With Airport' (Right)



Note that the Outer Sydney Orbital will not pass through the airport site. This is a limitation of the modelling software which can only show roads as straight lines.

By 2063, with or without the proposed airport, the road network is forecast to exhibit a considerable amount of congestion.

It should be noted that because of the significant time horizon being forecast and the lack of available information on possible future road network upgrades beyond 2041, the 2063 airport demand forecasts have been assigned to a 2051 road network. As a result, it is reasonable to suggest this analysis is a worst-case scenario and that additional traffic capacity infrastructure would be provided in the 20 years between 2041 and 2063.

Motorways

In the 'Without Airport' scenario, the model predicts significant congestion as a result of background, non-airport related traffic in both the AM and PM peak periods:

- The M4 east of Archbold Road is at LoS F (eastbound in the AM peak and westbound in the PM peak);
- The M4 east of the M7 is at LoS F in both directions in the AM peak and westbound in the PM peak;
- Sections of the M7 are at LoS F
- The M5, east of the M7 is at LoS E or F.
- Sections of the M31 are at LoS E and F, south of Denham Court.
- The M12 is at LoS C or below in the Without Airport scenario.

The demand attributable to the airport in the 'With Airport' scenario causes or exacerbates the following issues, above and beyond the issues in the 'Without Airport' scenario:

- The M12 forms an important link for transport vehicles to and from the airport. The M12 itself has spare capacity even in the 'With Airport' scenario, with most sections at LoS D or better. Only the westbound link immediately prior to the airport entrance is at LoS E.
- Some sections of the M7, between Old Wallgrove Road and the M4 move from LoS E to Los F.
- In the AM peak, most sections of the M7 northbound between Fifteenth Avenue and Old Wallgrove Road move from LoS E to F.
- In the PM peak, most sections in both directions on the M7 between Elizabeth Drive and Fifteenth Avenue move from LoS D to LoS E.
- The M4, M5 and M31 have high volume/capacity ratios in both peak periods in both directions. However, the LoS is mostly unchanged due to airport traffic, with the exception of some sections of the M4 and M5 east of the M7, which move from LoS E to LoS F in the PM peak.
- The Outer Sydney Orbital is within capacity, with a LoS of D or below with the airport in both the AM and PM peaks.

Arterial Roads

In the 'Without Airport' scenario, significant congestion is predicted on arterial roads in Western Sydney:

- Bringelly Road exhibits high levels of congestion eastbound in the AM peak and westbound in the PM peak; and
- Narellan Road is considerably more congested than in 2031.
- Sections of Camden Valley Way are at LoS F.

With the addition of the airport traffic, the following changes are observed:

- Localised increases in LoS to F on Bringelly Road westbound in the AM peak.

- The Northern Road carries more traffic with the airport and M12 in place, partly due to the relative lack of connectivity between the airport and Outer Sydney Orbital. In the AM peak in particular, LoS on The Northern Road increases from C/D to E/F between Bringelly Road and the M4.

Local Roads

- North-south links between Elizabeth Drive and Fifteenth Avenue are more congested with the airport, rising to LoS F in both peak periods. These are important links that will be used to access the airport via Elizabeth Drive and have not been assumed to have been upgraded in this modelling analysis.
- Increases in traffic volumes on Luddenham Road and Mamre Road do not generally translate into an increase in LoS.

10.4 Public transport impacts

No assessment of the changes to the capacity requirements for the long term public transport network has been made. Due to the capacity constraints of the internal road system within the proposed airport, the mode split to public transport would need to increase over the long term and suitable levels of service will be required.

10.5 Key findings

The following key findings concerning passenger and employee trip generation and freight trip generation have been identified:

- daily passenger, employee and freight vehicle trip generation of 103,291 vehicles to the airport and 103,091 vehicles from the proposed airport, with 309 trains per day;
- the peak passenger and employee vehicle demand to the proposed airport is between 9:00 am and 10:00 am and is 8,567 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 am and 7:00 pm and is 7,957 vehicles per hour; and
- daily freight vehicle trip generation is expected to be 537 trucks per day in each direction, equating to 1,189 pcu, with a peak hour of 45 trucks (99 pcu).

The following key findings were identified from the assessment:

- percentage increase in volumes during peak periods on the motorway network attributable to the airport are less than 10% with the exception of the M12 and sections of the M7 in close proximity to the M12;
- greater congestion is predicted on the M12 and M7 motorways (near the interchange with the M12) in particular;
- greater congestion is predicted on arterial routes, in particular on Elizabeth Drive, The Northern Road and Bringelly Road in particular; and
- greater congestion on local roads in the vicinity of the airport.

Due to the capacity constraints of the internal road system within the proposed airport, the mode split to public transport would need to increase over the longer term and suitable levels of service will be required.

As demonstrated, the long term airport development and forecast growth in Western Sydney will have a significant combined impact on both the roads and public transport systems. The Australian and NSW governments have not commenced planning any road or transport upgrades beyond 2041.

Long term airport operations will be reliant on the introduction of an airport rail connection after 2031. Even with a South West Rail Link extension, the assessed increases in demand vs capacity for 2063 show that detailed planning is required to preserve additional corridors and transport upgrades to cater for the population and development growth associated with the airport and surrounding urban development.

The Australian and NSW governments are undertaking a Joint Scoping Study on the rail needs for Western Sydney, including the proposed airport. The study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region.

It is recommended that more detailed planning for road infrastructure is commenced to address the envisioned capacity shortfall so that potential future upgrades are not constrained by encroachment from surrounding development.

11. Summary and conclusions

11.1 Existing conditions

The existing land use in the vicinity of the airport site is generally rural /agricultural, consisting mainly of farming land and residential properties.

The existing traffic volumes on the surrounding road network are within the expected functional classification outlined by Roads and Maritime for arterial roads.

Bus routes 789 and 801 currently service the area in the vicinity of the airport site.

Pedestrian and cycling infrastructure is provided within the study area but is currently very limited.

The 2011 STM3 model for existing conditions shows capacity constraints:

- on the M4 and M5 eastbound and in both directions on the M7 during the AM peak;
- on the M4 and M5 westbound, as well as both directions on the M7 in the PM peak.

Therefore, although the immediate area around the airport site does not exhibit significant congestion, there are existing constraints on the strategic motorway network.

The crash history identified for the strategic road network is not out of character for these types of high volume roads. The following stands out in the analysis:

- there is a high representation of speed and fatigue in the crashes analysed;
- there is a high number of rear end crashes on The Northern Road; and
- there have been two fatalities at the intersection of Bringelly Road and Camden Valley Way.

The identified common crash types and themes should be considered in future proposed works.

11.2 Construction traffic impact

The construction of the proposed airport would generate an additional 1,254 vehicle movements per day on the surrounding road network during the construction period. This equates to around 160 peak hour vehicle movements in the morning peak period, which is not a significant value in the context of Western Sydney.

The construction stages for the proposed airport would not impact on the surrounding road transport system with the exception of potential oversized vehicle movements for the earthworks. These movements may require temporary road closures or police escorts.

A TACEMP would be developed in consultation with relevant stakeholders prior to the commencement of construction. The TACEMP would provide the overall plan and staging for managing traffic through and around each work site and take into consideration major projects around the airport site.

An important measure relating to construction traffic impacts is the implementation of a community information awareness programme. This programme will be initiated prior to construction commencing and continue throughout the entire construction period to ensure that local residents are aware of the construction activities, with particular regard to construction traffic issues.

11.3 Stage 1 airport development

The main access to the airport site from the north would be via the new M12 Motorway that is planned to run generally parallel to Elizabeth Drive. It is expected to include a grade separated interchange for the proposed airport access. The proposed access corridor within the airport site will be 100 m wide

comprising of six traffic lanes, two bus lanes and a 40 metre rail reserve corridor (including provision for station(s) within the corridor).

Additional commercial development area access could be via Elizabeth Drive and Badgerys Creek Road.

Access to the airport site from the south-west will be via The Northern Road, which will be relocated and upgraded by others prior to the commencement of operations. This access point is anticipated as being primarily for secure commercial access to operational areas of the site, including cargo and maintenance. This access road is expected to consist of a 50 metre-wide corridor allowing four trafficable lanes.

Parking would be provided for up to 12,500 vehicles, consisting of short and long stay parking, employee and operational parking, commercial vehicle parking and storage, parking for rental cars, and emergency services vehicle parking.

Pedestrian and cycle access would be included in the terminal and ground transport precincts and parking areas, and pedestrian and cycle routes would be provided throughout the airport site.

11.4 Operational assessment of the proposed Stage 1 airport development

The following key findings concerning passenger and employee trip generation and freight trip generation:

- daily passenger, employee and freight vehicle trip generation of 21,562 vehicles to the proposed airport and 21,556 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 6:00 am and 7:00 am and is 2,397 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 pm and 7:00 pm and is 2,254 vehicles per hour;
- daily freight vehicle trip generation of 66 trucks to / from the airport (equivalent to 145 pcu).

Overall, Stage 1 operations would not generate the level of traffic required to impact significantly the operation of the surrounding road network. This is primarily because the substantial package of road improvements proposed as part of the WSIP, in addition to those identified in the South West Priority Land Release Area, will have sufficient capacity to cater for the expected passenger and employee traffic demand for the proposed airport in 2031.

The public transport and walking and cycling systems proposed by the NSW Government and local councils would also have sufficient capacity to cater to the expected passenger and employee demand at the proposed airport.

As such, no transport mitigation measures are considered to be required for the Stage 1 airport development.

11.5 Operational assessment of the long term airport development

The following key findings concerning passenger and employee trip generation and freight trip generation have been identified:

- daily passenger, employee and freight vehicle trip generation of 103,291 vehicles to the airport and 103,628 vehicles from the proposed airport, with 309 trains per day;
- the peak passenger and employee vehicle demand to the proposed airport is between 9.00 am and 10.00 am and is 8,567 vehicles per hour;

- the peak passenger and employee vehicle demand away from the proposed airport is between 6.00 pm and 7.00 pm and is 7,957 vehicles per hour;
- daily freight vehicle trip generation is expected to be 537 trucks per day in each direction, with a peak hour of 45 trucks;

The following key findings were identified from the impact assessment:

- the percentage increase in volumes during peak periods on the motorway network attributable to the airport are less than 10% with the exception of the M12 and sections of the M7 in close proximity to the M12.
- greater congestion on motorways M12 and M7 (near the interchange with the M12) in particular;
- greater congestion on arterial routes Elizabeth Drive, Northern Road and Bringelly Road in particular; and
- greater congestion on local roads in the vicinity of the airport.

The assessment of the impact of public transport is limited to the forecast reduction in traffic volumes as a consequence of an assumed South West Rail Link extension from Leppington to St Marys via WSA.

As demonstrated, the indicative long term operation of the proposed airport together with forecast development growth in Western Sydney would have a significant combined effect on both the roads and transport systems. The Australian and NSW governments have not commenced planning any road or transport upgrades beyond 2041.

The indicative long term operation of the proposed airport would be reliant on the introduction of an airport rail connection after 2031. Even with a South West Rail Link extension, the identified increases in demand vs capacity for 2063 show that detailed planning is required to preserve additional road corridors to cater for the population and travel growth associated with the airport and surrounding urban development.

It is recommended that more detailed planning is commenced to address this envisioned road capacity shortfall such that potential future upgrades are not constrained by encroachment from the surrounding development.

12. References

Airport Cooperative Research Program *ACRP Report 4 – Ground Access to Major Transports by Public Transportation, 2008.*

Austroads 2009, *Guide to Traffic Management Part 3 Traffic Study Analysis, 2009*

Australian Standards *AS1742.3 Manual of Uniform Traffic Control Devices – Traffic control for works on roads*

Department of Environment 2015, *EIS Guidelines – Western Sydney Airport EPBC 2014/7391*. 22nd January 2015

GHD 2013, *Broader Western Sydney Employment Area Transport Planning Preliminary Analysis Exhibition Draft* 2013

LEK *Airport Demand Summary* April 2015

Liverpool City Council 2009, *Bike Plan* 2009

NSW Government 2015 *Western Sydney Infrastructure Plan Report Card* January to March 2015

NSW RTA 2002, *Guide to Traffic Generating Developments* 2002

Roads and Maritime *Road Design Guide*

Roads and Maritime *Traffic Control at Work Sites* manual

South West Priority Growth Area Structure Plan
http://growthcentres.planning.nsw.gov.au/LinkClick.aspx?fileticket=DIxdhdNT1b8%3d&tabid=91

Transport for NSW, *Bus 789 Route Map*
http://www.busways.com.au/sites/default/files/network_maps/781%2C789%2C795WarragambaLuddenham_map.pdf

Transport for NSW, *Bus 801 Route Map*

http://www.transitsystems.com.au/sydney/pdf/maps/801_Map.pdf

US Customs and Border Protection *Airport wait times (http://awt.cbp.gov/)*

US Transportation Security Administration *Security wait times (https://apps.tsa.dhs.gov/mytsa/wait_times_home.aspx)*

Western Sydney Unit 2015*, Airport Plan Western Sydney Airport,* Draft June 2015

Appendices

Appendix A - Traffic Volumes

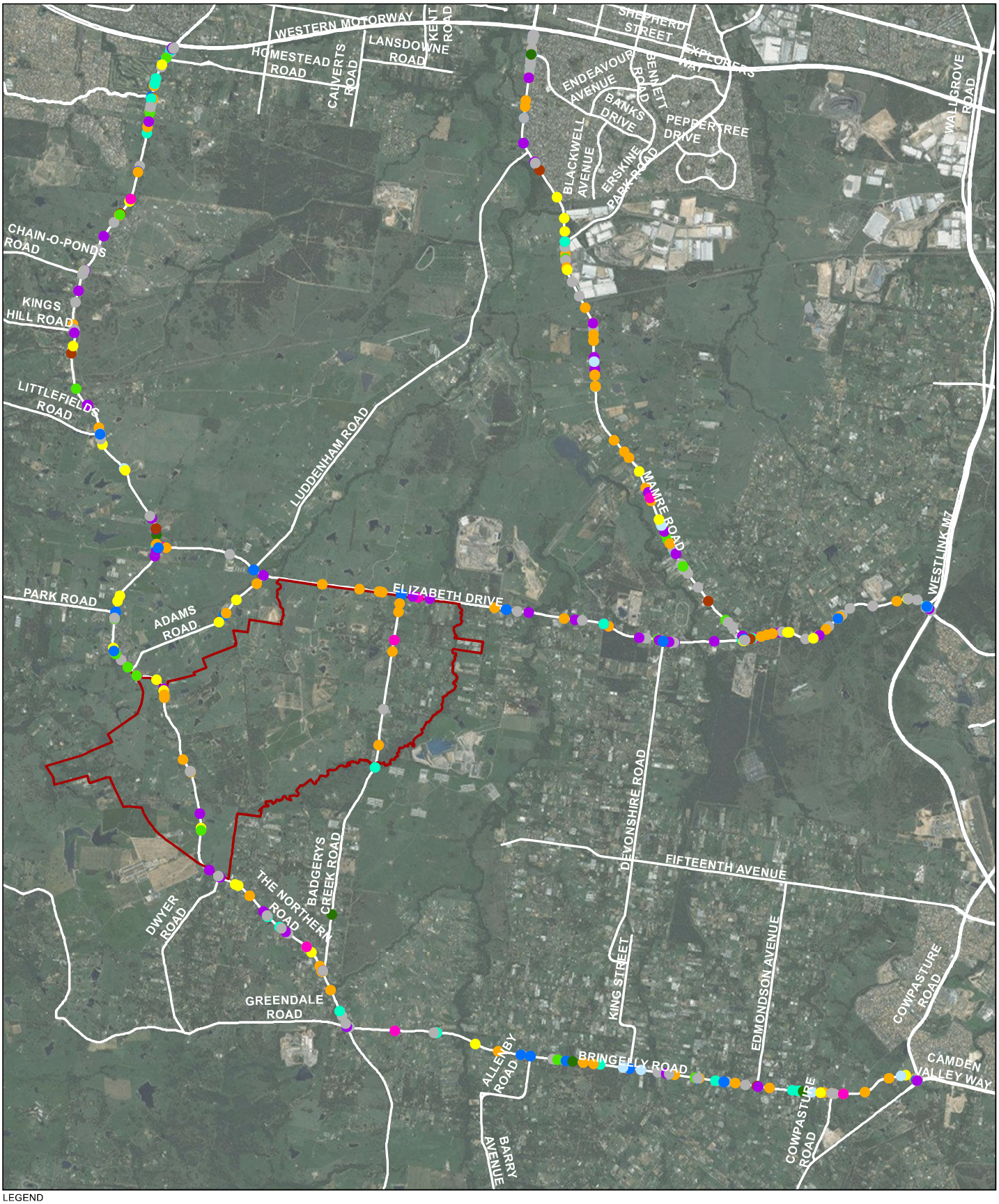
ID	Status	station	station	Location	Map	1991	1993	1996	1999	2002	2005	2005 flag	2005 factor	2005 converted	2005 converted flag
2340		64.014	64.014	BRINGELLY-N OF MR647,BRINGELLY RD	62	10591	11724	12224	15134	15790	17290	Axle Pair	0.98	16944	Vehicle
2341		64.015	64.015	LUDDENHAM-1K S OF EATON RD	55	9819	10060	12313	12951	13425	14885	Axle Pair	0.98	14587	Vehicle
2991		85.021	85.021	NARELLAN-1.5K W OF MR178,CAMDEN V'WY	75	8201	9119	9758	11857	15308	16369	Axle Pair	0.98	16042	Vehicle
2992		85.023	85.023	ORAN PARK-N OF WSTN. END COBBITY RD	69	8829						Axle Pair			Axle Pair
2993		85.024	85.024	BRINGELLY-S OF MR647,BRINGELLY RD	999	8291						Axle Pair			Axle Pair
3058		87.019	87.019	KINGSWOOD-N OF F4,WESTERN FWY	40	26964	31451	34120	41598	42786	44018	Axle Pair	0.98	43138	Vehicle
3059		87.020	87.020	KINGSWOOD-S OF F4,WESTERN FWY	47	16602	15268	21836	28531	30500	33069	Axle Pair	0.98	32408	Vehicle
3061		87.023	87.023	CAMBRIDGE PK-S OF SR2048,ANDREWS RD	40	28285	25546	27918	30601	27679	33961	Axle Pair	1.00	33961	Axle Pair
3063		87.026	87.026	LONDONDERRY-S OF SR2063,LONDOND'Y RD	32	10611	10690	12132	11813	12605	14329	Axle Pair	1.00	14329	Axle Pair
2994		85.026	85.026	BRINGELLY-S OF LOWES CK	62		9538	9775	12067	13212	14284	Axle Pair	0.98	13998	Vehicle
3060		87.021	87.021	LUDDENHAM-N OF MR535,ELIZABETH DR	55	12850	11643	13318	15501	14515	16902	Axle Pair	0.98	16564	Vehicle
3062		87.025	87.025	LONDONDERRY-E OF SR2063,LONDOND'Y RD	32	8342	9067	8975	10821	11255	10649	Axle Pair	1.00	10649	Axle Pair
2292	V	60.032	60.032	LIVERPOOL-AT CABRAMATTA CK BRIDGE	64	40651		45583	47878	49940	50281	Vehicle	1.00	50281	Vehicle
2301		60.092	60.092	LIVERPOOL-W OF SH 2,COPELAND ST	999							Axle Pair			Axle Pair
2302		60.093	60.093	LIVERPOOL-W OF MACQUARIE ST	64							Axle Pair			Axle Pair
2343		64.032	64.032	LUDDENHAM-E OF MR154,THE NORTHERN RD	55	6526	5446	5879	6753	6592	7311	Axle Pair	1.00	7311	Axle Pair
2344		64.033	64.033	CECIL PARK-W OF MR515,WALLGROVE RD	56	16980	15906	17274	19180	17910	17311	Axle Pair	1.00	17311	Axle Pair
2345		64.034	64.034	KEMPS CREEK-W OF MR536,MAMRE RD	56	10580	10943					Axle Pair			Axle Pair
2346		64.037	64.037	KEMPS CK-AT SOUTH CK BR	56			8041	9117	9098	9757	Axle Pair	1.00	9757	Axle Pair
2367		65.011	65.011	BONNYRIGG-S OF MR534,CABRAMATTA RD	57	23770	25621	25652	24412	24861	26122	Axle Pair	1.00	26122	Axle Pair
2368		65.012	65.012	BONNYRIGG-W OF MR534,CABRAMATTA RD	57	35698	35375					Axle Pair			Axle Pair
2371		65.022	65.022	BONNYR'G HTS-E OF MR648,COWPASTURE R	57			25920				Axle Pair			Axle Pair
2386	V	65.143	65.143	BONNYRIGG-W OF BONNYRIGG AV	57		32198	31504	28996	35506	36046	Vehicle	1.00	36046	Vehicle
2342	V	64.022	64.022	CECIL PARK-E OF MR515,WALLGROVE RD	56	21890		19755	23669	23303	M7 Roadwo	Vehicle	1.00		Vehicle
3032		86.041	86.041	ST MARYS-S OF SH5,GT WESTERN HWY	41							Axle Pair			Axle Pair
3049		86.165	86.165	ST CLAIR-N OF RAMPS TO WESTERN FWY	41		22282	28231	32143	32716	32534	Axle Pair	0.98	31883	Vehicle
3067		87.041	87.041	KEMPS CK-N OF MR535,ELIZABETH DR	56							Axle Pair			Axle Pair
3033		86.044	86.044	ERSKINE PK-AT WATER SUPPLY PIPELINE	48		9676	10859	12153	12446	14074	Axle Pair	0.98	13793	Vehicle
3038		86.084	86.084	KINGSWOOD-S OF SH5,GT WESTERN HWY	40							Axle Pair			Axle Pair
2358		64.099	64.099	PRESTONS-W OF MR620,CAMDEN VALLEY WY	63			7263			8900	Axle Pair	1.00	8900	Axle Pair
3008		85.092	85.092	AUSTRAL-E OF BROWNS AV	63	5558	5935		8484	8828	9449	Axle Pair	1.00	9449	Axle Pair
3012		85.099	85.099	BRINGELLY-E OF MR154,THE NORTHERN RD	62	3806	4874	4921	5841	6015	6212	Axle Pair	1.00	6212	Axle Pair
2356		64.097	64.097	AUSTRAL-AT SYDNEY WATER SUPPLY LINE	63	12412	12348	14554	15399	9363	8865	Axle Pair	1.00	8865	Axle Pair

Job No	N1840
Client	RMS
Road	The Northern Rd - north of Bringelly Rd
Location	Bringelly
Site No.	16
Start Date	16-Jun-15
Description	Volume Summary
Direction	Combined

Average Weekday	16,916
7 Day Average	15,593

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	22-Jun	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun		
AM Peak	1735	1699	1630	1595	1516	1024	1049		
PM Peak	1642	1543	1523	1671	1581	1015	1123		
0:00	39	42	44	45	44	102	146	43	66
1:00	23	33	33	25	28	53	59	28	36
2:00	44	39	37	28	34	40	42	36	38
3:00	88	78	69	66	73	44	33	75	64
4:00	215	180	188	194	195	99	52	194	160
5:00	689	591	587	590	553	219	98	602	475
6:00	1451	1399	1304	1280	1106	432	152	1308	1018
7:00	1735	1699	1630	1595	1516	542	263	1635	1283
8:00	1328	1240	1277	1260	1166	618	442	1254	1047
9:00	913	875	897	879	913	805	658	895	849
10:00	772	777	755	762	847	920	875	783	815
11:00	691	828	719	778	796	1024	1049	762	841
12:00	741	850	796	799	872	978	958	812	856
13:00	781	862	804	798	968	1015	958	843	884
14:00	1037	957	953	1019	1120	972	970	1017	1004
15:00	1406	1323	1338	1431	1436	988	1037	1387	1280
16:00	1642	1543	1523	1671	1581	1006	1123	1592	1441
17:00	1592	1451	1469	1555	1575	971	948	1528	1366
18:00	948	839	898	850	987	679	635	904	834
19:00	412	363	411	456	514	373	385	431	416
20:00	240	240	244	304	358	274	296	277	279
21:00	193	212	161	277	254	279	213	219	227
22:00	124	158	212	175	286	301	141	191	200
23:00	71	68	130	70	148	241	63	97	113
Total	17175	16647	16479	16907	17370	12975	11596	16916	15593
7-19	13586	13244	13059	13397	13777	10518	9916	13413	12500
6-22	15882	15458	15179	15714	16009	11876	10962	15648	14440
6-24	16077	15684	15521	15959	16443	12418	11166	15937	14753
0-24	17175	16647	16479	16907	17370	12975	11596	16916	15593

Appendix B – Crash data



LEGEND

- Airport site
- Adjacent Direction
- Manoeurving
- Miscellanous
- Off carriageway on bend
- Off carriageway on straight
- On path
- Opposing Direction
- Out of Control
- Overtaking
- Same direction - lane changing
- Same direction - rear end

Paper Size A3

0 500 1,000 2,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Job Number	XX-12345
Revision	A
Date	05 Jul 2016

Location of crashes (5 years)

Figure 1

N:\AU\Sydney\Projects\21\24265\GIS\Maps\Deliverables\KBM.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

Summary Crash Report

# Crash Type		
Car Crash	281	92.4%
Light Truck Crash	67	22.0%
Rigid Truck Crash	11	3.6%
Articulated Truck Crash	8	2.6%
'Heavy Truck Crash	(19)	(6.3%)
Bus Crash	4	1.3%
"Heavy Vehicle Crash	(21)	(6.9%)
Emergency Vehicle Crash	2	0.7%
Motorcycle Crash	20	6.6%
Pedal Cycle Crash	4	1.3%
Pedestrian Crash	1	0.3%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	157	51.6%
Non intersection	147	48.4%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	51	16.8%
Multi Vehicle	253	83.2%

Road Classification		
Freeway/Motorway	1	0.3%
State Highway	0	0.0%
Other Classified Road	303	99.7%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	32	10.5%
Fatigue	25	8.2%
Alcohol	7	2.3%

Weather		
Fine	230	75.7%
Rain	41	13.5%
Overcast	26	8.6%
Fog or mist	5	1.6%
Other	1	0.3%

Road Surface Condition		
Wet	56	18.4%
Dry	248	81.6%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	18	5.9%
Daylight	200	65.8%
Dusk	28	9.2%
Darkness	58	19.1%

Crash Movement		
Intersection, adjacent approaches	29	9.5%
Head-on (not overtaking)	20	6.6%
Opposing vehicles; turning	28	9.2%
U-turn	4	1.3%
Rear-end	141	46.4%
Lane change	13	4.3%
Parallel lanes; turning	2	0.7%
Vehicle leaving driveway	5	1.6%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	1	0.3%
Permanent obstruction on road	0	0.0%
Hit animal	2	0.7%
Off road, on straight	1	0.3%
Off road on straight, hit object	23	7.6%
Out of control on straight	4	1.3%
Off road, on curve	1	0.3%
Off road on curve, hit object	14	4.6%
Out of control on curve	1	0.3%
Other crash type	15	4.9%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	97	31.9%
50 km/h zone	7	2.3%	90 km/h zone	0	0.0%
60 km/h zone	42	13.8%	100 km/h zone	0	0.0%
70 km/h zone	156	51.3%	110 km/h zone	2	0.7%

~ 40km/h or less 0 0.0%

CRASHES	304	
Fatal crash	4	1.3%
Injury crash	130	42.8%
Non-casualty crash	170	55.9%

CASUALTIES	190	
Killed	4	2.1%
Injured	186	97.9%
^ Unrestrained	1	0.5%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	6	2.0%	12.5%
03:00 - 04:59	7	2.3%	8.3%
05:00 - 05:59	15	4.9%	4.2%
06:00 - 06:59	19	6.3%	4.2%
07:00 - 07:59	23	7.6%	4.2%
08:00 - 08:59	25	8.2%	4.2%
09:00 - 09:59	9	3.0%	4.2%
10:00 - 10:59	11	3.6%	4.2%
11:00 - 11:59	21	6.9%	4.2%
12:00 - 12:59	14	4.6%	4.2%
13:00 - 13:59	11	3.6%	4.2%
14:00 - 14:59	15	4.9%	4.2%
15:00 - 15:59	22	7.2%	4.2%
16:00 - 16:59	29	9.5%	4.2%
17:00 - 17:59	34	11.2%	4.2%
18:00 - 18:59	19	6.3%	4.2%
19:00 - 19:59	11	3.6%	4.2%
20:00 - 21:59	9	3.0%	8.3%
22:00 - 24:00	4	1.3%	8.3%

Street Lighting Off/Nil		% of Dark
13	of 58 in Dark	22.4%

Crashes		Casualties
49	2013	24
49	2012	43
73	2011	41
85	2010	54
48	2009	28

~ School Travel Time		
Involvement	73	24.0%

McLean Periods			% Week
A	81	26.6%	17.9%
B	8	2.6%	7.1%
C	57	18.8%	17.9%
D	11	3.6%	3.5%
E	13	4.3%	3.6%
F	52	17.1%	10.7%
G	46	15.1%	7.1%
H	24	7.9%	7.1%
I	3	1.0%	12.5%
J	9	3.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	55	18.1%	Thursday	52	17.1%	Sunday	35	11.5%
Tuesday	34	11.2%	Friday	54	17.8%	WEEKDAY	241	79.3%
Wednesday	46	15.1%	Saturday	28	9.2%	WEEKEND	63	20.7%

New Year	2	0.7%	Queen's BD	2	0.7%	Easter SH	8	2.6%
Aust. Day	1	0.3%	Labour Day	2	0.7%	June/July SH	11	3.6%
Easter	0	0.0%	Christmas	3	1.0%	Sept./Oct. SH	16	5.3%
Anzac Day	2	0.7%	January SH	9	3.0%	December SH	8	2.6%

Crashid dataset 6169 - The Northern Road from Maxwell Street to Mersey Road - Jan09 to Dec13
Note: 6169 - The Northern Road from Maxwell Street to Mersey Road - Jan09 to Dec13

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	106	93.8%
Light Truck Crash	23	20.4%
Rigid Truck Crash	6	5.3%
Articulated Truck Crash	3	2.7%
'Heavy Truck Crash	(9)	(8.0%)
Bus Crash	1	0.9%
"Heavy Vehicle Crash	(10)	(8.8%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	5	4.4%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	2	1.8%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	72	63.7%
Non intersection	41	36.3%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	25	22.1%
Multi Vehicle	88	77.9%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	34	30.1%
Unclassified Road	79	69.9%

Contributing Factors		
Speeding	8	7.1%
Fatigue	7	6.2%
Alcohol	1	0.9%

Weather		
Fine	96	85.0%
Rain	9	8.0%
Overcast	6	5.3%
Fog or mist	2	1.8%
Other	0	0.0%

Road Surface Condition		
Wet	12	10.6%
Dry	101	89.4%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	6	5.3%
Daylight	66	58.4%
Dusk	5	4.4%
Darkness	36	31.9%

Crash Movement		
Intersection, adjacent approaches	34	30.1%
Head-on (not overtaking)	1	0.9%
Opposing vehicles; turning	7	6.2%
U-turn	5	4.4%
Rear-end	29	25.7%
Lane change	1	0.9%
Parallel lanes; turning	2	1.8%
Vehicle leaving driveway	1	0.9%
Overtaking; same direction	2	1.8%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	1	0.9%
Permanent obstruction on road	0	0.0%
Hit animal	1	0.9%
Off road, on straight	1	0.9%
Off road on straight, hit object	14	12.4%
Out of control on straight	1	0.9%
Off road, on curve	1	0.9%
Off road on curve, hit object	3	2.7%
Out of control on curve	0	0.0%
Other crash type	9	8.0%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	59	52.2%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	29	25.7%	100 km/h zone	0	0.0%
70 km/h zone	25	22.1%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less			~ School Travel Time Involvement		
		0	0.0%		27	23.9%

CRASHES	113	
Fatal crash	2	1.8%
Injury crash	61	54.0%
Non-casualty crash	50	44.2%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	1	0.9%	12.5%
03:00 - 04:59	1	0.9%	8.3%
05:00 - 05:59	2	1.8%	4.2%
06:00 - 06:59	6	5.3%	4.2%
07:00 - 07:59	2	1.8%	4.2%
08:00 - 08:59	6	5.3%	4.2%
09:00 - 09:59	2	1.8%	4.2%
10:00 - 10:59	8	7.1%	4.2%
11:00 - 11:59	2	1.8%	4.2%
12:00 - 12:59	7	6.2%	4.2%
13:00 - 13:59	6	5.3%	4.2%
14:00 - 14:59	8	7.1%	4.2%
15:00 - 15:59	10	8.8%	4.2%
16:00 - 16:59	9	8.0%	4.2%
17:00 - 17:59	7	6.2%	4.2%
18:00 - 18:59	10	8.8%	4.2%
19:00 - 19:59	4	3.5%	4.2%
20:00 - 21:59	12	10.6%	8.3%
22:00 - 24:00	10	8.8%	8.3%

Street Lighting Off/Nil		% of Dark
16	of 36 in Dark	44.4%

CASUALTIES	94	
Killed	2	2.1%
Injured	92	97.9%
^ Unrestrained	1	1.1%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
16	2014	16
19	2013	14
24	2012	15
25	2011	22
19	2010	20
10	2009	7

McLean Periods			% Week
A	15	13.3%	17.9%
B	2	1.8%	7.1%
C	20	17.7%	17.9%
D	6	5.3%	3.5%
E	7	6.2%	3.6%
F	23	20.4%	10.7%
G	16	14.2%	7.1%
H	4	3.5%	7.1%
I	12	10.6%	12.5%
J	8	7.1%	10.7%

Day of the Week								
Monday	13	11.5%	Thursday	13	11.5%	Sunday	11	9.7%
Tuesday	26	23.0%	Friday	22	19.5%	WEEKDAY	86	76.1%
Wednesday	12	10.6%	Saturday	16	14.2%	WEEKEND	27	23.9%

# Holiday Periods								
New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	6	5.3%
Aust. Day	0	0.0%	Labour Day	1	0.9%	June/July SH	4	3.5%
Easter	1	0.9%	Christmas	2	1.8%	Sept./Oct. SH	2	1.8%
Anzac Day	0	0.0%	January SH	3	2.7%	December SH	2	1.8%

Crashid dataset 6470 - Bringelly Rd - The Northern Rd to Camden Valley Way - July09 to June14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	137	87.3%
Light Truck Crash	43	27.4%
Rigid Truck Crash	14	8.9%
Articulated Truck Crash	10	6.4%
'Heavy Truck Crash	(24)	(15.3%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(24)	(15.3%)
Emergency Vehicle Crash	1	0.6%
Motorcycle Crash	8	5.1%
Pedal Cycle Crash	1	0.6%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	86	54.8%
Non intersection	71	45.2%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	38	24.2%
Multi Vehicle	119	75.8%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	157	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	21	13.4%
Fatigue	14	8.9%

Weather		
Fine	116	73.9%
Rain	22	14.0%
Overcast	14	8.9%
Fog or mist	4	2.5%
Other	0	0.0%

Road Surface Condition		
Wet	39	24.8%
Dry	118	75.2%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	6	3.8%
Daylight	103	65.6%
Dusk	7	4.5%
Darkness	41	26.1%

Crash Movement		
Intersection, adjacent approaches	32	20.4%
Head-on (not overtaking)	12	7.6%
Opposing vehicles; turning	5	3.2%
U-turn	1	0.6%
Rear-end	50	31.8%
Lane change	11	7.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	1	0.6%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	4	2.5%
Off road, on straight	2	1.3%
Off road on straight, hit object	21	13.4%
Out of control on straight	2	1.3%
Off road, on curve	4	2.5%
Off road on curve, hit object	3	1.9%
Out of control on curve	0	0.0%
Other crash type	9	5.7%

Speed Limit				
40 km/h or less	1	0.6%	80 km/h zone	89	57.1%
50 km/h zone	2	1.3%	90 km/h zone	0	0.0%
60 km/h zone	34	21.8%	100 km/h zone	0	0.0%
70 km/h zone	30	19.2%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less	0	0.0%	~ School Travel Time Involvement	33	21.0%

CRASHES	157	
Fatal crash	2	1.3%
Injury crash	75	47.8%
Non-casualty crash	80	51.0%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	6	3.8%	12.5%
03:00 - 04:59	10	6.4%	8.3%
05:00 - 05:59	3	1.9%	4.2%
06:00 - 06:59	6	3.8%	4.2%
07:00 - 07:59	7	4.5%	4.2%
08:00 - 08:59	12	7.6%	4.2%
09:00 - 09:59	7	4.5%	4.2%
10:00 - 10:59	5	3.2%	4.2%
11:00 - 11:59	10	6.4%	4.2%
12:00 - 12:59	5	3.2%	4.2%
13:00 - 13:59	9	5.7%	4.2%
14:00 - 14:59	7	4.5%	4.2%
15:00 - 15:59	8	5.1%	4.2%
16:00 - 16:59	17	10.8%	4.2%
17:00 - 17:59	14	8.9%	4.2%
18:00 - 18:59	8	5.1%	4.2%
19:00 - 19:59	4	2.5%	4.2%
20:00 - 21:59	10	6.4%	8.3%
22:00 - 24:00	9	5.7%	8.3%

Street Lighting Off/Nil		% of Dark
25	of 41 in Dark	61.0%

CASUALTIES	101	
Killed	2	2.0%
Injured	99	98.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
18	2014	14
26	2013	12
31	2012	21
24	2011	15
40	2010	28
18	2009	11

McLean Periods			% Week
A	35	22.3%	17.9%
B	3	1.9%	7.1%
C	33	21.0%	17.9%
D	4	2.5%	3.5%
E	6	3.8%	3.6%
F	27	17.2%	10.7%
G	20	12.7%	7.1%
H	6	3.8%	7.1%
I	10	6.4%	12.5%
J	13	8.3%	10.7%

Day of the Week								
Monday	26	16.6%	Thursday	40	25.5%	Sunday	13	8.3%
Tuesday	18	11.5%	Friday	17	10.8%	WEEKDAY	130	82.8%
Wednesday	29	18.5%	Saturday	14	8.9%	WEEKEND	27	17.2%

# Holiday Periods								
New Year	0	0.0%	Queen's BD	1	0.6%	Easter SH	3	1.9%
Aust. Day	1	0.6%	Labour Day	0	0.0%	June/July SH	6	3.8%
Easter	1	0.6%	Christmas	3	1.9%	Sept./Oct. SH	4	2.5%
Anzac Day	0	0.0%	January SH	12	7.6%	December SH	8	5.1%

Crashid dataset 6454 - Reported crashes on Elizabeth Dr between the Northern Rd & M7 - 1 Jul 09 to 30 Jun 14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	144	90.6%
Light Truck Crash	21	13.2%
Rigid Truck Crash	14	8.8%
Articulated Truck Crash	8	5.0%
'Heavy Truck Crash	(22)	(13.8%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(22)	(13.8%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	8	5.0%
Pedal Cycle Crash	2	1.3%
Pedestrian Crash	1	0.6%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	67	42.1%
Non intersection	92	57.9%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	43	27.0%
Multi Vehicle	116	73.0%

Road Classification		
Freeway/Motorway	1	0.6%
State Highway	0	0.0%
Other Classified Road	157	98.7%
Unclassified Road	1	0.6%

Contributing Factors		
Speeding	14	8.8%
Fatigue	14	8.8%

Weather		
Fine	114	71.7%
Rain	22	13.8%
Overcast	15	9.4%
Fog or mist	7	4.4%
Other	0	0.0%

Road Surface Condition		
Wet	33	20.8%
Dry	126	79.2%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	16	10.1%
Daylight	98	61.6%
Dusk	3	1.9%
Darkness	42	26.4%

Crash Movement		
Intersection, adjacent approaches	24	15.1%
Head-on (not overtaking)	11	6.9%
Opposing vehicles; turning	10	6.3%
U-turn	3	1.9%
Rear-end	50	31.4%
Lane change	4	2.5%
Parallel lanes; turning	1	0.6%
Vehicle leaving driveway	4	2.5%
Overtaking; same direction	2	1.3%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	1	0.6%
Permanent obstruction on road	0	0.0%
Hit animal	3	1.9%
Off road, on straight	4	2.5%
Off road on straight, hit object	22	13.8%
Out of control on straight	2	1.3%
Off road, on curve	1	0.6%
Off road on curve, hit object	6	3.8%
Out of control on curve	0	0.0%
Other crash type	11	6.9%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	97	61.0%
50 km/h zone	4	2.5%	90 km/h zone	0	0.0%
60 km/h zone	42	26.4%	100 km/h zone	0	0.0%
70 km/h zone	16	10.1%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less	0	0.0%	~ School Travel Time Involvement	37	23.3%

CRASHES	159	
Fatal crash	1	0.6%
Injury crash	79	49.7%
Non-casualty crash	79	49.7%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	8	5.0%	12.5%
03:00 - 04:59	4	2.5%	8.3%
05:00 - 05:59	12	7.5%	4.2%
06:00 - 06:59	14	8.8%	4.2%
07:00 - 07:59	13	8.2%	4.2%
08:00 - 08:59	10	6.3%	4.2%
09:00 - 09:59	4	2.5%	4.2%
10:00 - 10:59	6	3.8%	4.2%
11:00 - 11:59	5	3.1%	4.2%
12:00 - 12:59	4	2.5%	4.2%
13:00 - 13:59	9	5.7%	4.2%
14:00 - 14:59	12	7.5%	4.2%
15:00 - 15:59	12	7.5%	4.2%
16:00 - 16:59	11	6.9%	4.2%
17:00 - 17:59	10	6.3%	4.2%
18:00 - 18:59	6	3.8%	4.2%
19:00 - 19:59	2	1.3%	4.2%
20:00 - 21:59	4	2.5%	8.3%
22:00 - 24:00	13	8.2%	8.3%

Street Lighting Off/Nil		% of Dark
11	of 42 in Dark	26.2%

CASUALTIES	106	
Killed	1	0.9%
Injured	105	99.1%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
13	2014	8
38	2013	29
33	2012	22
30	2011	17
32	2010	21
13	2009	9

McLean Periods		% Week
A	48	30.2% 17.9%
B	5	3.1% 7.1%
C	30	18.9% 17.9%
D	5	3.1% 3.5%
E	5	3.1% 3.6%
F	18	11.3% 10.7%
G	13	8.2% 7.1%
H	12	7.5% 7.1%
I	12	7.5% 12.5%
J	11	6.9% 10.7%

Day of the Week						# Holiday Periods		
Monday	23	14.5%	Thursday	22	13.8%	Sunday	20	12.6%
Tuesday	18	11.3%	Friday	24	15.1%	WEEKDAY	125	78.6%
Wednesday	38	23.9%	Saturday	14	8.8%	WEEKEND	34	21.4%

New Year	0	0.0%	Queen's BD	1	0.6%	Easter SH	1	0.6%
Aust. Day	0	0.0%	Labour Day	2	1.3%	June/July SH	4	2.5%
Easter	0	0.0%	Christmas	2	1.3%	Sept./Oct. SH	6	3.8%
Anzac Day	0	0.0%	January SH	15	9.4%	December SH	3	1.9%

Crashid dataset 6467 - Reported crashes on Mamre Rd between Elizabeth Dr & M4 Mtwy - 1 Jul 09 to 30 Jun 14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	5	83.3%
Light Truck Crash	0	0.0%
Rigid Truck Crash	1	16.7%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(1)	(16.7%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(1)	(16.7%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	1	16.7%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	1	16.7%
Non intersection	5	83.3%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	5	83.3%
Multi Vehicle	1	16.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	0	0.0%
Unclassified Road	6	100.0%

Contributing Factors		
Speeding	4	66.7%
Fatigue	1	16.7%

Weather		
Fine	5	83.3%
Rain	0	0.0%
Overcast	1	16.7%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	1	16.7%
Dry	5	83.3%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	4	66.7%
Dusk	0	0.0%
Darkness	2	33.3%

Crash Movement		
Intersection, adjacent approaches	1	16.7%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	2	33.3%
Out of control on straight	0	0.0%
Off road, on curve	1	16.7%
Off road on curve, hit object	1	16.7%
Out of control on curve	1	16.7%
Other crash type	0	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	2	33.3%	100 km/h zone	0	0.0%
70 km/h zone	4	66.7%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less			~ School Travel Time Involvement		
	0	0.0%		0	0.0%	

CRASHES	6	
Fatal crash	0	0.0%
Injury crash	4	66.7%
Non-casualty crash	2	33.3%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	1	16.7%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	1	16.7%	4.2%
12:00 - 12:59	1	16.7%	4.2%
13:00 - 13:59	1	16.7%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	1	16.7%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	1	16.7%	8.3%

Street Lighting Off/Nil		% of Dark
1	of 2 in Dark	50.0%

CASUALTIES	6	
Killed	0	0.0%
Injured	6	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
2	2014	1
2	2013	2
1	2012	0
1	2009	3

McLean Periods			% Week
A	0	0.0%	17.9%
B	1	16.7%	7.1%
C	2	33.3%	17.9%
D	1	16.7%	3.5%
E	0	0.0%	3.6%
F	0	0.0%	10.7%
G	1	16.7%	7.1%
H	0	0.0%	7.1%
I	1	16.7%	12.5%
J	0	0.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	1	16.7%	Thursday	0	0.0%	Sunday	1	16.7%
Tuesday	0	0.0%	Friday	1	16.7%	WEEKDAY	4	66.7%
Wednesday	2	33.3%	Saturday	1	16.7%	WEEKEND	2	33.3%

New Year	0	0.0%	Queen's BD	1	16.7%	Easter SH	0	0.0%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	16.7%
Anzac Day	0	0.0%	January SH	0	0.0%	December SH	0	0.0%

Crashid dataset 6493 - Reported crashes on Adams Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	22	91.7%
Light Truck Crash	5	20.8%
Rigid Truck Crash	1	4.2%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(1)	(4.2%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(1)	(4.2%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	17	70.8%
Non intersection	7	29.2%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	8	33.3%
Multi Vehicle	16	66.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	16	66.7%
Unclassified Road	8	33.3%

Contributing Factors		
Speeding	6	25.0%
Fatigue	3	12.5%

Weather		
Fine	17	70.8%
Rain	3	12.5%
Overcast	4	16.7%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	3	12.5%
Dry	21	87.5%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	8.3%
Daylight	17	70.8%
Dusk	1	4.2%
Darkness	4	16.7%

Crash Movement		
Intersection, adjacent approaches	12	50.0%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	1	4.2%
U-turn	0	0.0%
Rear-end	2	8.3%
Lane change	1	4.2%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	1	4.2%
Off road, on straight	1	4.2%
Off road on straight, hit object	4	16.7%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	1	4.2%
Out of control on curve	0	0.0%
Other crash type	1	4.2%

CRASHES	24	
Fatal crash	0	0.0%
Injury crash	9	37.5%
Non-casualty crash	15	62.5%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	1	4.2%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	3	12.5%	4.2%
07:00 - 07:59	4	16.7%	4.2%
08:00 - 08:59	2	8.3%	4.2%
09:00 - 09:59	1	4.2%	4.2%
10:00 - 10:59	2	8.3%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	1	4.2%	4.2%
15:00 - 15:59	2	8.3%	4.2%
16:00 - 16:59	3	12.5%	4.2%
17:00 - 17:59	1	4.2%	4.2%
18:00 - 18:59	2	8.3%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	2	8.3%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
4	of 4 in Dark	100.0%

CASUALTIES	12	
Killed	0	0.0%
Injured	12	100.0%
^ Unrestrained	1	8.3%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
5	2014	3
4	2013	1
2	2012	0
5	2011	3
3	2010	3
5	2009	2

McLean Periods			% Week
A	9	37.5%	17.9%
B	1	4.2%	7.1%
C	3	12.5%	17.9%
D	1	4.2%	3.5%
E	0	0.0%	3.6%
F	6	25.0%	10.7%
G	4	16.7%	7.1%
H	0	0.0%	7.1%
I	0	0.0%	12.5%
J	0	0.0%	10.7%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	11	45.8%
50 km/h zone	3	12.5%	90 km/h zone	0	0.0%
60 km/h zone	7	29.2%	100 km/h zone	0	0.0%
70 km/h zone	3	12.5%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less	0	0.0%	~ School Travel Time Involvement	8	33.3%

Day of the Week								
Monday	6	25.0%	Thursday	6	25.0%	Sunday	0	0.0%
Tuesday	2	8.3%	Friday	2	8.3%	WEEKDAY	22	91.7%
Wednesday	6	25.0%	Saturday	2	8.3%	WEEKEND	2	8.3%

# Holiday Periods								
New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	1	4.2%
Aust. Day	1	4.2%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	0	0.0%
Anzac Day	1	4.2%	January SH	2	8.3%	December SH	0	0.0%

Crashid dataset 6493 - Reported crashes on Badgerys Creek Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	14	87.5%
Light Truck Crash	4	25.0%
Rigid Truck Crash	1	6.3%
Articulated Truck Crash	1	6.3%
'Heavy Truck Crash	(2)	(12.5%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(2)	(12.5%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	2	12.5%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	5	31.3%
Non intersection	11	68.8%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	7	43.8%
Multi Vehicle	9	56.3%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	16	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	4	25.0%
Fatigue	5	31.3%

Weather		
Fine	11	68.8%
Rain	2	12.5%
Overcast	2	12.5%
Fog or mist	1	6.3%
Other	0	0.0%

Road Surface Condition		
Wet	3	18.8%
Dry	13	81.3%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	12.5%
Daylight	11	68.8%
Dusk	2	12.5%
Darkness	1	6.3%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	2	12.5%
Opposing vehicles; turning	1	6.3%
U-turn	1	6.3%
Rear-end	4	25.0%
Lane change	1	6.3%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	1	6.3%
Off road, on straight	0	0.0%
Off road on straight, hit object	3	18.8%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	3	18.8%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	12	75.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	4	25.0%	100 km/h zone	0	0.0%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less			~ School Travel Time Involvement	
		0	0.0%	4	25.0%

CRASHES	16	
Fatal crash	1	6.3%
Injury crash	6	37.5%
Non-casualty crash	9	56.3%

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	1	6.3%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	2	12.5%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	1	6.3%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	2	12.5%	4.2%
10:00 - 10:59	1	6.3%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	4	25.0%	4.2%
15:00 - 15:59	2	12.5%	4.2%
16:00 - 16:59	1	6.3%	4.2%
17:00 - 17:59	1	6.3%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	1	6.3%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
1	of 1 in Dark	100.0%

CASUALTIES	9	
Killed	1	11.1%
Injured	8	88.9%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
3	2014	0
2	2013	0
4	2012	4
4	2011	3
2	2010	1
1	2009	1

McLean Periods			% Week
A	2	12.5%	17.9%
B	1	6.3%	7.1%
C	5	31.3%	17.9%
D	2	12.5%	3.5%
E	0	0.0%	3.6%
F	3	18.8%	10.7%
G	1	6.3%	7.1%
H	1	6.3%	7.1%
I	1	6.3%	12.5%
J	0	0.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	3	18.8%	Thursday	0	0.0%	Sunday	2	12.5%
Tuesday	3	18.8%	Friday	3	18.8%	WEEKDAY	12	75.0%
Wednesday	3	18.8%	Saturday	2	12.5%	WEEKEND	4	25.0%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	1	6.3%
Aust. Day	1	6.3%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	0	0.0%
Anzac Day	2	12.5%	January SH	2	12.5%	December SH	0	0.0%

Crashid dataset 6493 - Reported crashes on The Northern Rd between Badgerys Creek Rd & Mersey Rd - 1 Jul 09 to 30 Jun 14

Note: Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Detailed Crash Report

NOTES: Reported crashes on Adams Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																						S F
Sydney Region																						
Liverpool LGA																						
Luddenham																						
Adams Rd																						
685110	P	07/10/2009	Wed	11:20		at	ANTON RD	TJN	STR	Fine	Dry	70	2	CAR	F41	N in ANTON RD	10	Turning right	I	0	3	
E39087277								RUM: 13	Right near					LOR	M32	W in ADAMS RD	60	Proceeding in lane				
838660	P	17/05/2013	Fri	18:20	140 m	W	ANTON RD	2WY	CRV	Fine	Dry	60	1	M/C	M19	W in ADAMS RD	60	Proceeding in lane	I	0	1	S
E52318939								RUM: 88	Out of cont on bend													
1030690	P	07/06/2014	Sat	13:50	200 m	S	ELIZABETH DR	2WY	STR	Fine	Dry	70	1	CAR	M34	S in ADAMS RD	60	Proceeding in lane	I	0	1	F
E106028601								RUM: 71	Off rd left => obj					Tree/bush								
828100	P	24/02/2013	Sun	08:35	650 m	S	ELIZABETH DR	2WY	CRV	Overcast	Wet	60	1	CAR	M41	S in ADAMS RD	50	Turning right	I	0	1	S
E52546780								RUM: 87	Off lft/lft bnd=>obj					Tree/bush								
1024162	P	17/03/2014	Mon	23:10	1.8 km	E	THE NORTHERN RD	2WY	CRV	Fine	Dry	70	1	CAR	M35	E in ADAMS RD	Unk	Proceeding in lane	N	0	0	S
E54546762								RUM: 82	Off right/right bend													
807193	P	15/08/2012	Wed	12:30	2 km	E	THE NORTHERN RD	2WY	STR	Fine	Dry	70	1	CAR	F53	W in ADAMS RD	75	Proceeding in lane	N	0	0	S
E48779912								RUM: 71	Off rd left => obj					Utility pole								

Report Totals: Total Crashes: 6 Fatal Crashes: 0 Injury Crashes: 4 Killed: 0 Injured: 6

Crashid dataset 6493 - Reported crashes on Adams Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Detailed Crash Report

NOTES: Reported crashes on Badgerys Creek Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																						S F
Sydney Region																						
Liverpool LGA																						
Badgerys Creek																						
Badgerys Creek Rd																						
1030027	P	31/05/2014	Sat	06:50	150 m	S	ELIZABETH DR	2WY	STR	Overcast	Dry	50	1	CAR	M56	S in BADGERYS CREEK RD	60	Proceeding in lane	N	0	0	S
E56747487								RUM: 73		Off rd rght => obj				Tree/bush								
1013301	P	26/02/2014	Wed	20:20	300 m	S	ELIZABETH DR	2WY	STR	Raining	Wet	50	1	CAR	M37	N in BADGERYS CREEK RD	60	Proceeding in lane	I	0	1	S F
E54704563								RUM: 71		Off rd left => obj				Tree/bush								
682922	P	19/08/2009	Wed	18:50	800 m	S	ELIZABETH DR	2WY	STR	Fine	Dry	60	1	CAR	F49	N in BADGERYS CREEK RD	50	Proceeding in lane	I	0	1	
E38246676								RUM: 67		Struck animal				Riderless horse								
1020452	P	09/04/2014	Wed	20:49	1 km	S	ELIZABETH DR	2WY	STR	Fine	Dry	50	1	CAR	M34	N in BADGERYS CREEK RD	60	Proceeding in lane	N	0	0	S
E55293839								RUM: 73		Off rd rght => obj				Tree/bush								
777159	P	21/11/2011	Mon	07:00	290 m	S	JAGELMAN RD	2WY	CRV	Fine	Dry	80	2	LOR	U 49	S in BADGERYS CREEK RD	70	Proceeding in lane	I	0	1	
E46498019								RUM: 33		Lane sideswipe				R A	F21	S in BADGERYS CREEK RD		Proceeding in lane				
846686	P	01/08/2013	Thu	16:15		at	LEGGO ST	TJN	STR	Fine	Dry	70	2	CAR	F23	N in BADGERYS CREEK RD	60	Proceeding in lane	I	0	1	
E53043608								RUM: 30		Rear end				4WD	M56	N in BADGERYS CREEK RD	10	Proceeding in lane				
683225	P	23/09/2009	Wed	08:45	1 km	S	LONGLEYS RD	2WY	STR	Overcast	Dry	60	1	CAR	F23	N in BADGERYS CREEK RD	50	Proceeding in lane	N	0	0	
E39038151								RUM: 70		Off road to left												
Elizabeth Dr																						
691666	P	03/12/2009	Thu	08:10		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	CAR	F38	N in BADGERYS CREEK RD	Unk	Turning right	N	0	0	
E39315561								RUM: 13		Right near				CAR	M21	W in ELIZABETH DR	Unk	Proceeding in lane				
692496	P	14/12/2009	Mon	16:15		at	BADGERYS CREEK RD	TJN	STR	Overcast	Dry	70	2	WAG	F63	N in BADGERYS CREEK RD	Unk	Turning right	I	0	1	S
E39905267								RUM: 13		Right near				TRK	M21	W in ELIZABETH DR	80	Proceeding in lane				
696715	P	07/01/2010	Thu	10:45		at	BADGERYS CREEK RD	TJN	STR	Overcast	Dry	80	2	CAR	M25	N in BADGERYS CREEK RD	Unk	Turning right	I	0	1	
E148038095								RUM: 13		Right near				4WD	M65	W in ELIZABETH DR	75	Proceeding in lane				
731447	P	04/11/2010	Thu	15:45		at	BADGERYS CREEK RD	TJN	STR	Raining	Wet	80	2	TRK	M43	N in BADGERYS CREEK RD	10	Turning right	N	0	0	
E43263178								RUM: 13		Right near				CAR	F49	W in ELIZABETH DR	80	Proceeding in lane				
734079	P	03/12/2010	Fri	06:40		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	CAR	M41	N in BADGERYS CREEK RD	Unk	Turning right	I	0	2	
E45416386								RUM: 13		Right near				CAR	M24	W in ELIZABETH DR	Unk	Proceeding in lane				
770981	P	12/10/2011	Wed	07:15		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	CAR	M24	N in BADGERYS CREEK RD	20	Turning right	N	0	0	
E45871747								RUM: 13		Right near				CAR	F69	W in ELIZABETH DR	70	Proceeding in lane				

Detailed Crash Report

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																						S F
807223	P	16/08/2012	Thu	07:20		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	CAR	F30	N in BADGERYS CREEK RD	5	Turning right	N	0	0	
E49369267								RUM: 13	Right near					CAR	F61	W in ELIZABETH DR	75	Proceeding in lane				
819701	P	10/12/2012	Mon	17:38		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	70	2	UTE	M U	N in BADGERYS CREEK RD	70	Turning right	N	0	0	
E50343379								RUM: 13	Right near					TRK	M39	W in ELIZABETH DR	50	Proceeding in lane				
839238	P	31/05/2013	Fri	16:30		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	60	2	4WD	M17	N in BADGERYS CREEK RD	Unk	Turning right	N	0	0	
E52077528								RUM: 13	Right near					CAR	M45	W in ELIZABETH DR	Unk	Proceeding in lane				
1003651	P	04/11/2013	Mon	09:25		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	WAG	M51	N in BADGERYS CREEK RD	Unk	Turning right	N	0	0	
E53523043								RUM: 13	Right near					TRK	F38	W in ELIZABETH DR	70	Proceeding in lane				
1014639	P	20/02/2014	Thu	18:00		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	CAR	F41	N in BADGERYS CREEK RD	20	Proceeding in lane	I	0	2	
E54600969								RUM: 10	Cross traffic					CAR	M25	W in ELIZABETH DR	80	Proceeding in lane				
1029759	P	24/06/2014	Tue	06:20		at	BADGERYS CREEK RD	TJN	STR	Fine	Dry	80	2	UTE	M64	N in BADGERYS CREEK RD	10	Proceeding in lane	N	0	0	
E55438858								RUM: 10	Cross traffic					CAR	M28	W in ELIZABETH DR	75	Proceeding in lane				
Bringelly																						
Badgerys Creek Rd																						
679756	P	03/08/2009	Mon	04:00	1 km	N	THE NORTHERN RD	2WY	STR	Fine	Dry	60	1	CAR	M28	N in BADGERYS CREEK RD	80	Other forward	N	0	0	S
E38270412								RUM: 79	Other straight													
The Northern Rd																						
751938	P	26/04/2011	Tue	15:00		at	BADGERYS CREEK RD	RDB	CRV	Fine	Dry	60	1	CAR	M74	W in THE NORTHERN RD	Unk	Proceeding in lane	I	0	2	S F
E44265205								RUM: 81	Off left/rt bnd=>obj					Body of water								
773894	P	29/10/2011	Sat	14:50		at	BADGERYS CREEK RD	RDB	STR	Fine	Dry	60	1	TRK	M38	N in THE NORTHERN RD	60	Proceeding in lane	N	0	0	F
E46047247								RUM: 71	Off rd left => obj					Utility pole								
772511	P	02/11/2011	Wed	07:45		at	BADGERYS CREEK RD	RDB	CRV	Fine	Dry	60	2	CAR	M59	N in THE NORTHERN RD	15	Turning right	N	0	0	
E45991827								RUM: 21	Right through					CAR	F22	S in THE NORTHERN RD	15	Proceeding in lane				
826214	P	28/01/2013	Mon	10:55		at	BADGERYS CREEK RD	RDB	STR	Raining	Wet	80	2	4WD	U U	S in THE NORTHERN RD	Unk	Proceeding in lane	N	0	0	
E50730562								RUM: 30	Rear end					CAR	F41	S in THE NORTHERN RD	40	Proceeding in lane				

Report Totals: Total Crashes: 24 Fatal Crashes: 0 Injury Crashes: 9 Killed: 0 Injured: 12

Crashid dataset 6493 - Reported crashes on Badgerys Creek Rd between Elizabeth Dr & The Northern Rd - 1 Jul 09 to 30 Jun 14

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Detailed Crash Report

NOTES: Reported crashes on The Northern Rd between Badgerys Creek Rd & Mersey Rd - 1 Jul 09 to 30 Jun 14

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																						S F
Sydney Region																						
Liverpool LGA																						
Bringelly																						
The Northern Rd																						
1004381	P	23/10/2013	Wed	09:00	100 m	N	AVON RD	2WY	STR	Fine	Dry	80	2	CAR	F25	N in THE NORTHERN RD	80	Proceeding in lane	N	0	0	
E52617652								RUM: 32	Right rear					WAG	M36	N in THE NORTHERN RD	80	Turning right				
The Northern Rd																						
699084	P	06/02/2010	Sat	14:30	100 m	N	AVON RD	2WY	STR	Overcast	Dry	80	2	TRK	M16	S in THE NORTHERN RD	5	Perform U-turn	I	0	1	
E149013195								RUM: 40	U turn					PAN	M56	S in THE NORTHERN RD	75	Proceeding in lane				
1022901	P	05/05/2014	Mon	05:00	235 m	S	AVON RD	2WY	STR	Fine	Dry	80	2	TRK	M34	S in THE NORTHERN RD	80	Proceeding in lane	N	0	0	
E216800695								RUM: 30	Rear end					4WD	M21	S in THE NORTHERN RD	50	Proceeding in lane				
751938	P	26/04/2011	Tue	15:00		at	BADGERYS CREEK RD	RDB	CRV	Fine	Dry	60	1	CAR	M74	W in THE NORTHERN RD	Unk	Proceeding in lane	I	0	2	S F
E44265205								RUM: 81	Off left/rt bnd=>obj					Body of water								
773894	P	29/10/2011	Sat	14:50		at	BADGERYS CREEK RD	RDB	STR	Fine	Dry	60	1	TRK	M38	N in THE NORTHERN RD	60	Proceeding in lane	N	0	0	F
E46047247								RUM: 71	Off rd left => obj					Utility pole								
772511	P	02/11/2011	Wed	07:45		at	BADGERYS CREEK RD	RDB	CRV	Fine	Dry	60	2	CAR	M59	N in THE NORTHERN RD	15	Turning right	N	0	0	
E45991827								RUM: 21	Right through					CAR	F22	S in THE NORTHERN RD	15	Proceeding in lane				
826214	P	28/01/2013	Mon	10:55		at	BADGERYS CREEK RD	RDB	STR	Raining	Wet	80	2	4WD	U U	S in THE NORTHERN RD	Unk	Proceeding in lane	N	0	0	
E50730562								RUM: 30	Rear end					CAR	F41	S in THE NORTHERN RD	40	Proceeding in lane				
1015736	P	07/03/2014	Fri	14:20	100 m	N	BADGERYS CREEK RD	2WY	STR	Overcast	Wet	60	1	CAR	F45	S in THE NORTHERN RD	80	Proceeding in lane	N	0	0	S F
E53592370								RUM: 73	Off rd rght => obj					Tree/bush								
798869	P	22/05/2012	Tue	16:00	500 m	N	BADGERYS CREEK RD	2WY	CRV	Fine	Dry	80	1	4WD	M43	N in THE NORTHERN RD	Unk	Proceeding in lane	I	0	2	S
E47943154								RUM: 87	Off lft/lft bnd=>obj					Tree/bush								
1026438	P	14/05/2014	Wed	01:00	500 m	N	BADGERYS CREEK RD	2WY	CRV	Fog or mist	Dry	80	1	WAG	F39	S in THE NORTHERN RD	70	Proceeding in lane	N	0	0	
E55099673								RUM: 67	Struck animal					Straying stock								
791904	P	23/03/2012	Fri	14:00	2 km	N	BRINGELLY RD	2WY	STR	Fine	Dry	80	3	CAR	F25	S in THE NORTHERN RD	80	Incorrect side	I	0	1	F
E47597966								RUM: 20	Head on					VAN	M52	N in THE NORTHERN RD	80	Proceeding in lane				
														LOR	M28	S in THE NORTHERN RD	80	Proceeding in lane				
681913	P	13/09/2009	Sun	17:15	100 m	W	DERWENT RD	2WY	STR	Fine	Dry	80	2	M/C	M66	W in THE NORTHERN RD	70	Proceeding in lane	I	0	1	
E40725083								RUM: 30	Rear end					4WD	M54	W in THE NORTHERN RD	0	Stationary				

Detailed Crash Report

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																						S F
772636	P	13/01/2012	Fri	19:30	1 km	S	DWYER RD	2WY	CRV	Fine	Dry	80	2	M/C	M29	S in THE NORTHERN RD	Unk	Incorrect side	F	1	0	
E46455217								RUM: 20	Head on					SEM	M39	N in THE NORTHERN RD	80	Proceeding in lane				
746680	P	29/03/2011	Tue	09:55	2.1 km	S	DWYER RD	2WY	CRV	Fine	Dry	80	1	CAR	F36	S in THE NORTHERN RD	80	Proceeding in lane	I	0	1	S F
E44926908								RUM: 81	Off left/rt bnd=>obj					Tree/bush								
707861	P	25/04/2010	Sun	05:00		at	MERSEY RD	TJN	STR	Raining	Wet	80	1	CAR	M19	E in THE NORTHERN RD	75	Proceeding in lane	N	0	0	
E41377778								RUM: 73	Off rd rght => obj					Utility pole								
821266	P	12/11/2012	Mon	15:20		at	NUMBER 1455 HN	2WY	STR	Fine	Dry	80	3	TRK	M55	W in THE NORTHERN RD	80	Veering right	N	0	0	
E49418652								RUM: 34	Lane change right					CAR	M44	W in THE NORTHERN RD	80	Proceeding in lane				
														TRK	M42	W in THE NORTHERN RD	80	Proceeding in lane				

Report Totals: Total Crashes: 16 Fatal Crashes: 1 Injury Crashes: 6 Killed: 1 Injured: 8

Crashid dataset 6493 - Reported crashes on The Northern Rd between Badgerys Creek Rd & Mersey Rd - 1 Jul 09 to 30 Jun 14

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Appendix C – Initial airport development traffic generation

Initial airport development

Traffic generation tables

Table 1 2031 passenger trip generation to the airport

Hr comm.	Domestic air departures	International air departures	Hourly total
00:00	139	152	291
01:00	117	593	710
02:00	102	404	507
03:00	-	213	213
04:00	70	81	151
05:00	851	441	1,292
06:00	1,290	429	1,720
07:00	1,615	407	2,022
08:00	1,282	604	1,886
09:00	905	613	1,517
10:00	611	504	1,115
11:00	768	270	1,037
12:00	658	-	658
13:00	793	78	870
14:00	531	74	605
15:00	628	-	628
16:00	1,152	110	1,262
17:00	1,595	270	1,865
18:00	1,184	78	1,261
19:00	396	74	471
20:00	164	11	175
21:00	353	323	676
22:00	292	791	1,083
23:00	173	397	570
Total	**15,669**	**6,916**	**22,585**

Table 2 2031 passenger trip generation from the airport

Hr comm.	Domestic air arrivals	International air arrivals	Hourly total
00:00	502	638	1,141
01:00	184	508	692
02:00	53	280	333
03:00	-	556	556
04:00	14	492	505
05:00	407	26	433
06:00	736	-	736
07:00	1,131	217	1,348
08:00	1,425	755	2,180
09:00	1,040	756	1,796
10:00	753	373	1,126
11:00	789	202	991
12:00	491	172	663
13:00	799	224	1,024
14:00	571	238	809
15:00	485	26	511
16:00	884	-	884
17:00	1,585	-	1,585
18:00	1,343	160	1,503
19:00	505	346	851
20:00	252	42	294
21:00	497	354	851
22:00	658	364	1,022
23:00	566	186	753
Total	**15,669**	**6,916**	**22,585**

Table 3 Passenger trip generation to the airport

Hr Comm.	Kiss'n'fly	Park'n'fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	291	-	-	-	-	-	291
01:00	399	156	102	25	29	-	710
02:00	245	131	84	21	26	-	507
03:00	213	-	-	-	-	-	213
04:00	102	25	14	4	7	-	151
05:00	478	407	245	61	101	-	1,292
06:00	644	538	320	80	138	-	1,720
07:00	824	599	353	88	158	-	2,022
08:00	1,062	412	243	61	108	-	1,886
09:00	787	365	221	55	89	-	1,517
10:00	565	275	169	42	63	-	1,115
11:00	456	291	174	43	73	-	1,037
12:00	274	192	110	27	55	-	658
13:00	443	214	122	31	61	-	870
14:00	324	141	80	20	40	-	605
15:00	259	185	105	26	53	-	628
16:00	531	365	212	53	100	-	1,262
17:00	846	509	299	75	136	-	1,865
18:00	643	309	176	44	88	-	1,261
19:00	271	100	57	14	28	-	471
20:00	108	33	19	5	10	-	175
21:00	461	107	65	16	27	-	676
22:00	580	252	164	41	47	-	1,083
23:00	378	96	64	16	16	-	570
Total	**11,184**	**5,700**	**3,399**	**850**	**1,452**	**-**	**22,585**

Table 4 Passenger trip generation from the airport

Hr Comm.	Kiss 'n' fly	Park 'n' fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	589	276	168	42	65	-	1,141
01:00	346	173	109	27	36	-	692
02:00	200	66	44	11	11	-	333
03:00	237	160	106	27	27	-	556
04:00	384	60	40	10	10	-	505
05:00	278	77	44	11	22	-	433
06:00	451	142	81	20	41	-	736
07:00	773	288	166	42	80	-	1,348
08:00	895	643	391	98	154	-	2,180
09:00	982	407	245	61	101	-	1,796
10:00	562	282	166	42	74	-	1,126
11:00	598	196	112	28	56	-	991
12:00	409	127	73	18	36	-	663
13:00	483	270	160	40	70	-	1,024
14:00	396	206	123	31	52	-	809
15:00	277	117	67	17	33	-	511
16:00	411	236	135	34	67	-	884
17:00	719	433	247	62	124	-	1,585
18:00	684	410	240	60	110	-	1,503
19:00	479	186	112	28	46	-	851
20:00	117	88	51	13	24	-	294
21:00	204	324	200	50	73	-	851
22:00	477	273	161	40	71	-	1,022
23:00	232	260	154	39	67	-	753
Total	**11,184**	**5,700**	**3,399**	**850**	**1,452**	**-**	**22,585**

Table 5 Total hourly passenger traffic generation to the airport (vehicles)

Hr comm.	Car	Taxi	Mini bus	Bus	Hourly total
00:00	227	-	-	9	236
01:00	365	71	3	5	443
02:00	242	61	3	2	307
03:00	142	-	-	4	145
04:00	159	13	0	1	174
05:00	1,060	202	8	3	1,272
06:00	2,091	270	10	26	2,397
07:00	2,027	303	11	27	2,368
08:00	1,738	208	8	31	1,985
09:00	1,471	180	7	24	1,682
10:00	616	133	5	10	764
11:00	569	145	5	7	726
12:00	753	100	3	11	868
13:00	903	111	4	16	1,033
14:00	693	73	3	13	781
15:00	681	96	3	10	790
16:00	710	187	7	9	913
17:00	1,069	258	9	16	1,353
18:00	772	160	6	15	953
19:00	295	52	2	6	355
20:00	258	17	1	3	279
21:00	563	53	2	10	628
22:00	571	115	5	9	700
23:00	342	43	2	9	396
Total	**18,316**	**2,850**	**106**	**277**	**21,549**

Table 6 Total hourly passenger traffic generation from the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Hourly total
00:00	601	135	5	-	741
01:00	424	81	3	2	511
02:00	208	30	1	2	241
03:00	309	71	3	-	383
04:00	456	27	1	0	485
05:00	478	40	1	7	526
06:00	579	74	3	20	676
07:00	996	148	5	19	1,168
08:00	1,454	315	12	13	1,793
09:00	1,223	202	8	11	1,444
10:00	1,145	142	5	7	1,300
11:00	1,104	102	4	8	1,218
12:00	803	66	2	10	881
13:00	1,042	136	5	10	1,193
14:00	561	103	4	5	673
15:00	949	61	2	11	1,023
16:00	1,219	123	4	12	1,357
17:00	1,785	225	8	14	2,032
18:00	2,024	208	7	14	2,254
19:00	1,231	92	3	7	1,334
20:00	692	45	2	1	739
21:00	592	156	6	2	756
22:00	684	137	5	3	829
23:00	489	131	5	1	625
Total	**21,048**	**2,850**	**106**	**179**	**24,183**

Table 7 Shift profiles

Worker type	Start	Finish	Percent of total employees	No of employees
Airfield overnight	21:00	05:00	2	140
Airfield day	05:00	13:00	3	210
Airfield afternoon	13:00	21:00	3	210
Terminal support morning	06:00	13:00	10	698
Terminal support afternoon	13:00	20:00	10	698
Terminal supplementary morning	06:00	11:00	14	978
Terminal supplementary morning	15:00	17:00	14	978
Office early start	07:00	17:00	21	1,467
Office later start	09:00	19:00	23	1,606
			Total	**6,983**

Table 8 Hourly arrival and departure volumes

Hr comm.	Arrival	Departure	Hourly total
00:00	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	-	-
04:00	70	140	210
05:00	419	140	559
06:00	1,571	-	1,571
07:00	1,222	-	1,222
08:00	803	-	803
09:00	803	-	803
10:00	-	489	489
11:00	-	489	489
12:00	489	419	908
13:00	489	419	908
14:00	419	-	419
15:00	419	733	1,152
16:00	-	733	733
17:00	-	803	803
18:00	-	1,222	1,222
19:00	-	838	838
20:00	140	489	629
21:00	140	70	210
22:00	-	-	-
23:00	-	-	-
Total	**6,983**	**6,983**	**13,967**

Table 9 Employee volumes arriving at the airport by mode

Hr Comm.	Car driver	Car Passenger	Bus	Train	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	-	-	-	-	-
04:00	70	-	-	-	70
05:00	419	-	-	-	419
06:00	1,210	204	157	-	1,571
07:00	941	159	122	-	1,222
08:00	618	104	80	-	803
09:00	618	104	80	-	803
10:00	-	-	-	-	-
11:00	-	-	-	-	-
12:00	376	64	49	-	489
13:00	376	64	49	-	489
14:00	323	54	42	-	419
15:00	323	54	42	-	419
16:00	-	-	-	-	-
17:00	-	-	-	-	-
18:00	-	-	-	-	-
19:00	-	-	-	-	-
20:00	140	-	-	-	140
21:00	140	-	-	-	140
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**5,554**	**808**	**622**	**-**	**6,983**

Table 10 Employee volumes departing the airport by mode

Hr Comm.	Car driver	Car Passenger	Bus	Train	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	-	-	-	-	-
04:00	140	-	-	-	140
05:00	140	-	-	-	140
06:00	-	-	-	-	-
07:00	-	-	-	-	-
08:00	-	-	-	-	-
09:00	-	-	-	-	-
10:00	376	64	49	-	489
11:00	376	64	49	-	489
12:00	323	54	42	-	419
13:00	323	54	42	-	419
14:00	-	-	-	-	-
15:00	565	95	73	-	733
16:00	565	95	73	-	733
17:00	618	104	80	-	803
18:00	941	159	122	-	1,222
19:00	645	109	84	-	838
20:00	489	-	-	-	489
21:00	70	-	-	-	70
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**5,570**	**799**	**615**	**-**	**6,983**

Table 11 Employee traffic generation to the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	-
02:00	-	-	-	-
03:00	-	-	-	-
04:00	70	-	-	70
05:00	419	-	-	419
06:00	1,210	10	-	1,220
07:00	941	8	-	949
08:00	618	5	-	624
09:00	618	5	-	624
10:00	-	-	-	-
11:00	-	-	-	-
12:00	376	3	-	380
13:00	376	3	-	380
14:00	323	3	-	325
15:00	323	3	-	325
16:00	-	-	-	-
17:00	-	-	-	-
18:00	-	-	-	-
19:00	-	-	-	-
20:00	140	-	-	140
21:00	140	-	-	140
22:00	-	-	-	-
23:00	-	-	-	-
Total	**5,554**	**41**	**-**	**5,595**

Table 12 Employee traffic generation from the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	-
02:00	-	-	-	-
03:00	-	-	-	-
04:00	140	-	-	140
05:00	140	-	-	140
06:00	-	-	-	-
07:00	-	-	-	-
08:00	-	-	-	-
09:00	-	-	-	-
10:00	376	3	-	380
11:00	376	3	-	380
12:00	323	3	-	325
13:00	323	3	-	325
14:00	-	-	-	-
15:00	565	5	-	569
16:00	565	5	-	569
17:00	618	5	-	624
18:00	941	8	-	949
19:00	645	6	-	651
20:00	489	-	-	489
21:00	70	-	-	70
22:00	-	-	-	-
23:00	-	-	-	-
Total	**5,570**	**41**	**-**	**5,611**

Table 13 All day trip generation and mode share

	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	38%	19%	11%	3%	19%	3%	7%	0%
No. trips	22,367	11,401	6,797	1,699	11,124	1,607	4,134	-

Table 14 AM peak trip generation and mode share

AM peak	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	36%	20%	12%	3%	21%	4%	5%	0%
No. trips	1,597	887	520	130	941	159	237	-

Table 15 PM peak trip generation and mode share

PM peak	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	32%	17%	10%	3%	23%	4%	11%	0%
No. trips	1,327	718	416	104	941	159	443	-

Table 16 Airport traffic generation to airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	227	0	0	9	236	-
01:00	365	71	3	5	443	-
02:00	242	61	3	2	307	-
03:00	142	0	0	4	145	-
04:00	159	13	0	1	174	-
05:00	1060	202	8	3	1272	-
06:00	2091	270	10	26	2397	-
07:00	2020	303	11	27	2360	-
08:00	1731	208	8	31	1978	-
09:00	1465	180	7	24	1676	-
10:00	613	133	5	10	762	-
11:00	566	145	5	7	724	-
12:00	750	100	3	11	865	-
13:00	899	111	4	16	1030	-
14:00	690	73	3	13	778	-
15:00	678	96	3	10	787	-
16:00	708	187	7	9	910	-
17:00	1065	258	9	16	1349	-
18:00	769	160	6	15	950	-
19:00	294	52	2	6	354	-
20:00	257	17	1	3	278	-
21:00	561	53	2	10	626	-
22:00	569	115	5	9	698	-
23:00	341	43	2	9	394	-
Total	**18,263**	**2,850**	**106**	**277**	**21,496**	**-**

Table 17 Airport traffic generation from airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	593	135	5	4	737	-
01:00	338	81	3	2	425	-
02:00	176	30	1	1	208	-
03:00	235	71	3	2	311	-
04:00	424	27	1	1	452	-
05:00	432	40	1	1	475	-
06:00	498	74	3	13	588	-
07:00	837	148	5	13	1,003	-
08:00	1,123	315	12	16	1,466	-
09:00	1,007	202	8	12	1,229	-
10:00	989	142	5	8	1,144	-
11:00	988	102	4	7	1,101	-
12:00	727	66	2	8	804	-
13:00	894	136	5	11	1,045	-
14:00	451	103	4	6	564	-
15:00	876	61	2	10	949	-
16:00	1,081	123	4	9	1,217	-
17:00	1,539	225	8	14	1,785	-
18:00	2,023	208	7	15	2,254	-
19:00	1,138	92	3	9	1,243	-
20:00	647	45	2	2	695	-
21:00	436	156	6	5	603	-
22:00	546	137	5	5	693	-
23:00	358	131	5	4	498	-
Total	**18,355**	**2,850**	**106**	**179**	**21,490**	**-**

Appendix D – Long term airport development traffic generation

Longer term airport development

Traffic generation tables

Table 1 Passenger trip generation to the airport

Hr comm.	Domestic air departures	International air departures	Hourly total
00:00	300	1,936	2,236
01:00	82	2,194	2,276
02:00	1	1,037	1,039
03:00	67	413	480
04:00	551	1,443	1,994
05:00	2,718	2,310	5,028
06:00	4,441	4,768	9,210
07:00	4,198	5,994	10,192
08:00	4,122	8,406	12,528
09:00	3,804	9,484	13,288
10:00	2,719	7,675	10,394
11:00	2,392	4,226	6,617
12:00	2,672	5,174	7,845
13:00	2,954	5,380	8,335
14:00	3,624	3,842	7,466
15:00	4,035	3,651	7,686
16:00	4,287	4,589	8,876
17:00	4,492	3,617	8,109
18:00	3,381	3,273	6,654
19:00	3,099	5,382	8,481
20:00	1,903	5,336	7,238
21:00	1,151	4,598	5,750
22:00	931	4,036	4,967
23:00	688	4,178	4,866
Total	**58,613**	**102,942**	**161,555**

Table 2 Passenger trip generation from the airport

Hr comm.	Domestic air arrivals	International air arrivals	Hourly total
00:00	1,446	3,220	4,665
01:00	402	2,966	3,368
02:00	15	2,308	2,323
03:00	10	1,954	1,964
04:00	148	661	809
05:00	1,243	31	1,274
06:00	2,264	809	3,073
07:00	2,448	4,361	6,809
08:00	3,487	10,169	13,656
09:00	3,844	9,570	13,414
10:00	3,337	7,829	11,166
11:00	2,776	6,540	9,316
12:00	2,314	4,987	7,300
13:00	2,944	3,934	6,878
14:00	3,206	3,096	6,303
15:00	3,268	4,138	7,406
16:00	3,011	3,217	6,227
17:00	3,913	2,786	6,699
18:00	4,867	5,573	10,440
19:00	3,723	3,968	7,691
20:00	3,096	4,522	7,618
21:00	2,235	6,459	8,695
22:00	2,329	5,358	7,687
23:00	2,287	4,488	6,776
Total	**58,613**	**102,942**	**161,555**

Table 3 Passenger trip generation to the airport by mode

Hr Comm.	Kiss 'n' fly	Park 'n' fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	1,218	248	275	69	179	248	2,236
01:00	1,067	294	327	82	212	294	2,276
02:00	634	98	109	27	71	98	1,039
03:00	400	20	21	5	14	20	480
04:00	559	354	382	95	248	354	1,994
05:00	1,337	924	970	243	631	924	5,028
06:00	2,568	1,658	1,750	438	1,138	1,658	9,210
07:00	3,646	1,632	1,728	432	1,123	1,632	10,192
08:00	5,485	1,749	1,866	466	1,213	1,749	12,528
09:00	5,334	1,967	2,116	529	1,375	1,967	13,288
10:00	4,239	1,519	1,641	410	1,067	1,519	10,394
11:00	2,840	938	1,001	250	650	938	6,617
12:00	2,871	1,233	1,320	330	858	1,233	7,845
13:00	3,062	1,307	1,399	350	909	1,307	8,335
14:00	2,563	1,224	1,292	323	840	1,224	7,466
15:00	2,892	1,202	1,258	314	818	1,202	7,686
16:00	2,905	1,491	1,573	393	1,022	1,491	8,876
17:00	2,890	1,308	1,370	342	890	1,308	8,109
18:00	3,297	842	881	220	573	842	6,654
19:00	3,137	1,325	1,418	355	922	1,325	8,481
20:00	3,125	1,014	1,098	274	713	1,014	7,238
21:00	2,837	716	780	195	507	716	5,750
22:00	2,406	627	687	172	447	627	4,967
23:00	2,308	624	689	172	448	624	4,866
Total	**63,623**	**24,315**	**25,949**	**6,487**	**16,867**	**24,315**	**161,555**

Table 4 Passenger trip generation from the airport by mode

Hr Comm.	Kiss 'n' fly	Park 'n' fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	2,007	661	704	176	457	661	4,665
01:00	1,483	462	505	126	328	462	3,368
02:00	923	341	378	95	246	341	2,323
03:00	896	260	289	72	188	260	1,964
04:00	559	61	67	17	43	61	809
05:00	647	161	161	40	104	161	1,274
06:00	1,558	383	395	99	257	383	3,073
07:00	2,133	1,154	1,246	311	810	1,154	6,809
08:00	4,121	2,348	2,547	637	1,655	2,348	13,656
09:00	5,227	2,024	2,179	545	1,416	2,024	13,414
10:00	4,496	1,652	1,772	443	1,152	1,652	11,166
11:00	4,368	1,227	1,312	328	853	1,227	9,316
12:00	3,468	951	1,016	254	660	951	7,300
13:00	2,688	1,044	1,106	277	719	1,044	6,878
14:00	3,045	819	853	213	554	819	6,303
15:00	3,049	1,085	1,151	288	748	1,085	7,406
16:00	3,009	805	846	212	550	805	6,227
17:00	2,615	1,027	1,069	267	695	1,027	6,699
18:00	3,385	1,760	1,861	465	1,210	1,760	10,440
19:00	3,247	1,114	1,167	292	758	1,114	7,691
20:00	2,217	1,342	1,430	358	930	1,342	7,618
21:00	3,105	1,381	1,488	372	967	1,381	8,695
22:00	2,988	1,166	1,246	311	810	1,166	7,687
23:00	2,392	1,089	1,161	290	754	1,089	6,776
Total	**63,623**	**24,315**	**25,949**	**6,487**	**16,867**	**24,315**	**161,555**

Table 5 Traffic generation to the airport

Hr comm.	Car	Taxi	Minibus	Bus	Train	Hourly total
00:00	1,009	183	9	12	1	1,214
01:00	878	218	10	14	1	1,122
02:00	472	73	3	5	0	554
03:00	283	17	1	1	0	302
04:00	600	281	12	17	2	911
05:00	1,616	770	30	42	5	2,463
06:00	2,973	1,368	55	246	27	4,668
07:00	3,667	1,338	54	207	23	5,288
08:00	4,983	1,414	58	168	18	6,642
09:00	4,976	1,562	66	178	19	6,802
10:00	3,919	1,195	51	71	8	5,244
11:00	2,648	758	31	43	5	3,486
12:00	2,826	990	41	110	12	3,979
13:00	3,035	1,050	44	113	12	4,254
14:00	2,722	1,010	40	101	11	3,885
15:00	2,964	1,008	39	100	11	4,122
16:00	3,129	1,233	49	68	7	4,487
17:00	3,081	1,097	43	59	7	4,286
18:00	3,057	706	28	38	4	3,833
19:00	3,131	1,062	44	61	7	4,306
20:00	2,848	795	34	48	5	3,730
21:00	2,420	553	24	34	4	3,035
22:00	2,075	480	21	30	3	2,609
23:00	1,987	469	22	30	3	2,510
Total	**61,299**	**19,629**	**811**	**1,796**	**196**	**83,730**

Table 6 Traffic generation from the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Train	Hourly total
00:00	1,806	535	22	30	3	2,397
01:00	1,259	355	16	22	2	1,654
02:00	788	253	12	16	2	1,071
03:00	729	193	9	13	1	945
04:00	430	47	2	3	0	483
05:00	688	146	5	7	1	847
06:00	1,566	329	12	187	21	2,116
07:00	2,335	911	39	186	20	3,491
08:00	4,336	1,832	80	197	21	6,466
09:00	4,942	1,604	68	181	20	6,815
10:00	4,187	1,320	55	77	8	5,647
11:00	3,841	986	41	57	6	4,931
12:00	3,059	767	32	97	11	3,966
13:00	2,648	855	35	101	11	3,650
14:00	2,819	692	27	82	9	3,629
15:00	2,981	888	36	95	10	4,010
16:00	2,799	670	26	37	4	3,536
17:00	2,705	869	33	46	5	3,658
18:00	3,658	1,446	58	81	9	5,251
19:00	3,128	932	36	51	6	4,153
20:00	2,476	1,085	45	62	7	3,675
21:00	2,979	1,093	47	64	7	4,190
22:00	2,791	939	39	54	6	3,829
23:00	2,349	881	36	50	5	3,322
Total	**61,299**	**19,629**	**811**	**1,796**	**196**	**83,730**

Table 7 Hourly arrival and departure volumes

Hr comm.	Arrival	Departure	Hourly total
00:00	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	-	-
04:00	492	984	1,476
05:00	2,952	984	3,936
06:00	11,070	-	11,070
07:00	8,610	-	8,610
08:00	5,658	-	5,658
09:00	5,658	-	5,658
10:00	-	3,444	3,444
11:00	-	3,444	3,444
12:00	3,444	2,952	6,396
13:00	3,444	2,952	6,396
14:00	2,952	-	2,952
15:00	2,952	5,166	8,118
16:00	-	5,166	5,166
17:00	-	5,658	5,658
18:00	-	8,610	8,610
19:00	-	5,904	5,904
20:00	984	3,444	4,428
21:00	984	492	1,476
22:00	-	-	-
23:00	-	-	-
Total	**49,200**	**49,200**	**98,400**

Table 8 Employee volumes arriving at the airport by mode

Hr Comm.	Car driver	Car Passenger	Bus	Train	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	-	-	-	-	-
04:00	492	-	-	-	492
05:00	2,952	-	-	-	2,952
06:00	3,321	1,439	2,546	3,764	11,070
07:00	2,583	1,119	1,980	2,927	8,610
08:00	1,697	736	1,301	1,924	5,658
09:00	1,697	736	1,301	1,924	5,658
10:00	-	-	-	-	-
11:00	-	-	-	-	-
12:00	1,033	448	792	1,171	3,444
13:00	1,033	448	792	1,171	3,444
14:00	886	384	679	1,004	2,952
15:00	886	384	679	1,004	2,952
16:00	-	-	-	-	-
17:00	-	-	-	-	-
18:00	-	-	-	-	-
19:00	-	-	-	-	-
20:00	984	-	-	-	984
21:00	984	-	-	-	984
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**18,548**	**5,692**	**10,071**	**14,888**	**49,200**

Table 9 Employee volumes arriving at the airport by mode

Hr Comm.	Car driver	Car Passenger	Bus	Train	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	-	-	-	-	-
04:00	984	-	-	-	984
05:00	984	-	-	-	984
06:00	-	-	-	-	-
07:00	-	-	-	-	-
08:00	-	-	-	-	-
09:00	-	-	-	-	-
10:00	1,033	448	792	1,171	3,444
11:00	1,033	448	792	1,171	3,444
12:00	886	384	679	1,004	2,952
13:00	886	384	679	1,004	2,952
14:00	-	-	-	-	-
15:00	1,550	672	1,188	1,756	5,166
16:00	1,550	672	1,188	1,756	5,166
17:00	1,697	736	1,301	1,924	5,658
18:00	2,583	1,119	1,980	2,927	8,610
19:00	1,771	768	1,358	2,007	5,904
20:00	3,444	-	-	-	3,444
21:00	492	-	-	-	492
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**18,893**	**5,628**	**9,958**	**14,721**	**49,200**

Table 10 Employee traffic generation to the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	-
02:00	-	-	-	-
03:00	-	-	-	-
04:00	492	-	-	492
05:00	2,952	-	-	2,952
06:00	3,321	170	19	3,510
07:00	2,583	132	15	2,730
08:00	1,697	87	10	1,794
09:00	1,697	87	10	1,794
10:00	-	-	-	-
11:00	-	-	-	-
12:00	1,033	53	6	1,092
13:00	1,033	53	6	1,092
14:00	886	45	5	936
15:00	886	45	5	936
16:00	-	-	-	-
17:00	-	-	-	-
18:00	-	-	-	-
19:00	-	-	-	-
20:00	984	-	-	984
21:00	984	-	-	984
22:00	-	-	-	-
23:00	-	-	-	-
Total	**18,548**	**671**	**74**	**19,294**

Table 11 Employee traffic generation from the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	-
02:00	-	-	-	-
03:00	-	-	-	-
04:00	984	-	-	984
05:00	984	-	-	984
06:00	-	-	-	-
07:00	-	-	-	-
08:00	-	-	-	-
09:00	-	-	-	-
10:00	1,033	53	6	1,092
11:00	1,033	53	6	1,092
12:00	886	45	5	936
13:00	886	45	5	936
14:00	-	-	-	-
15:00	1,550	79	9	1,638
16:00	1,550	79	9	1,638
17:00	1,697	87	10	1,794
18:00	2,583	132	15	2,730
19:00	1,771	91	10	1,872
20:00	3,444	-	-	3,444
21:00	492	-	-	492
22:00	-	-	-	-
23:00	-	-	-	-
Total	**18,893**	**664**	**74**	**19,630**

Table 12 All day trip generation and mode share

AM peak	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	20%	8%	8%	2%	6%	2%	8%	12%
No. of trips	127,247	48,630	51,898	12,974	37,441	11,321	53,650	78,071

Table 13 AM peak trip generation and mode share

AM peak	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	17%	8%	9%	2%	7%	3%	6%	8%
No. of trips	5,779	2,786	2,974	743	2,583	1,119	1,933	2,786

Table 14 PM peak trip generation and mode share

PM	Passenger Kiss 'n' fly	Passenger Park 'n' fly	Passenger Taxi	Passenger Shuttle	Staff car driver	Staff car passenger	Bus	Train
Mode share	16%	6%	7%	2%	6%	3%	14%	20%
No trips	6,682	2,601	2,742	685	2,583	1,119	5,743	8,456

Table 15 Airport traffic generation to airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	1,009	183	9	12	1,213	1
01:00	878	218	10	14	1,120	1
02:00	472	73	3	5	553	0
03:00	283	17	1	1	301	0
04:00	1,092	281	12	17	1,401	2
05:00	4,568	770	30	42	5,411	5
06:00	6,294	1,368	55	415	8,131	46
07:00	6,250	1,338	54	339	7,981	37
08:00	6,681	1,414	58	254	8,407	28
09:00	6,673	1,562	66	265	8,567	29
10:00	3,919	1,195	51	71	5,237	8
11:00	2,648	758	31	43	3,481	5
12:00	3,859	990	41	163	5,053	18
13:00	4,068	1,050	44	166	5,328	18
14:00	3,608	1,010	40	147	4,805	16
15:00	3,850	1,008	39	145	5,042	16
16:00	3,129	1,233	49	68	4,479	7
17:00	3,081	1,097	43	59	4,279	7
18:00	3,057	706	28	38	3,829	4
19:00	3,131	1,062	44	61	4,299	7
20:00	3,832	795	34	48	4,709	5
21:00	3,404	553	24	34	4,016	4
22:00	2,075	480	21	30	2,606	3
23:00	1,987	469	22	30	2,507	3
Total	**79,847**	**19,629**	**811**	**2,467**	**102,754**	**270**

Table 16 Airport traffic generation from airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	1,806	535	22	30	2,394	3
01:00	1,259	355	16	22	1,652	2
02:00	788	253	12	16	1,069	2
03:00	729	193	9	13	944	1
04:00	1,414	47	2	3	1,466	0
05:00	1,672	146	5	7	1,830	1
06:00	1,566	329	12	187	2,095	21
07:00	2,335	911	39	186	3,471	20
08:00	4,336	1,832	80	197	6,445	21
09:00	4,942	1,604	68	181	6,795	20
10:00	5,220	1,320	55	130	6,725	8
11:00	4,874	986	41	110	6,011	6
12:00	3,945	767	32	142	4,886	11
13:00	3,534	855	35	146	4,570	11
14:00	2,819	692	27	82	3,620	9
15:00	4,531	888	36	174	5,629	10
16:00	4,349	670	26	116	5,161	4
17:00	4,402	869	33	133	5,437	5
18:00	6,241	1,446	58	213	7,957	9
19:00	4,899	932	36	141	6,009	6
20:00	5,920	1,085	45	62	7,112	7
21:00	3,471	1,093	47	64	4,675	7
22:00	2,791	939	39	54	3,823	6
23:00	2,349	881	36	50	3,317	5
Total	**80,192**	**19,629**	**811**	**2,460**	**103,091**	**196**

GHD

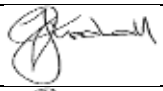
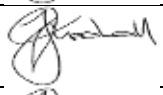
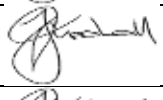
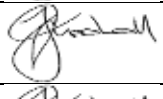
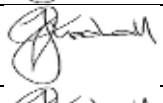
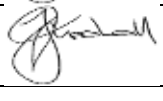
133 Castlereagh St Sydney NSW 2000

-

T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

G:\21\24265\Deliverables\09 Final EIS\Volume 4\01 Issued\J Transport and access re-issued with references fixed.docx

Document Status

Rev No.	Authors	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	S Payne K McNatty G McCabe	G McCabe		G Marshall		20.07.2015
B	S Payne K McNatty G McCabe	G McCabe		G Marshall		25.08.2015
C	S Payne K McNatty G McCabe	G McCabe		G Marshall		03.09.2015
0	S Payne K McNatty G McCabe	G McCabe		G Marshall		06.10.2015
1	S Payne G McCabe M.Sachdeva	G McCabe		G Marshall		16.06.2016
2	S Payne	G McCabe		G Marshall		22.08.2016
3	S Payne G McCabe	G McCabe		G Marshall		29.08.2016

www.ghd.com