VOLUME 4

Appendix J
Surface transport and access

Western Sydney Unit

Western Sydney Airport EIS

Surface Transport and Access Study

October 2015

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 to the extent expressly stated in the Contract (and for the purposes stated therein) the parties referred to in the Contract ("Other Parties") and may only be used and relied on by the Commonwealth and the Other Parties in accordance with the Contract for the purpose agreed between GHD and the Commonwealth as set out in the Contract.

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

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

Other than as expressly stated in this report to the contrary, 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.

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Executive summary

Introduction

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 1,700 hectares of land acquired by the Commonwealth in the 1980s and 1990s. Construction could commence as early as 2016, with airport operations commencing 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 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 up to 10 million passengers per year. 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.

In the longer term, approximately 40 years after operations commence and in accordance with relevant planning processes, the airport development could include parallel runways and additional passenger and transport facilities for around 82 million passenger movements per year. 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.

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. The draft Airport Plan is the primary source of reference for, and companion document to, the EIS. The draft Airport Plan identifies a staged development of the proposed airport. It provides details of the initial development being authorised, referred to as Stage 1, as well as a long-term vision of the airport's development. This enables preliminary consideration of the implications of longer term airport operations. Any stages of airport development beyond Stage 1 would be managed in accordance with the existing process in the Airports Act. This includes a requirement that for major developments (as 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.

This Assessment

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

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the report.

The periods considered in this traffic and transport impact assessment were the following:

- Construction – approximately 2016 - 2024
- Initial (Stage 1) airport development – assessed as occurring in 2031
- Longer term airport development – assessed as occurring in 2063.

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

Existing conditions and planned infrastructure developments

The existing land use in the vicinity of the airport site is generally rural/agricultural, consisting mainly of farming land and 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 South West Priority Growth Area (which lies adjacent to the airport site) and the Broader 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 $3.5 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 Broader Western Sydney Employment Area and South West Priority Growth 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:

- The Northern Road;
- Bringelly Road;
- Cowpastures Road;
- Camden Valley Way;
- Narellan Road;
- M4 with development of a managed motorway system; and
- M12 motorway, broadly along the current Elizabeth Drive alignment.

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 314 peak hour vehicle movements which would occur during the morning traffic 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 Construction Transport Management Plan (CTMP) would be developed by the construction contractor for approval by the Department of Infrastructure and Regional Development and NSW Roads and Maritime Services. The CTMP 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 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.

Initial airport 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 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 cargo and maintenance. This access road into the site is expected to consist of a 50 metre wide corridor allowing four trafficable lanes.

Parking for at least 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, and pedestrian and cycle routes will be provided throughout the airport site.

Initial airport development operational impact assessment

This surface transport assessment has used 2031 as the design year for the assessment of future impacts resulting from the proposed initial airport development. The year 2031 has been used in this study because it represents a midpoint between the current available traffic and transport models for Sydney, which includes the years 2026 and 2036. For the purpose of this analysis, it is assumed that the proposed airport rail link is not operational before 2036.

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

- the daily passenger and employee vehicle trip generation is 22,134 vehicles to the proposed airport and 24,857 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 7:00 and 8:00 AM and is 2,406 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 and 7:00 PM and is 2,429 vehicles per hour;
- a daily freight vehicle trip generation of 20,922 vehicles to the proposed airport and 20,936 vehicles from the airport;
- the freight AM peak (2 hour) vehicle demand is 3,966 to the proposed airport and 2,295 from the airport; and
- the freight PM peak (2 hour) vehicle demand is 1,905 to the airport and 2,117 from the airport.

The introduction of the proposed airport and the M12 has the following effects on the capacity of the major road network:

- a small increase in congestion on the Northern Road and the M4 at the intersection of the two roads; and
- a small increase in congestion on Mamre Road.

The public transport and walking and cycling systems proposed by the NSW Government and local councils and identified in Chapter 5 would also have sufficient capacity to cater for the expected passenger and employee demand of the proposed airport.

From the analysis contained within this study, it can be concluded that initial operation of the proposed airport would not impact significantly the surrounding transport system as planned.

Longer term development operational impact assessment

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

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

- a daily passenger and employee road vehicle trip generation of 87,575 vehicles to the proposed airport and 102,785 vehicles from the airport, with 242 trains per day;
- the peak passenger and employee vehicle demand to the proposed airport is between 7 and 8 AM and is 13,122 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6 and 7 PM and is 17,382 vehicles per hour;
- a daily freight vehicle trip generation of 85,077 vehicles to the airport and 85,291 vehicles from the proposed airport;
- peak AM (2 hour) vehicle demand is 12,201 to the proposed airport and 7,914 from the airport; and
- peak PM (2 hour) vehicle demand is 10,263 to the proposed airport and 10,753 from the airport.

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 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 the proposed rail line from Leppington to St Marys via the proposed airport.

As demonstrated, the long term operations of the proposed airport and forecast development growth in Western Sydney would have a significant combined impact on both the roads and transport systems

The longer term airport operations would be reliant on the introduction of the South West Rail Link extension after 2031. Even with the 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 proposed airport and urban development.

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

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Glossary and abbreviations

Term	Usage
ABS	Australian Bureau of Statistics
AM	Ante Meridiem
ART	Articulated Vehicles
BTS	Bureau of Transport Statistics
BWSEA	Broader Western Sydney Employment Area
CBD	Central Business District
CCTV	Closed-circuit television
CTMP	Construction Traffic Management Plan
Do Minimum	This is the minimum transport network improvements required to maintain the status quo on the road network around the airport site without the proposed project
EIS	Environmental Impact Statement
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
Longer 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

Term	Usage
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 for assessment purposes that airport operations commence in 2025 and the number of annual passengers reaches 10 million in 2030.
STM3	The Strategic Sydney Travel Model version 3
SWGC	Southwest Growth Centre
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 would be the location of a new airport for Western Sydney. The airport is proposed to be developed on approximately 1,700 hectares of land acquired by the Commonwealth between 1986 and 1991. Construction could commence as early as 2016, with airport operations commencing in the mid-2020s.

The airport would service both domestic and international air traffic, with development staged in response to passenger demand. The initial development of the airport would include a single 3.7 km 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 up to 10 million domestic and international passengers per year. In the longer term, approximately 40 years after the airport has commenced operations and in accordance with relevant planning processes, the airport development could include parallel runways and additional passenger and rail transport facilities for around 82 million passenger movements per year. To maximise the potential of the site, the airport is proposed to operate on a curfew free basis. Consistent with the practice at all federally leased airports; non-aeronautical commercial uses could be permitted on the site.

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

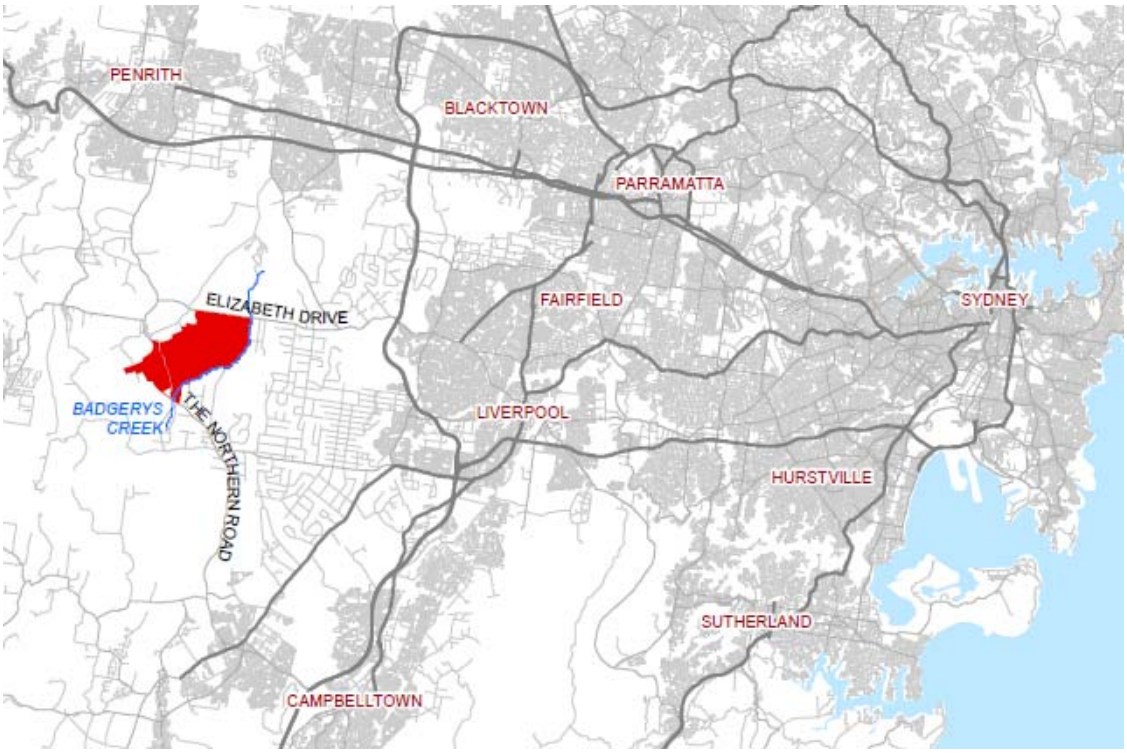
The Australian Government Department of Infrastructure and Regional Development is undertaking detailed planning and investigations for the new airport, including the development of an airport plan. The draft airport plan is the primary source of reference for the EIS. The draft airport plan identifies a staged development of the airport. It provides details of the initial development being authorised (referred to as Stage 1) as well as details of potential future stages of the airport's development which enable preliminary consideration of the implications of long term airport operations. Any stages of airport development beyond the initial stage would be managed in accordance with the existing process in the Commonwealth *Airports Act 1996*. This includes a requirement that for major developments (defined in the Airports Act) a major development plan be developed for approval by the Infrastructure Minister following a referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The airport plan will be required to include any conditions notified by the Environment Minister following the EIS. Any subsequent approvals for future stages of the development will form part of the airport lessee company's responsibilities under 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, 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 airport is around 1,700 hectares 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 (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 longer term development of the proposed airport on the surrounding transport network. This report focuses on 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 Initial 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 the operation of the project in the design year 2031 (approximately five years after opening).

Part B Longer term airport development

- **Section 8 – Key development components and assumed road network conditions**: provides a description of the key longer 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 longer 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 longer 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 are to address:

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

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

- construction – analysed years 2016 – 2026;
- initial stage development – assessment year 2031; and
- longer 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 during this period and the overall effect on the higher order road network.

The analysis year for the proposed initial stage was determined as a midpoint between the current available traffic and transport models for Sydney. These models are developed based on the following years: 2011, 2016, 2021, 2026, 2036, 2041 and 2063. By adopting the year 2031 for assessing the proposed initial stage development, this study differs from other Stage 1 studies conducted to inform the EIS, which are based on the year 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 longer 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 developed by the Transport for NSW Bureau of Transport Statistics apply transport demand data based on 2063 land use and population assumptions onto a 2041 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:

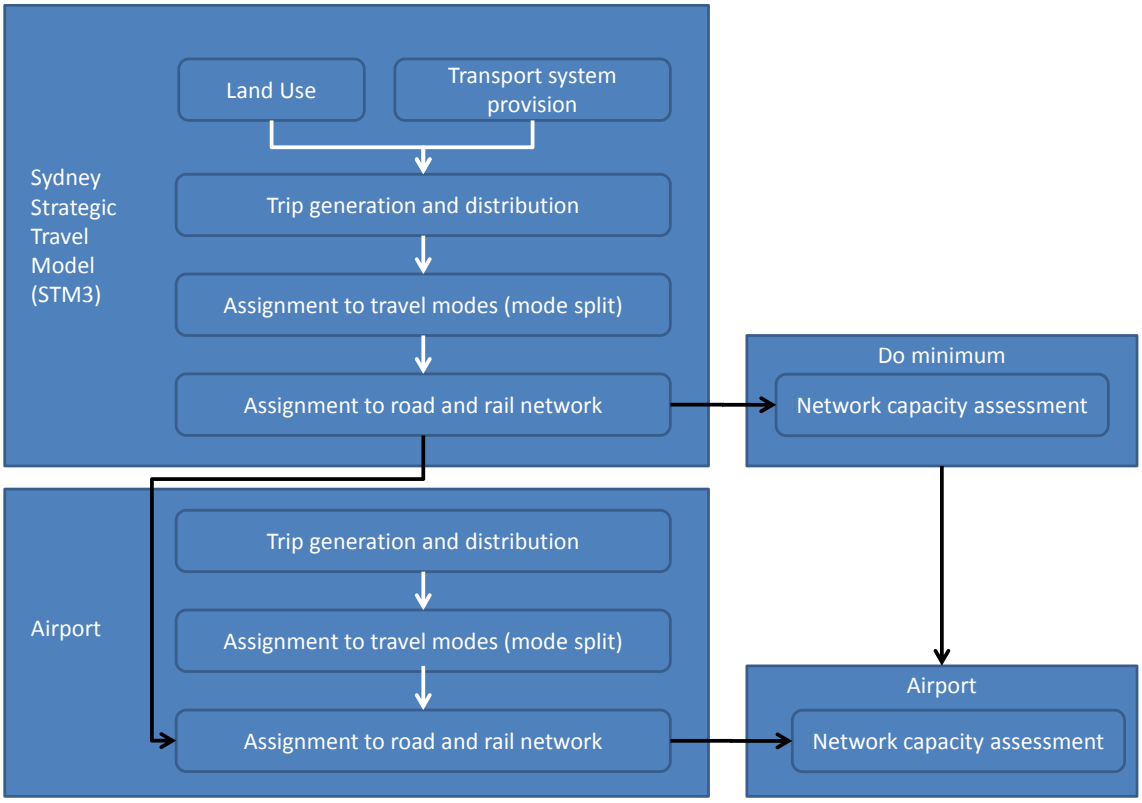
- Aerial photography and other GIS mapping information.
- Traffic count data for the study area (as defined in section 1.2) obtained from the NSW Roads and Maritime Services (Roads and Maritime).
- Roads and Maritime crash data for state and local authority controlled roads in the study area.
- Sydney 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 (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).
    - 2026 Western Sydney with Western Sydney Airport (WSAr02).
    - 2036 Western Sydney with Western Sydney Airport (WSAr02).
    - 2063 Western Sydney with Western Sydney Airport (WSAr02).

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 developed by the Transport for NSW Bureau of Transport Statistics to project travel patterns in the Sydney Greater Metropolitan Area (GMA).

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)
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.

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 existing information available, while enabling representation of the greater level of detail available to the EIS team regarding the proposed airport and surrounding infrastructure.

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 'Do Minimum' scenarios in 2031 and 2063, used to ascertain the impact of the airport above the 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)
    - initial stage development operational traffic in 2031 (see section 7.1 for further details)
    - longer term operational traffic in 2063, with and without rail (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 when the proposed airport is operational, so is included in all 'with Airport' model scenarios; and
- implicit within the calculation of vehicle trips coming from and to the proposed airport in the 2063 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.

However, the network exhibits the most 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 4 for semi-trailers and 5 for B-Doubles.

Therefore, for example, it is considered that an articulated vehicle takes up the equivalent road space of four cars.

2.3.3 Modelling assumptions

The trip generation and traffic generation for the proposed airport have been synthesised based on 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.

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 longer 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 over the longer 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. The models are currently in development by Transport for NSW. However, due to the time constraints for the Western Sydney Airport EIS, GHD has used the latest available versions as the basis for the analysis in this study. GHD has not reviewed or corroborated the models provided beyond consistency checks of outputs.

The road and public transport networks for Do Minimum modelling scenarios is consistent with assumptions made in the STM3 models adopted (see section 2.2). Note that a representation of the M12 was not included in these models.

The M12 motorway is assumed to be present in each 'with Airport' scenario. 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.

The construction impact has been analysed from 2016 to 2026, the construction profile shows that the year of 2021 has the peak construction movements and therefore this construction modelling has been based on 2021 to capture the 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. However based on Austroads *Guide to Traffic Management Part 3 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.

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 measure for each link (VCR) 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.

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.

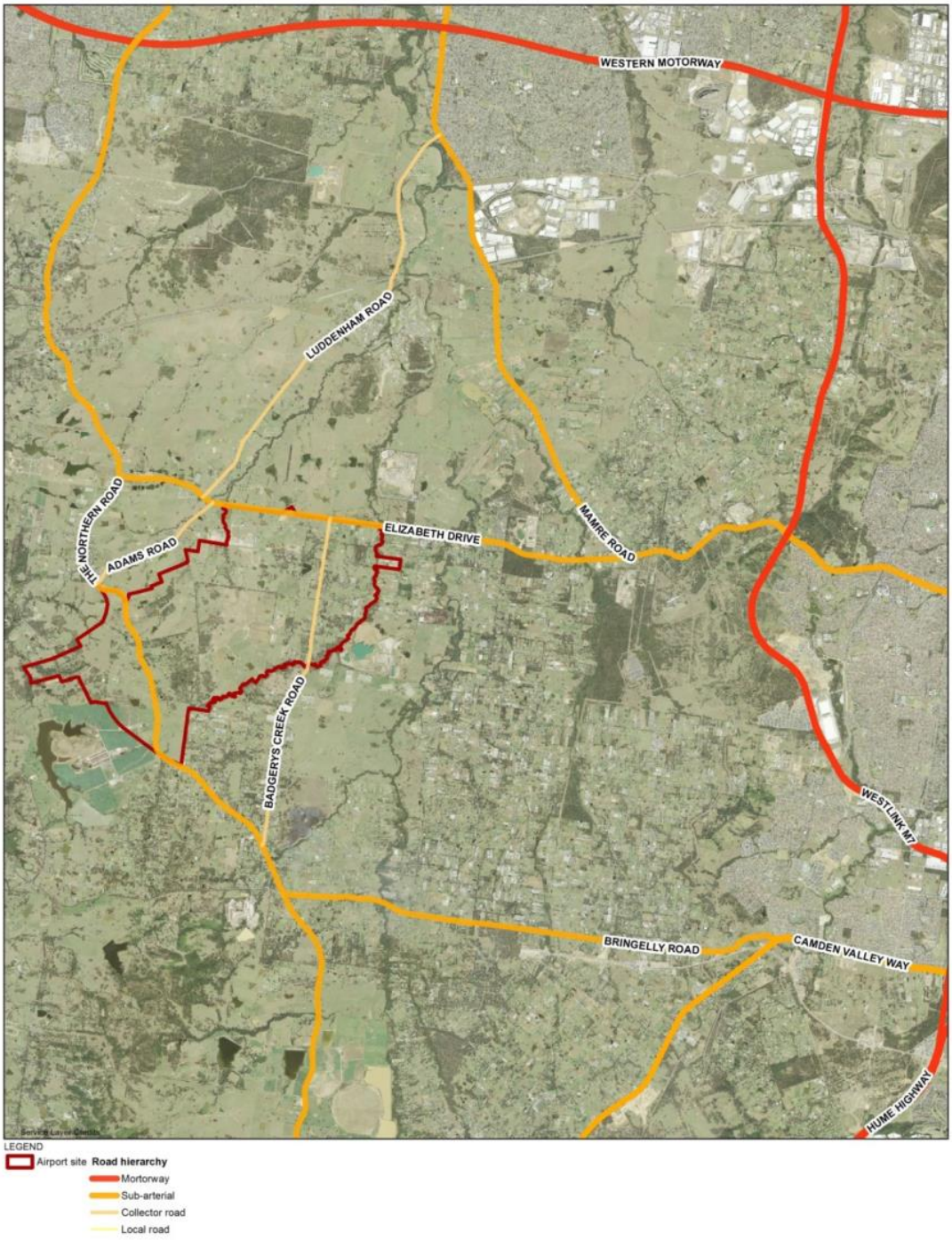
In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions within Sydney, and throughout the State. State roads are the responsibility of the Roads and Maritime to fund, prioritise and 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.

Local roads within the airport site

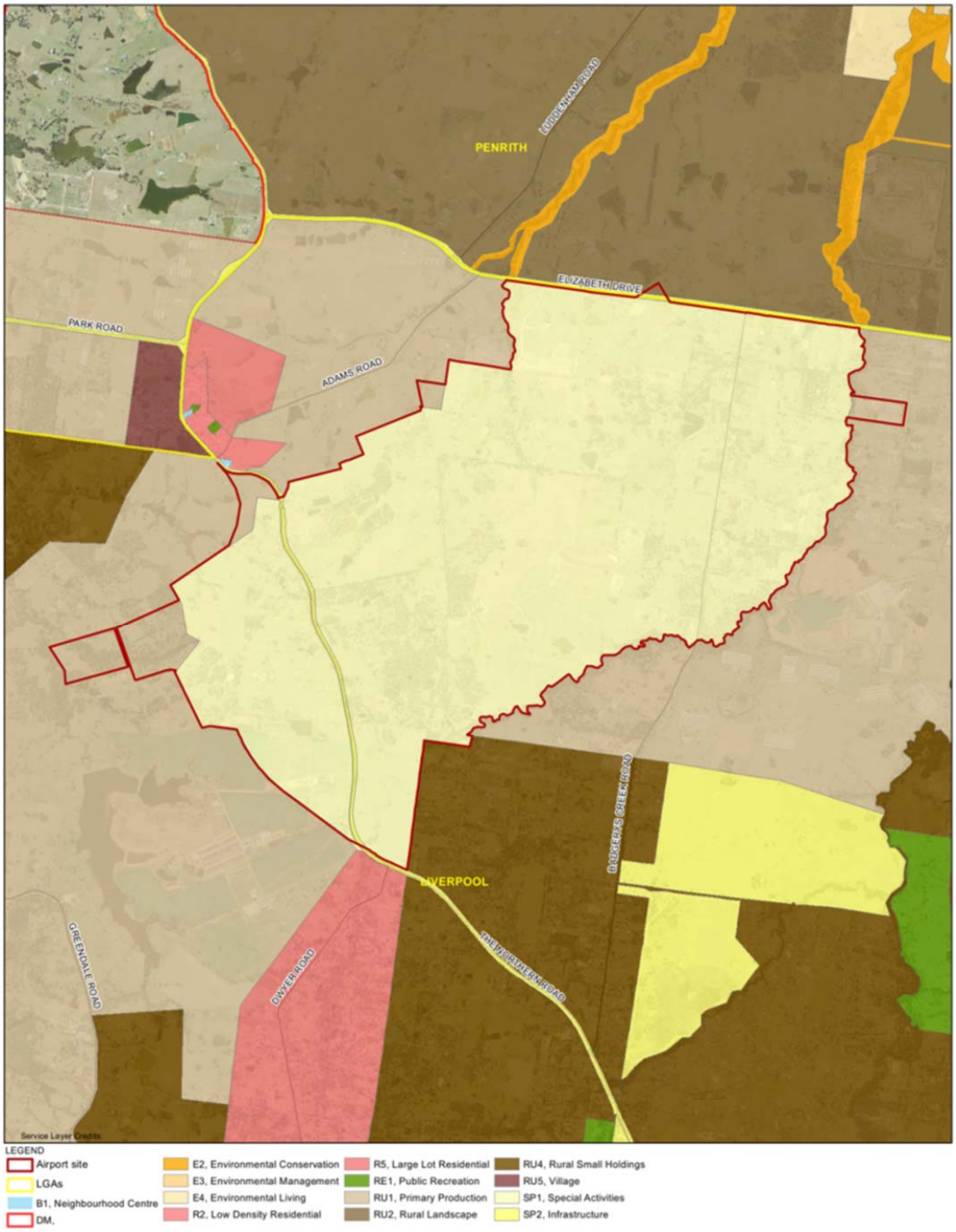
A number of roads pass through the airport site. Figure 3-2 shows their geographic locations. With the exception of The Northern Road, all other roads were compulsorily acquired by the Australian Government in July 1991. These roads are currently maintained by Liverpool City Council under an agreement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

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

Source: GHD

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 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 LPMA 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 is a combination of vehicle counts and axle pair counts. These count locations are no longer counted by Roads and Maritime, therefore the most recent data available without undertaking traffic surveys is 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 has 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

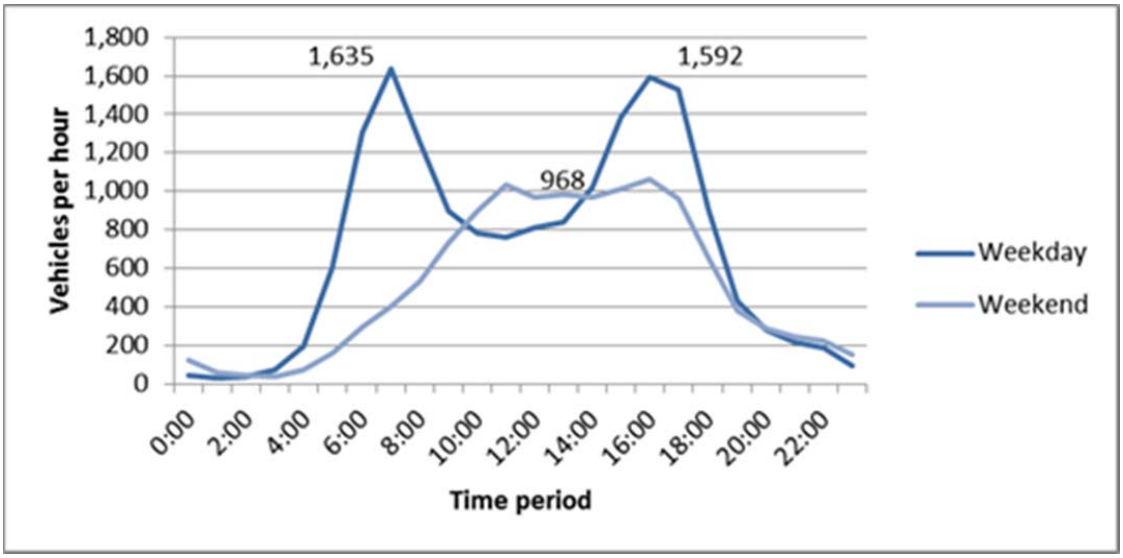


Figure 3-5 Traffic profile at The Northern Road south of Bringelly Road

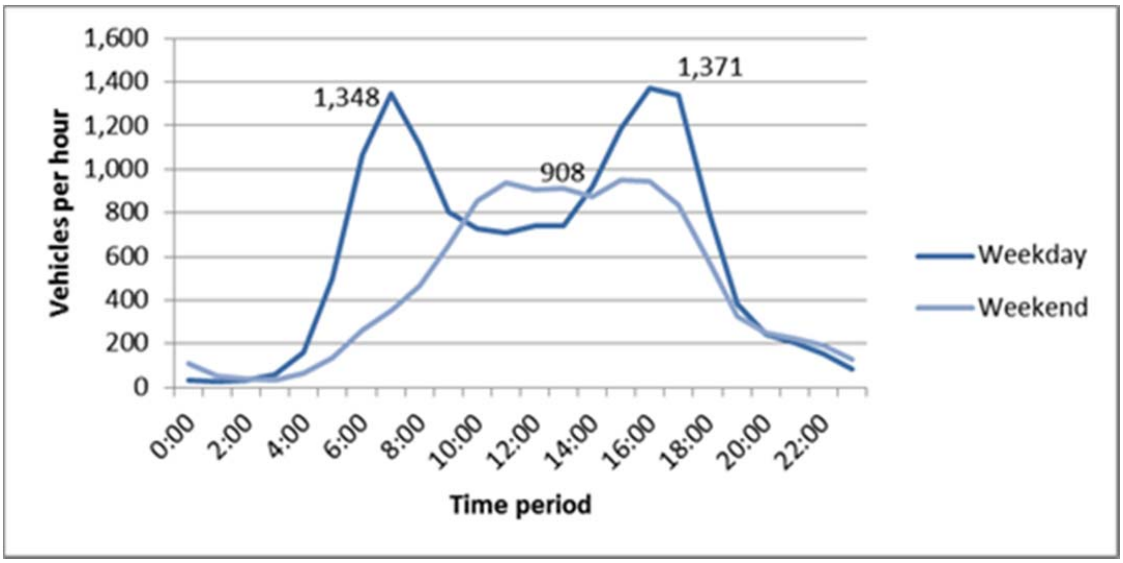
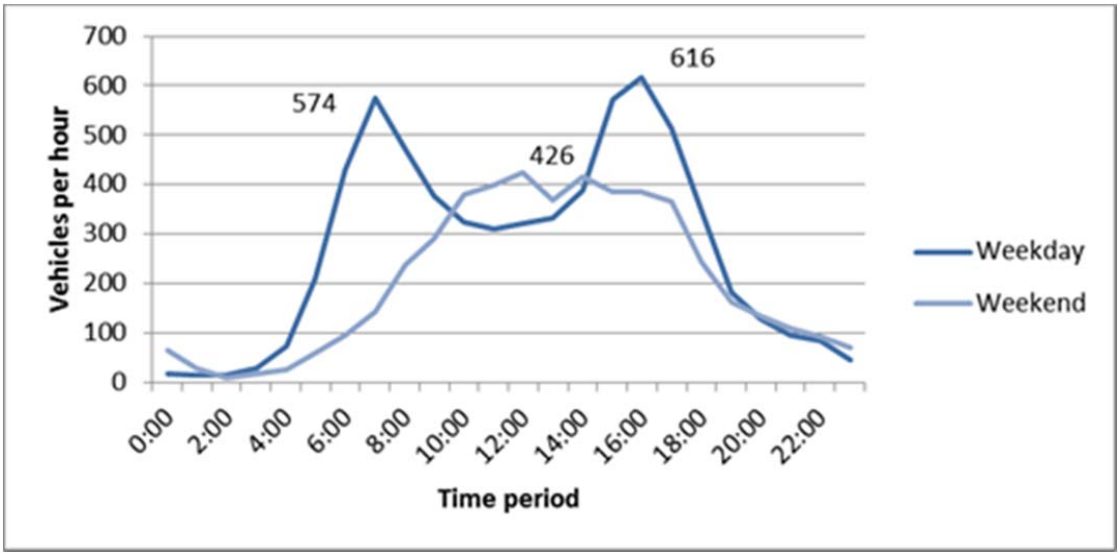


Figure 3-6 Traffic profile at Bringelly Road east of The Northern Road



3.4 Existing network peak period performance

The Sydney Strategic Travel Model, version 3 (STM3) 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 Dr	C	D	C	C
2	The Northern Road	South of M4	D	B	B	C
3	The Northern Road	South of Bringelly Rd	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 Dr	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 Dr	East of M7	C	C	C	C
14	Elizabeth Dr	West of M7	D	C	C	D
15	Elizabeth Dr	West of Mamre Road	C	B	A	C
16	Elizabeth Dr	East of the Northern Road	C	A	A	B
17	Mamre Road	North of Elizabeth Dr	C	C	B	C
18	Mamre Road	South of M4	D	C	C	C
19	Luddenham Dr	West of Mamre Road	B	A	A	B
20	Lawson Rd	South of Elizabeth Dr	A	A	A	A
21	Western Rd	South of Elizabeth Dr	A	A	A	A
22	Fifteenth Ave	West of Cowpasture Rd	B	A	A	B

Figure 3-7 Location of Tabulated Level of Service output

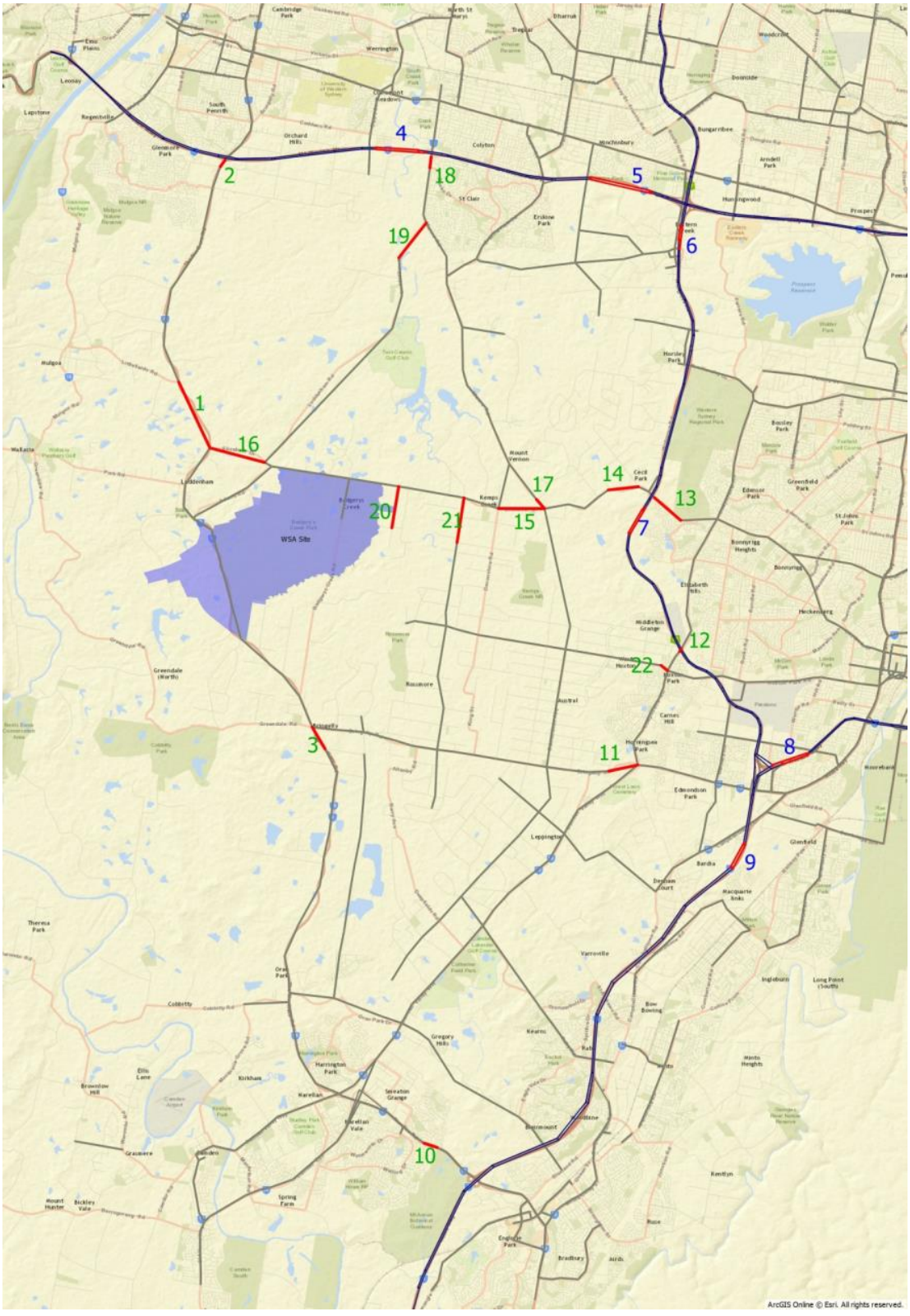
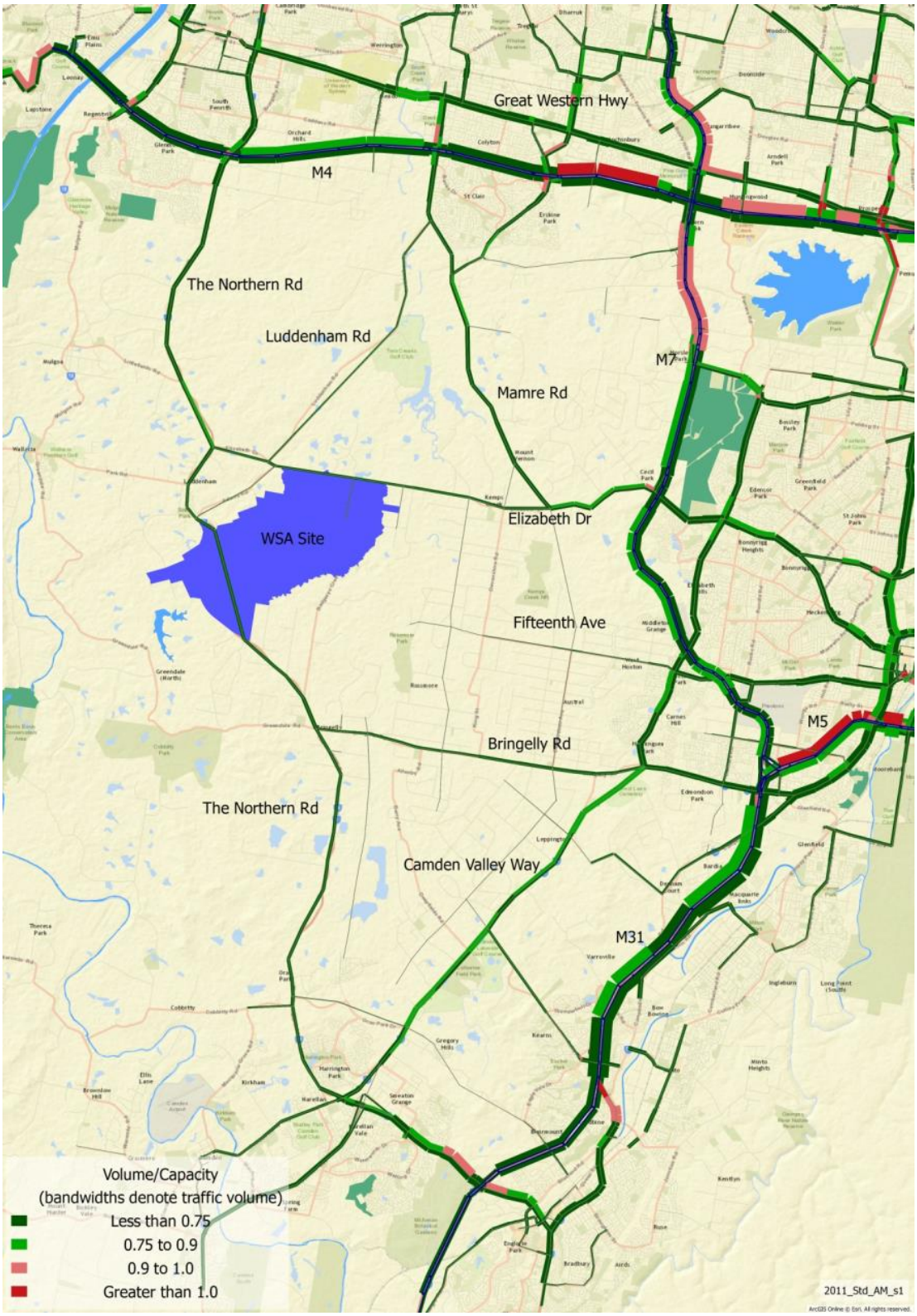


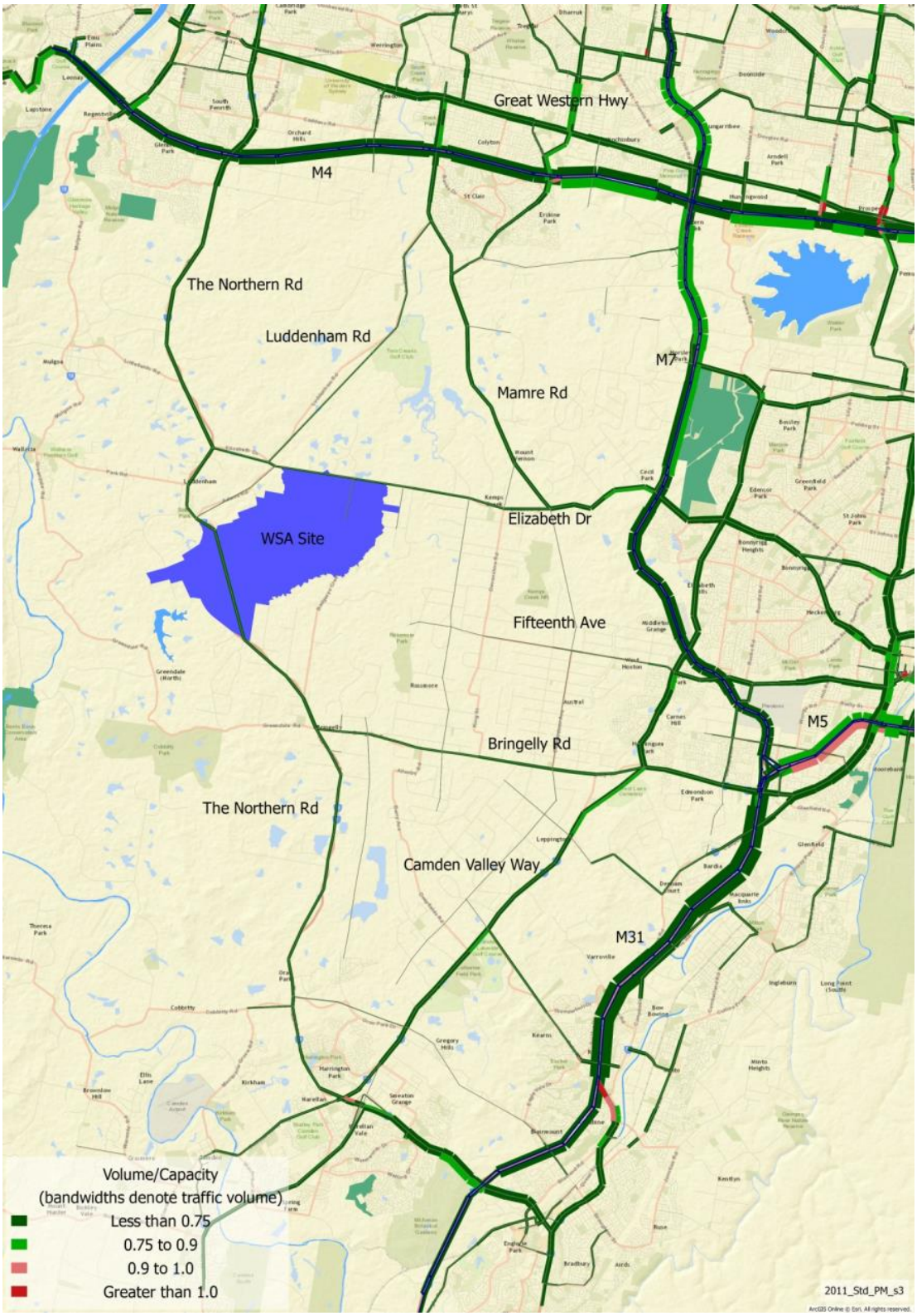
Figure 3-8 and Figure 3-9 show the modelled volume/capacity ratios for the 2011 base year model. The bandwidths in the figures are proportional to the total traffic volume, so the wider the bandwidth, the more traffic is using the link. The colour coding relates to the LoS criteria shown in Table 2-1, 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. It should be noted that since 2011 there has been development in the area, for example in the Broader Western Sydney Employment Area (BWSEA) and 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 constraint 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 constraint 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.

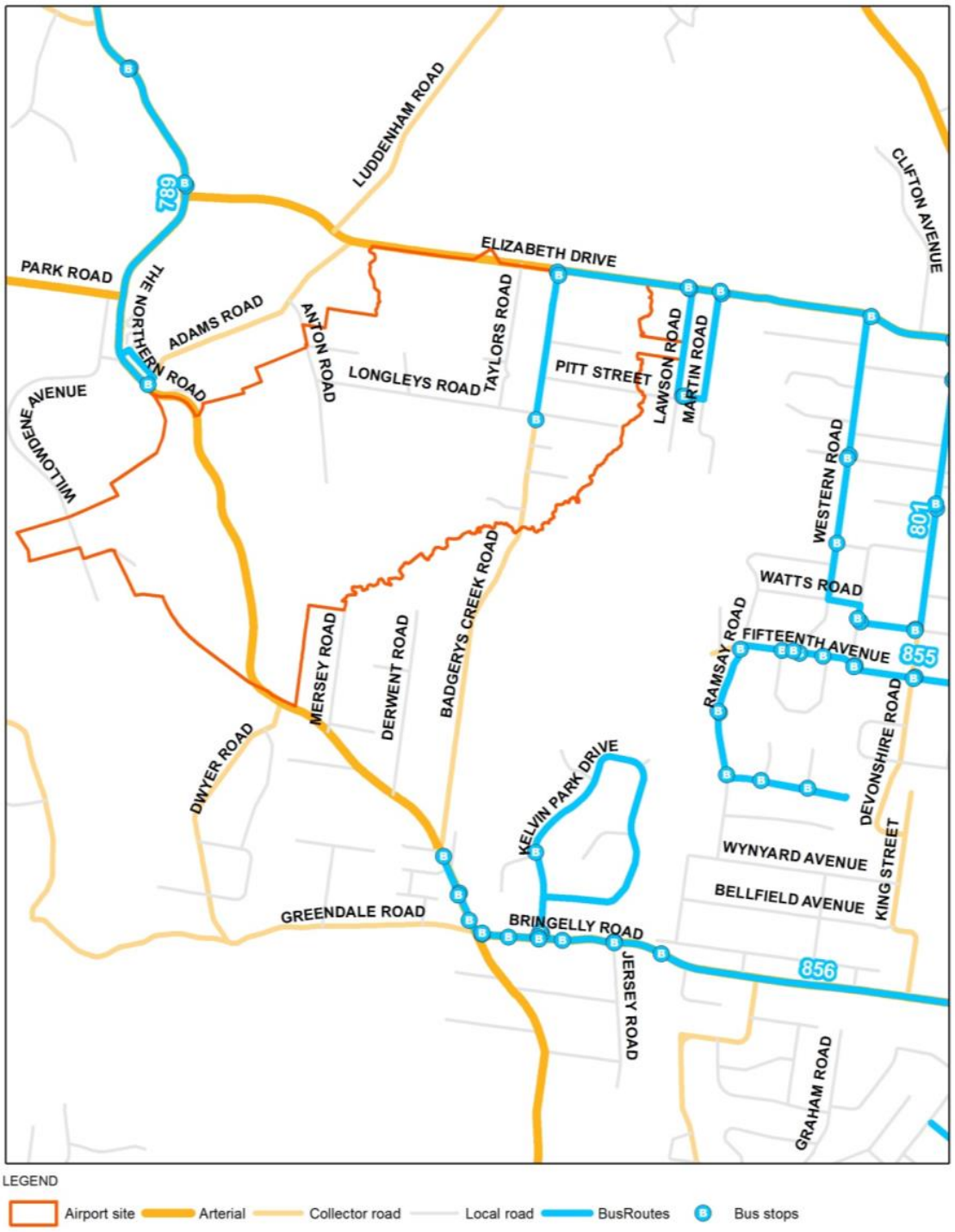
Route 856 Bringelly to Liverpool via Prestons and Churchill Gardens.

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 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 works of this road. This will form the principal cycle link with Camden LGA for the foreseeable future.

As the growth centres lands 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

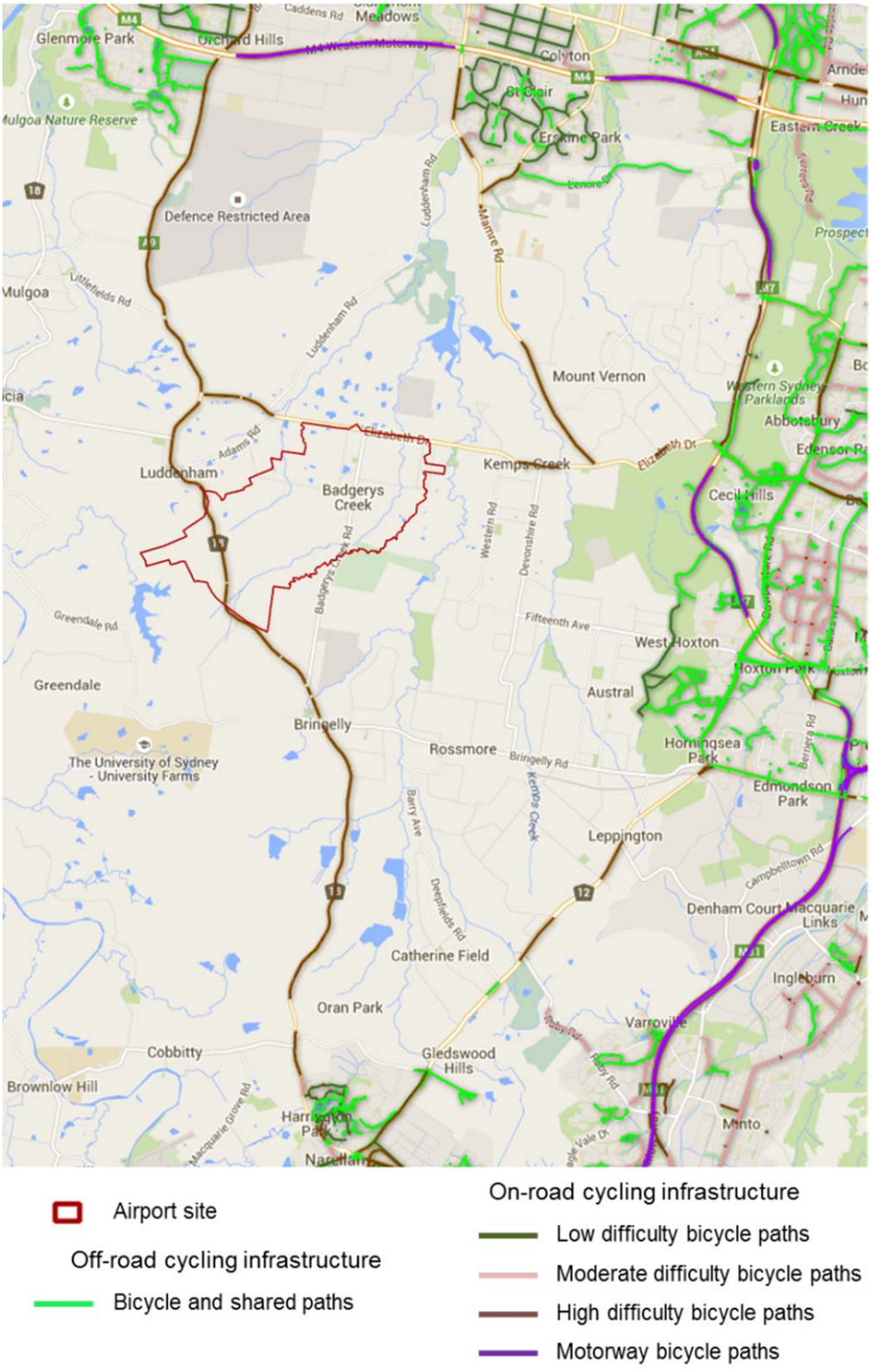
Local bike routes within Liverpool generally consist of recreational routes, such as the Wattle Grove cycle ways, Green Valley Road and the Chipping Norton Lakes cycle way. Other local routes that exist at present include the Cartwright Avenue route and the Memorial Avenue route. There are also some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

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.

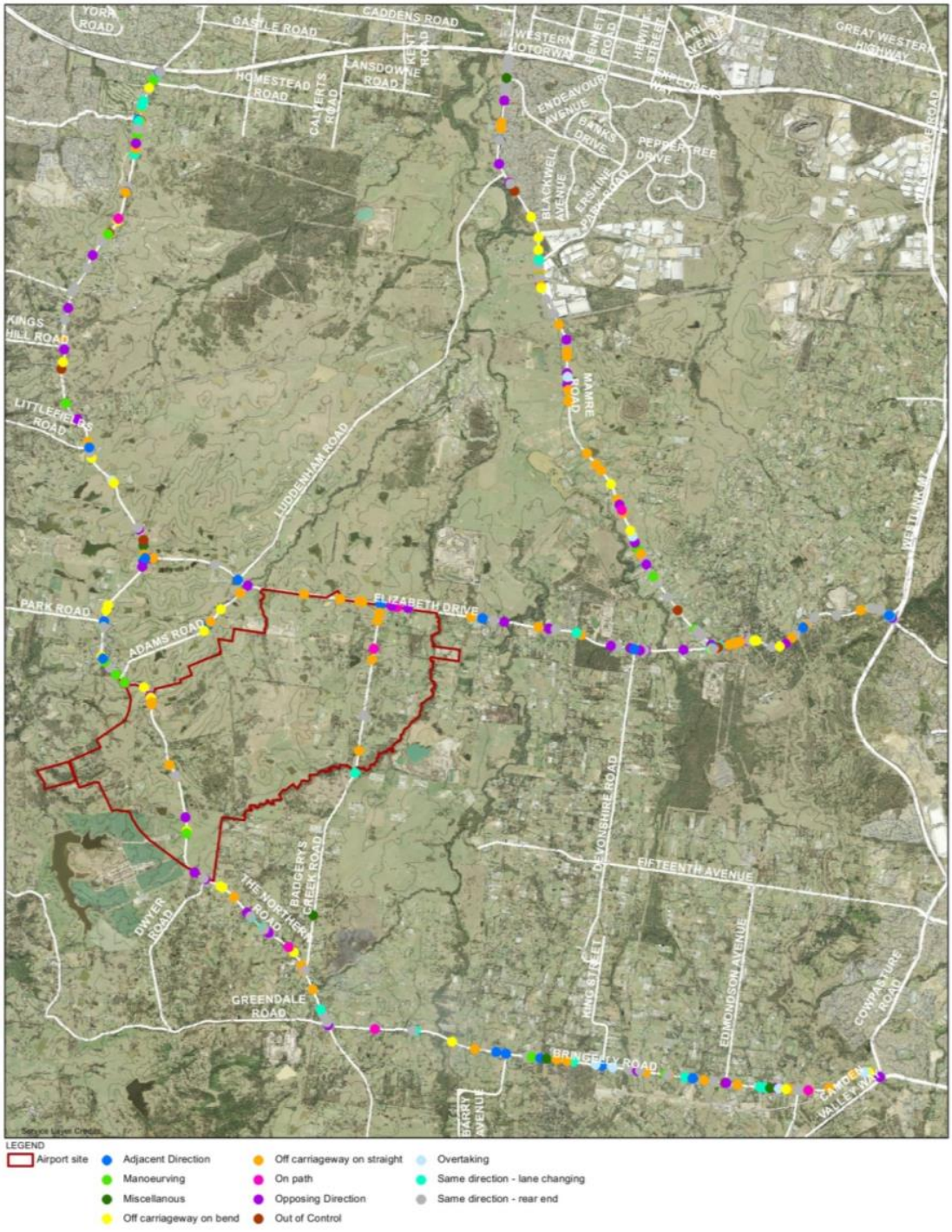
3.7.1 The Northern Road

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 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.
- crashes occurring in wet or dark conditions were not over represented.

Figure 3-12 Location of crashes (last five years)



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 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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 PM peak, the westbound direction on the M4 and M5, as well as both directions on the M7. 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 these high volume roads. The following stands out in the analysis:

- there is a high representation of speed and fatigue in 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 WSA would be 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 works.

These works will be approved through the Airport Plan.

Any subsequent construction beyond Stage 1, including the longer term airport development, 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 Site preparation works

Broadly, the site preparation works package would include:

- establishment of temporary site facilities and access
- identify limits of construction disturbance areas
- sewage disposal offsite
- construction of site perimeter fencing
- contaminated materials treatment and disposal
- clearing and grubbing and removal of decommissioned services including TransGrid 330 kV transmission line and The Northern Road within the airport site
- topsoil stripping and stockpiling
- bulk earthworks
- installation of drainage including culverts and open drains / swales including sedimentation facilities
- construction of the site perimeter access road
- providing site services to site boundary
- rehabilitation (topsoiling and grassing).

4.2.2 Aviation infrastructure works

Broadly, the aviation infrastructure works package would include:

- establishment of site facilities
- sewage disposal offsite
- establishment of an asphalt batch plant
- establishment of a concrete batch plant

- pavement excavation and subgrade preparation
- select fill placement
- asphalt placement
- concrete placement
- electrical and communications conduits
- aerodrome ground lighting
- provision of all services within the site
- buildings.

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 and Elizabeth Drive to provide a diversion around the northern triangle. Both projects are being progressed in parallel with this EIS by Roads and Maritime.

The construction impact has been analysed from 2016 to 2026, the construction profile shows that the year of 2021 has the peak construction movements and therefore this construction modelling has been based on 2021 to capture the worst case scenario.

4.3 Construction programme

An indicative construction programme has been developed (GHD, 2015). Key dates in the programme are:

- site preparation works would commence mid-2016 and be completed by early 2023 with handover of parts of the site to the aviation infrastructure works contractor in parallel
- aviation infrastructure works would commence mid-2019 and be completed by mid--2024
- commissioning and operational readiness would be undertaken in 2024 allowing for first passengers in 2025.

4.4 Estimated workforce

The proposed airport would create employment opportunities for construction workers and support staff. Estimated peak worker numbers for the site preparation and aviation infrastructure works are shown in Table 4-1.

Table 4-1 Peak on site construction personnel

Package	Peak personnel onsite
Site preparation works	233
Aviation infrastructure works	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 site preparation works, it is expected that the onsite works would be undertaken 6 am to 6 pm, Monday to Saturday.

During the aviation infrastructure works, the site would generally work 6 am to 6 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;
- works on or adjacent to existing roads (specifically Elizabeth Drive and The Northern Road); due to lane closure requirements
- deliveries of oversize loads; and
- large, 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 City 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.

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 Narrellan Road and The Northern Road around Campbelltown and Narrellan.

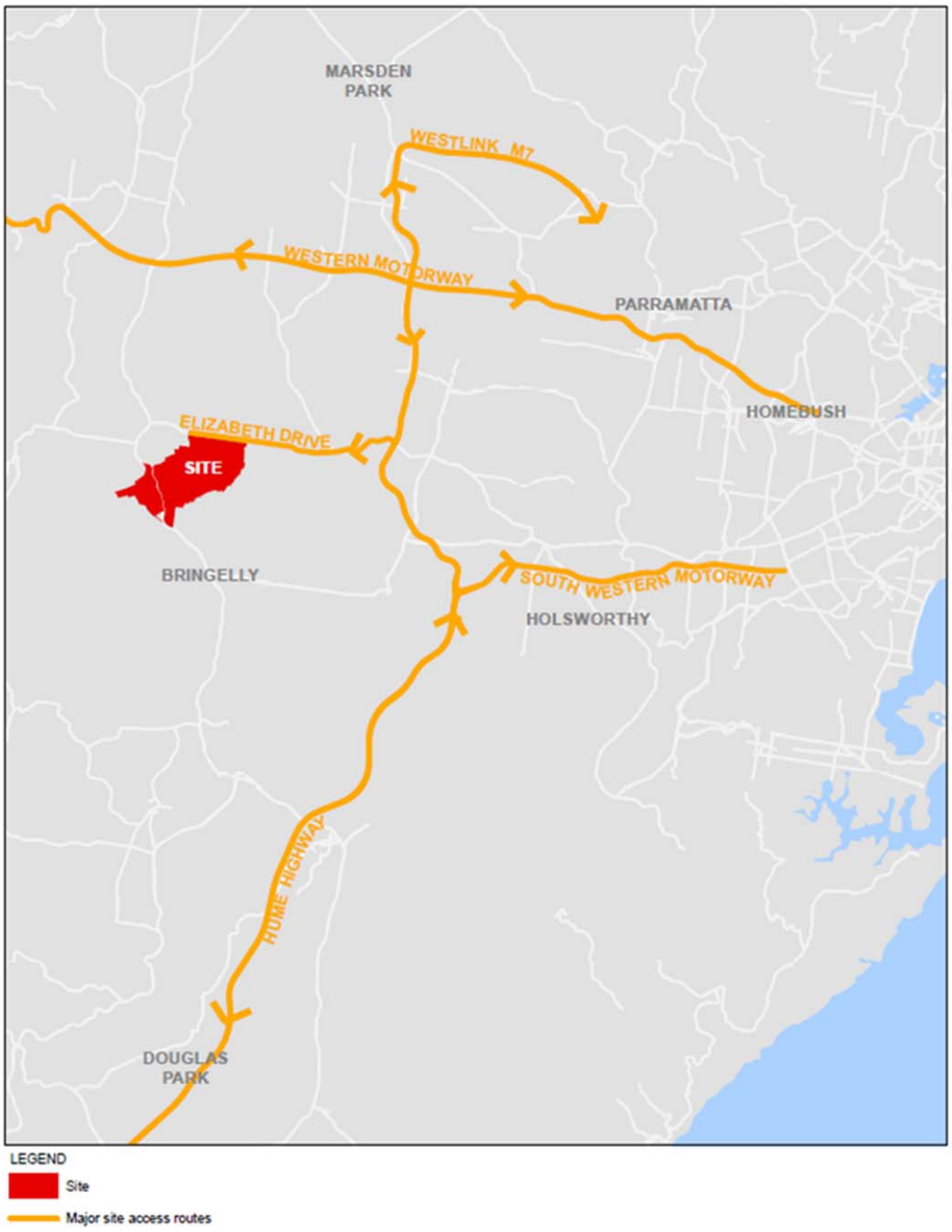
A number of site access gates would be established at the commencement of site preparatory works with provision for access by heavy and light vehicles. Seven gates would be established as detailed in Table 4-2.

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 the construction programme. 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 Key site access routes



Source: GHD

4.6.1 Potential source quarries

It is expected that gravel will be imported onto site from an established quarry.

The potential source 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 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 EIS 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.
- 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

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

- AM Peak (07:00 – 09:00)
- inter-peak (09:00 – 15:00)
- PM Peak (15:00 – 18:00)
- evening (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 has been based on the following assumptions:

- an arrival and departure profile for light vehicles from 5 am to 7 pm
- 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 has been 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, 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 Dr	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 Rd	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	Narellen Road	North of Tramway Dr	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 Dr	East of M7	C	C	C	C	C	C	C	C
14	Elizabeth Dr	West of M7	E	C	C	E	E	C	C	E
15	Elizabeth Dr	West of Mamre Road	D	C	C	D	D	C	C	D
16	Elizabeth Dr	East of the Northern Road	C	A	A	C	C	A	A	C
17	Mamre Road	North of Elizabeth Dr	C	C	C	C	C	C	C	C
18	Mamre Road	South of M4	D	D	D	D	D	D	D	D
19	Luddenham Dr	West of Mamre Road	C	B	B	C	C	B	C	C
20	Lawson Rd	South of Elizabeth Dr	A	A	A	A	A	A	A	A
21	Western Rd	South of Elizabeth Dr	A	A	A	A	A	A	A	A
22	Fifteenth Ave	West of Cowpasture Rd	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)

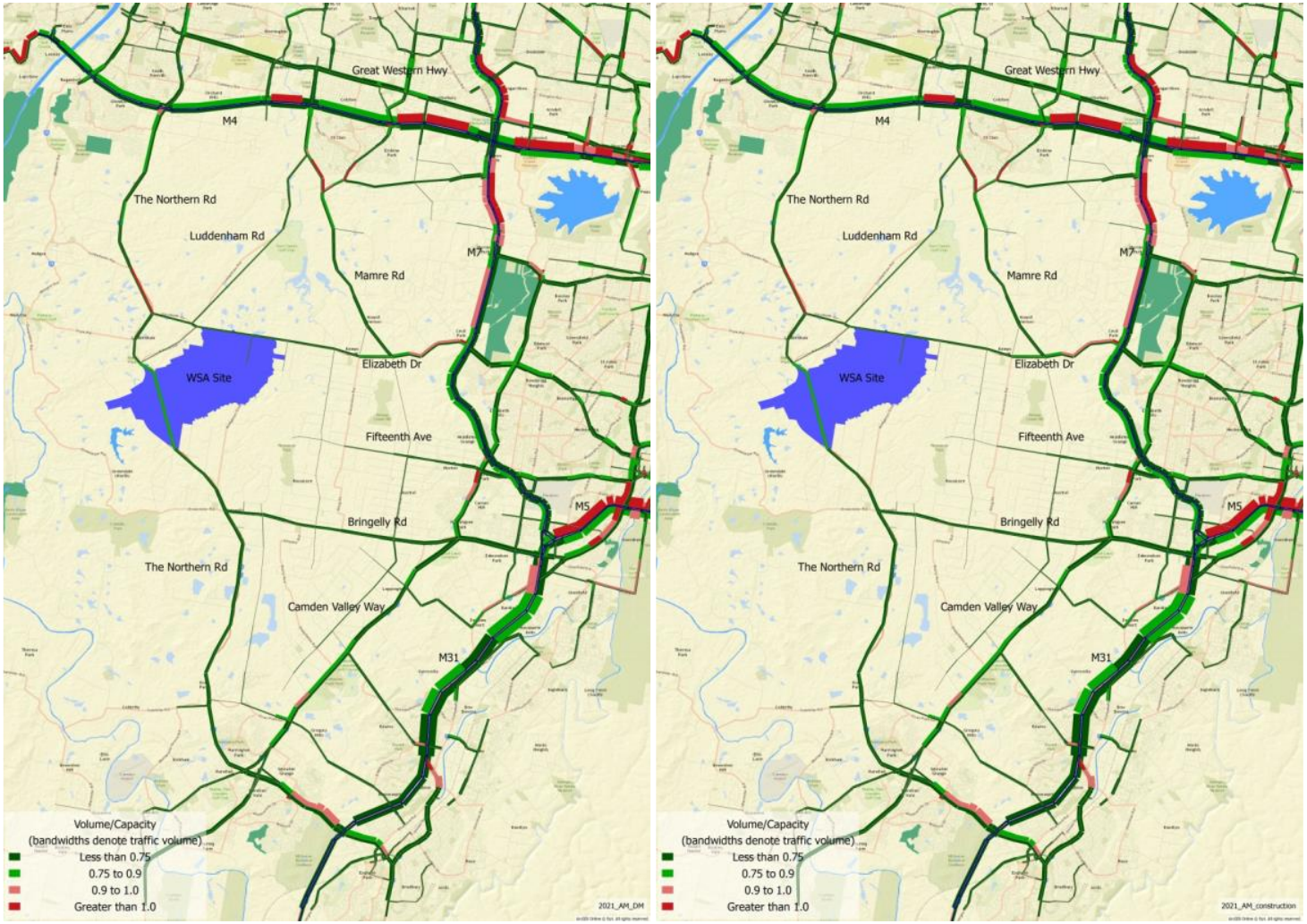
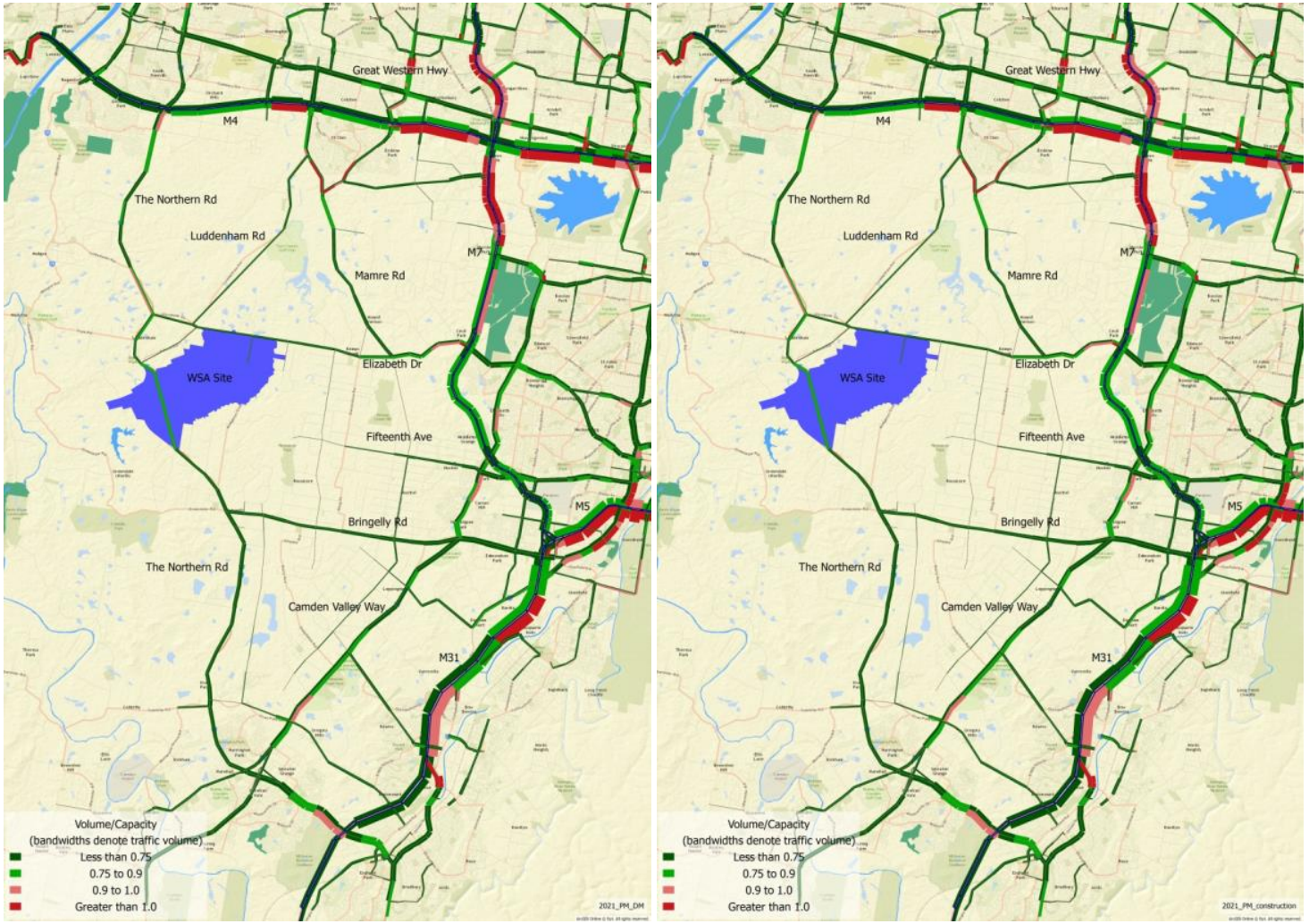


Figure 4-3 Volume/Capacity (PM Peak) in 2021 without (left) and with construction traffic (right)



The calculation of construction traffic volumes suggest an additional ~160 to ~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 in the vicinity of 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
- 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

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 continue throughout the entire construction period to ensure that local residents are aware of the construction activities, with particular regard to construction traffic and safety issues, such as diversions, temporary road closures, traffic signalling and speed limits.

Ahead of developing the Construction Traffic Management Plan (CTMP) for the proposed WSA, potential construction period impacts on local roads (on-site and in the local area), will require further assessment in consultation with local councils, NSW Roads and Maritime Services and Transport for New South Wales, identifying:

- any roads to be closed outright
- roads to be temporarily closed and the period of closure, including alternative arrangements
- closure points and the closure process
- accessibility to the temporarily closed roads e.g. public transport and emergency vehicles
- alternative routes that may be available or considered for through traffic and the potential impacts for people living along those routes.

Other important matters that would be considered as part of the CTMP include:

- development of a plan of management for the temporary and permanent closures of roads within the site;
- a specialised community engagement strategy to communicate potential construction traffic impacts to the public;
- ongoing consultation and governance arrangements with Roads and Maritime, Liverpool City Council, Penrith City Council and Emergency Services;
- Coordination with Roads and Maritime regarding safe heavy vehicle access to the site from Elizabeth Drive and The Northern Road;
- traffic control measures to be implemented at access/interaction points;

- potential road upgrades that may be required and the impacts on those roads during and post construction;
- approvals that may be required;
- haulage routes for trucks travelling to and from the site;
- mitigation measures to minimise impact on the community (e.g. avoidance of school zones during school hours, exam times etc.);
- induction for drivers working on the project to cover safety measures particularly for night works;
- reviewing speed environments along transport corridors;
- restriction of construction related traffic within the AM and PM peak periods;
- management of the transportation of construction materials to maximise vehicle loads in order to minimise vehicle movements;
- traffic control to manage and regulate traffic movements during construction;
- disruption to road users;
- use of arterial roads by construction and delivery vehicles entering or leaving the site compounds and/or stockpile sites. These movements would be restricted to a reduced number in the peak periods;
- parking facilities provided on the site for construction workers.

A CTMP would be developed prior to the commencement of construction. The CTMP would be a subplan to the Construction Enivormental Management Plan (CEMP) and provide the overall plan and staging for managing traffic through and around each work site. This would be in accordance with the *RMS Road Design Guide*, the *RMS Traffic Control at Work Sites* manual and *AS1742.3 Manual of Uniform Traffic Control Devices – Traffic control for works on roads*, and any other relevant standard, guide or manual. The draft CTMP would be prepared in consultation with relevant stakeholders.

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 314 peak hour vehicle movements which would occur during the AM 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 CTMP would be developed in consultation with relevant stakeholders prior to the commencement of construction. The CTMP 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 initial stage of 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 initial (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 up to an estimated 10 million passengers per year. This 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 new 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 Badgerys Creek Road. These additional roads would be developed in parallel with the commercial areas when needed.

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 for cargo and maintenance. This access road is expected to consist of a 50 metre wide corridor allowing four trafficable lanes.

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 Airport 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 Badgerys Creek Road would be maintained as a secure alternate access to the airport. 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 a minimum of 11,500 vehicles (but 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, with approximately 20 per cent as premium parking (1,680 bays). 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)		Longer term (82 MAP)	
	Departure	Arrival	Departure	Arrival
	185	191	738	732

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 the EIS and is included for reference only as the EIS 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:

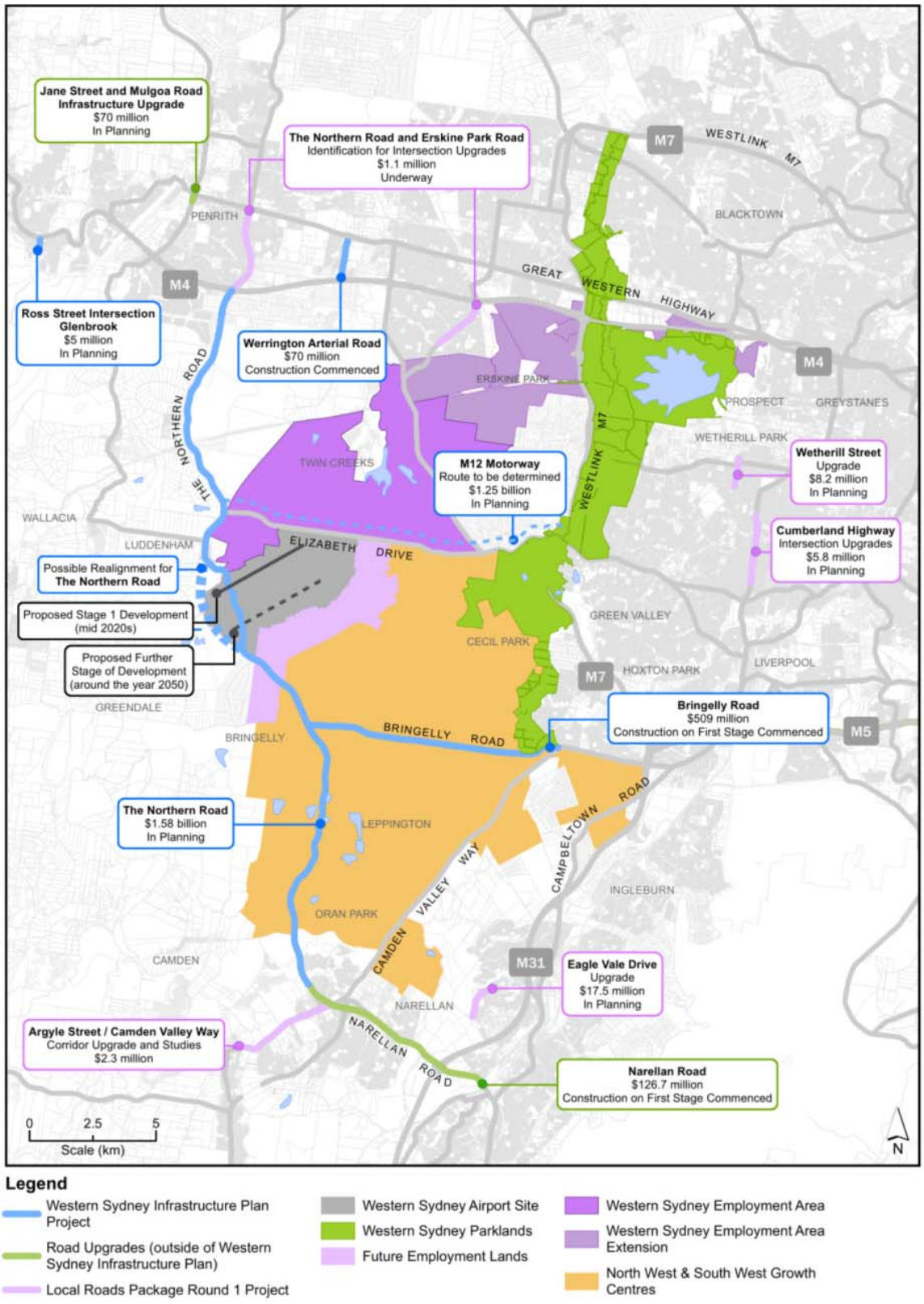
- pedestrian graded ramps for level changes for passengers arriving/departing with baggage;
- cycle parking with storage cages and storage sheds will be provided within the dedicated car park area; and
- grade separated, safe, undercover pedestrian movement between premium parking, pick up/drop-off areas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

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 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 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; Elizabeth Drive upgrade between M7 Motorway and the Northern Road (Including the M7 Interchange); Construction of a new four-lane 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; Moorebank Precinct; Werrington Arterial Road; Improve interchanges connecting Northern Road and new motorway with arterial roads; A $200 million local roads package.
Western Sydney Employment hub roads	Proposed road network to support the Growth Centre, as identified in the Broader 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 Growth Centre Roads	Proposed road network to support the Growth Centre, as identified in the North West Growth Structure Plan.
South West Priority Growth Area Roads	Proposed road network to support the Priority Growth Area, as identified in the South West Growth Structure Plan.
M4 Widening, Church Street to Mamre Road	
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 below 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.

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 access road to freight and maintenance precincts would include a minimum of two trafficable lanes for each carriageway on the main carriageways, and have a maximum design speed of 90 km/h and maximum posted speed of 80 km/h for the main carriageways.

The Northern Road realignment may occur partly on the airport site. Any realignment will be subject to separate approval processes being conducted by Roads and Maritime.

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 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 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 in part, 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 main public access road (from the Elizabeth Drive 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 and Ground Transportation Centre (maximum design speed of 40 km/h).
- 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.
- 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 local road under the control of Liverpool City Council. It is expected to remain a public road to the boundary of the airport site. Similarly it is expected at this stage that 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.

5.5.5 Other external roads

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

- Elizabeth Drive would be deviated to the northeast and upgraded, approximately between its current intersection with Badgerys Creek and Adams Road to accommodate exclusion zones for the northern runway.
- Adams Road which would be upgraded from Elizabeth Road at least to Anton Road to meet the needs of construction and support traffic for the proposed airport, including B-Double traffic.
- Anton Road which would be upgraded from Adams Road to meet the need for construction traffic and secondary access to non–public facilities for the proposed airport located along the northern site boundary, including B-Double traffic.
- a 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.

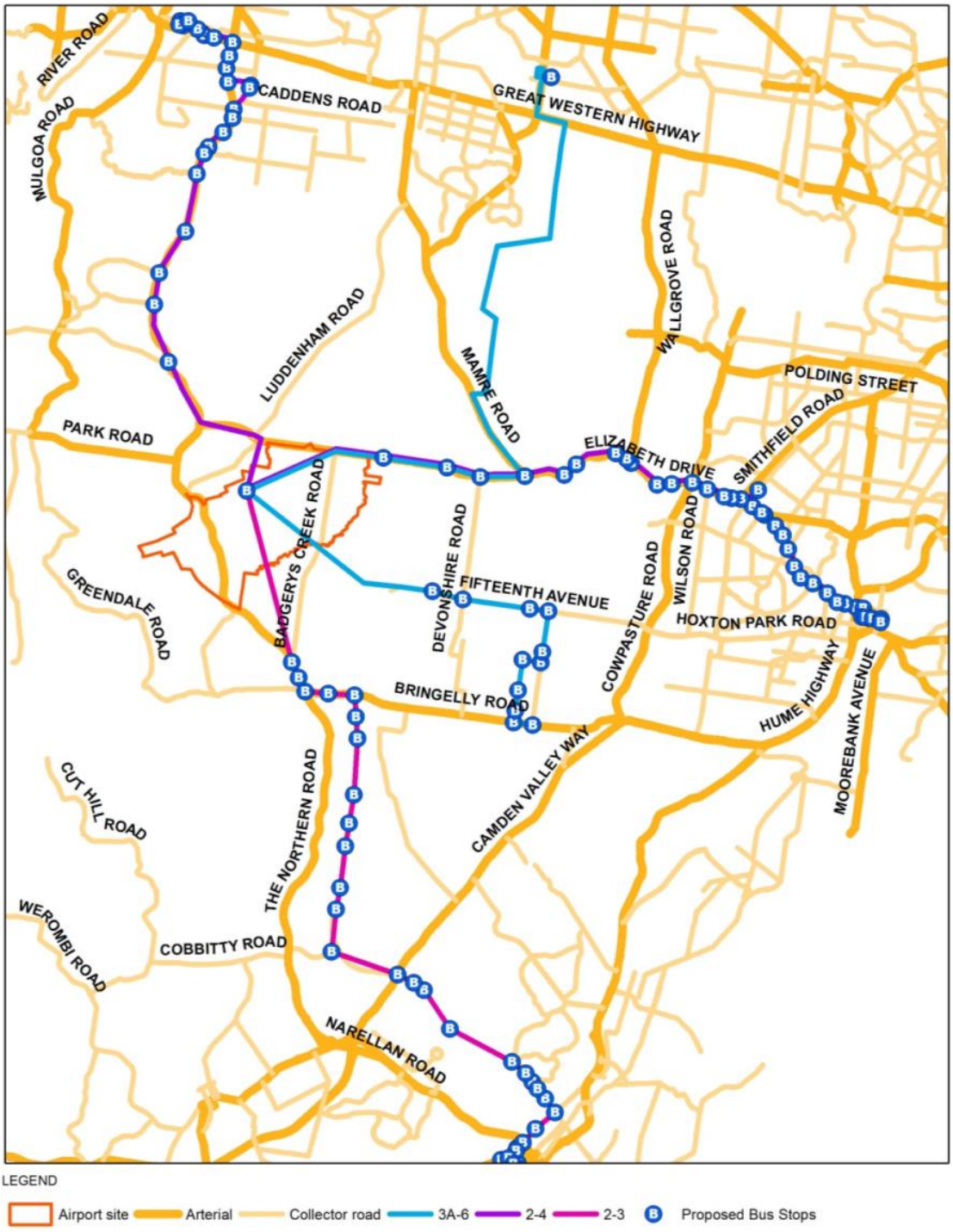
There are three additional bus routes identified by Transport for NSW to the proposed airport, as shown in Figure 5-2. These routes are:

- 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 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 South West Priority Growth Area and Broader 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.

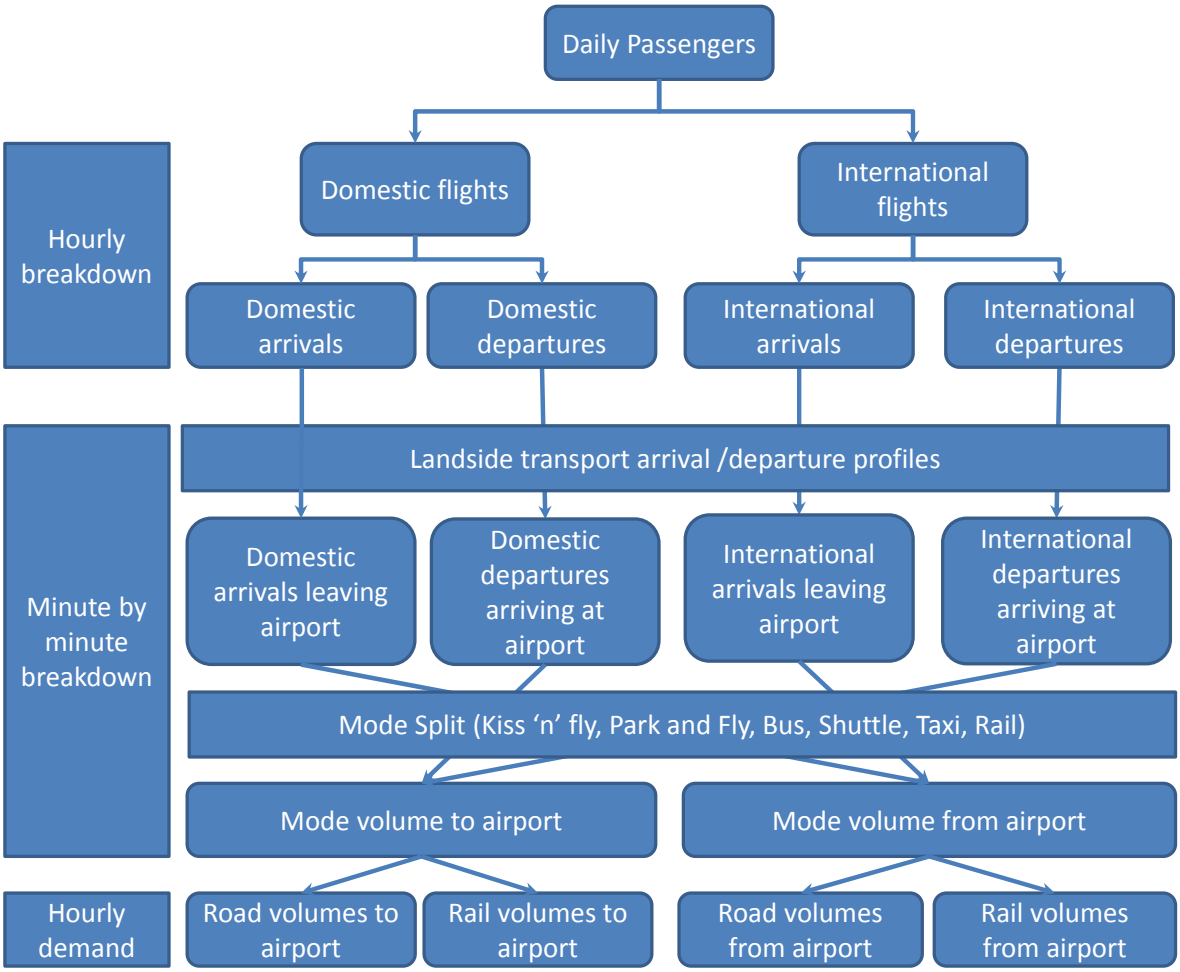
6. Trip generation

6.1 Introduction

In 2031, it is estimated that the proposed airport would be operating with passenger movements of 10 million per annum and an employee level of approximately 7,600 persons. In order to determine the impact of these passenger 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.

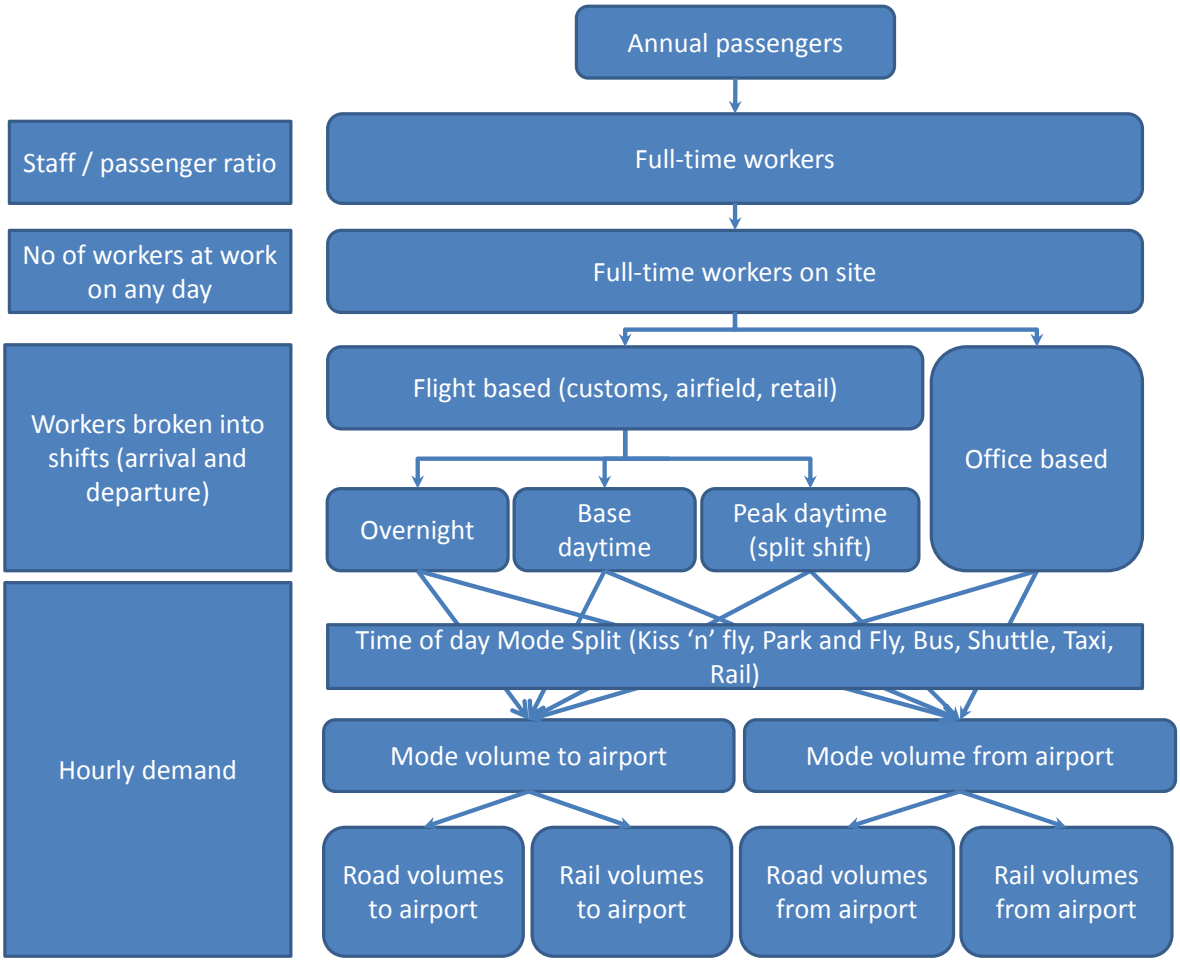
Information provided as part of the proposed airport concept plan includes daily passenger volumes and peak hour flights. From these data sets, it was necessary to determine the number of passengers that would be arriving and departing in any one hour period. The method for deriving passenger volumes 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 during the airport's peak 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 site shown in Table 6-1 has been determined based on a synthesised profile of the number of daily and peak hour passenger flights.

Table 6-1 Daily flight movements 2031

Design Day Passenger Air Traffic Movements	2031
Domestic passenger flights	149
International passenger flights	21
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 2031

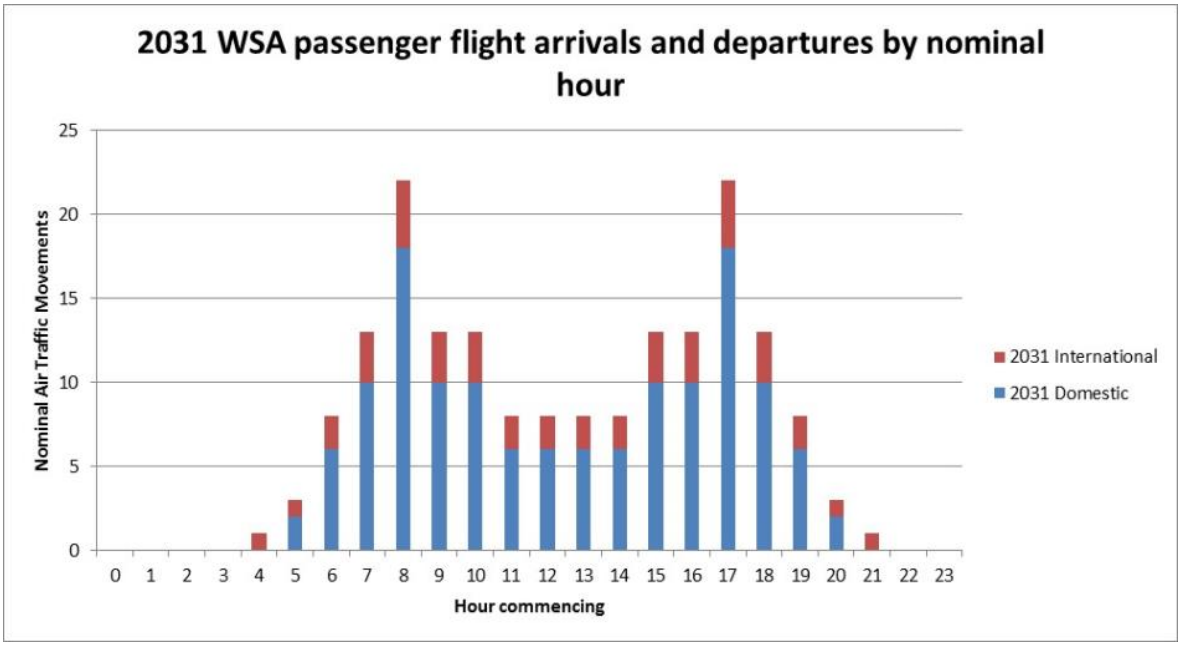
Peak hour flights	No flights	% of daily total
Arrivals (Domestic and International)	11	6.1
Departures (Domestic and International)	11	6.1
Total	**22**	**12.2**

Source: LEK Airport Demand Summary April 2015

The operations of airports with 24 hour operations (including Tullamarine, Adelaide and Brisbane Airports) 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. Based on the high ratio of the peak hour to the other hours of the day there would be limited flights outside of the peak travel hours. A synthetic plane arrival and departure profile has been developed by the traffic and transport specialist team to account for the peak to non-peak profiling of flight arrivals and departures. This is shown in Figure 6-3.

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

Figure 6-3 Synthesized 2031 daily flight profile



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 Sydney Airport Land Transport Model (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. Additionally, 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. Similar published information is not currently available for Australia.

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. 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

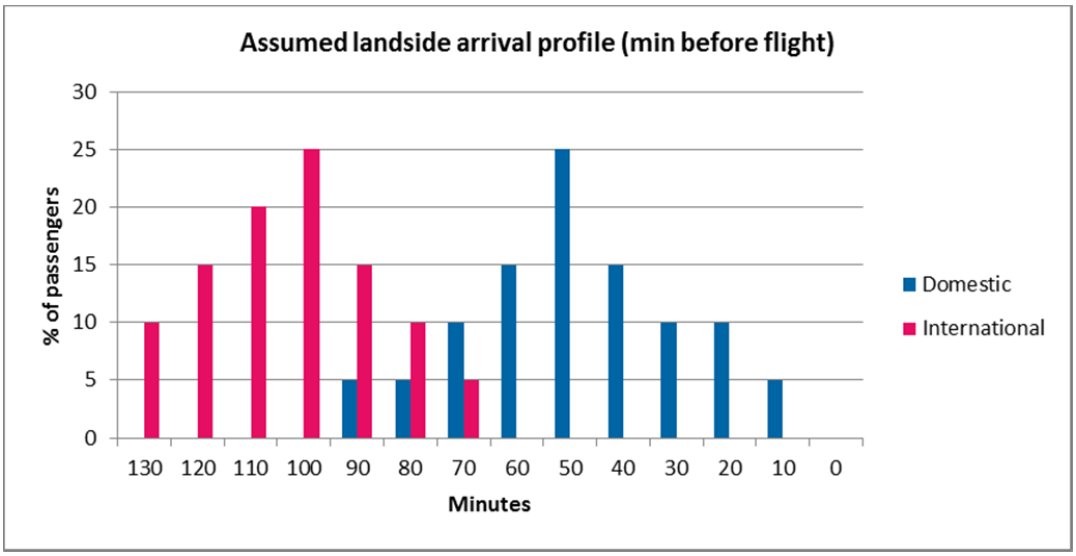
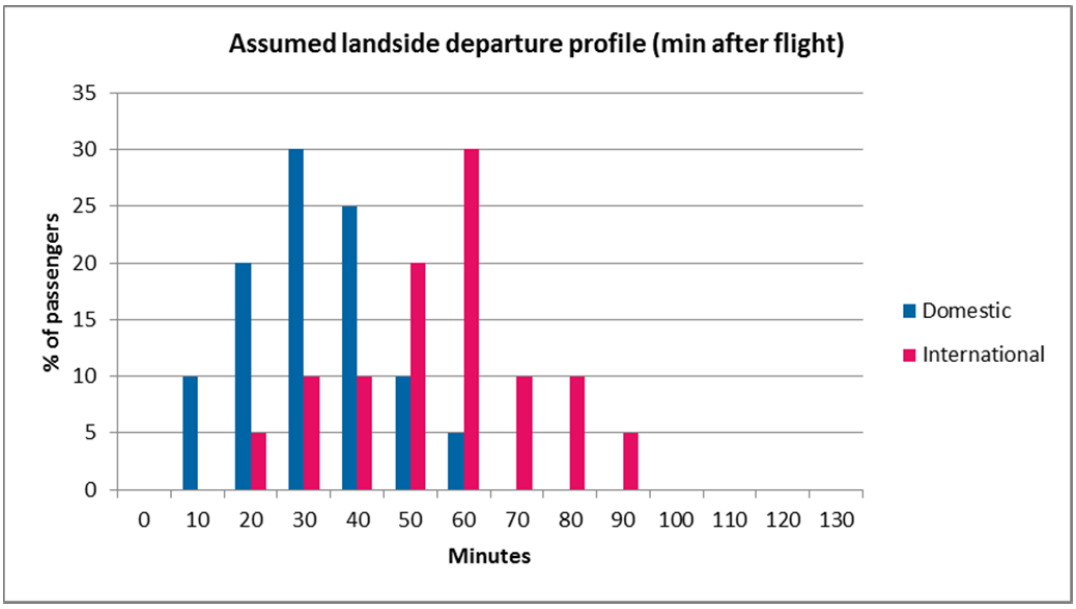


Figure 6-5 Assumed landside departure profile – percentage of passengers



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 90 per cent has been assumed.
- for each international aircraft, an assumed average capacity of 420 passengers with an average flight occupancy of 90 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

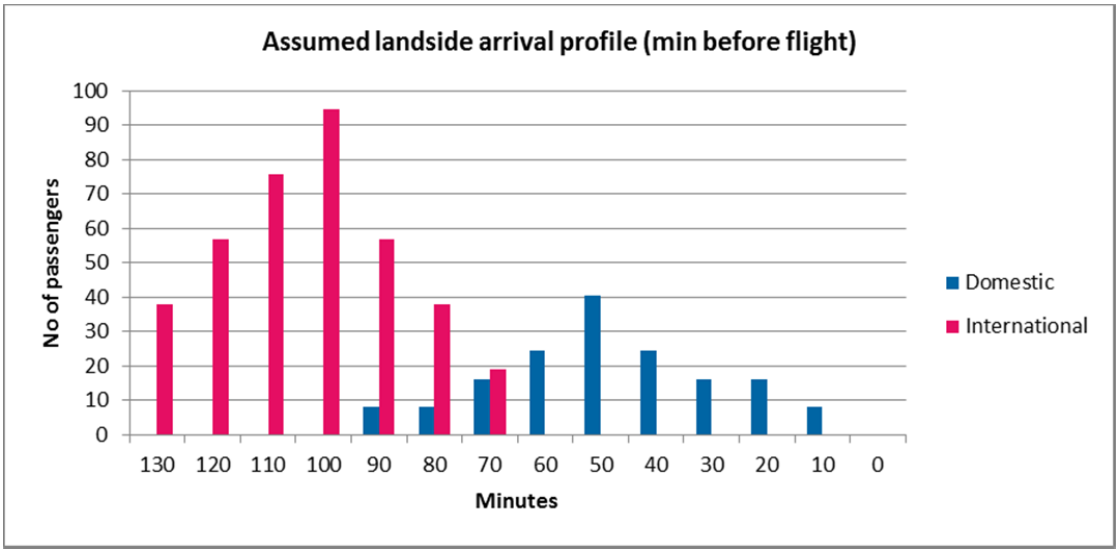
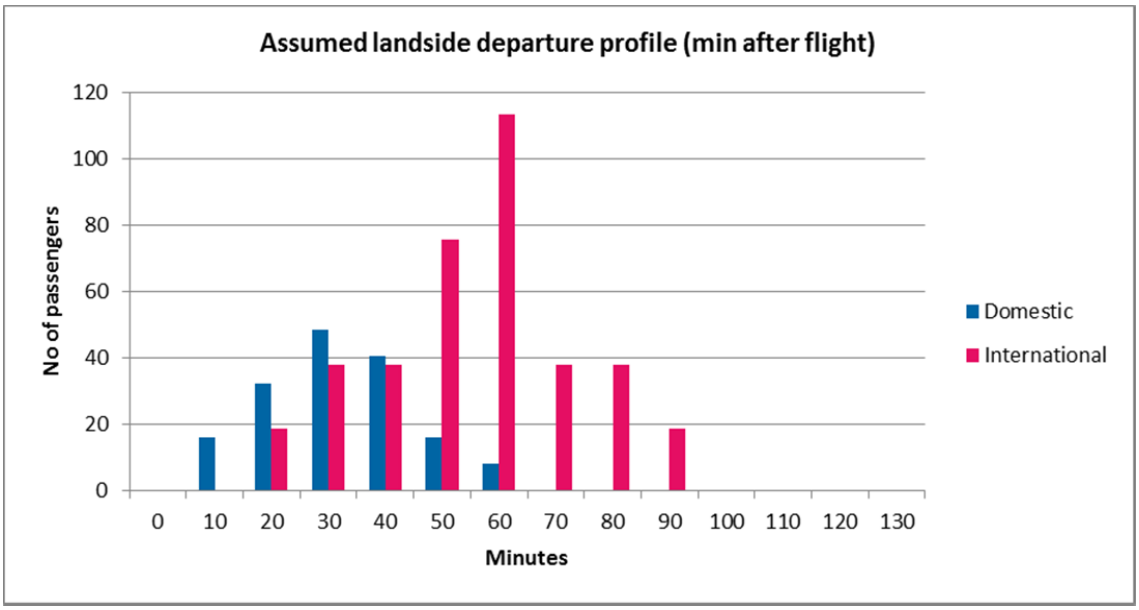
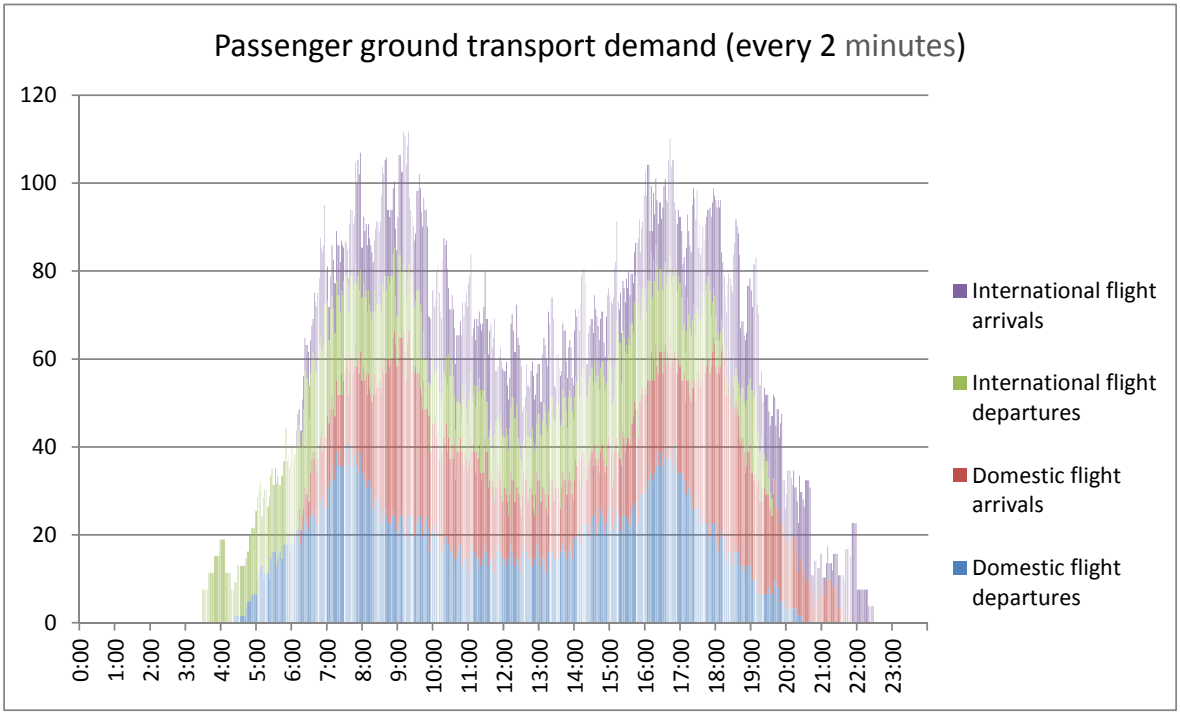


Figure 6-7 Landside departure profile for passengers – volumes



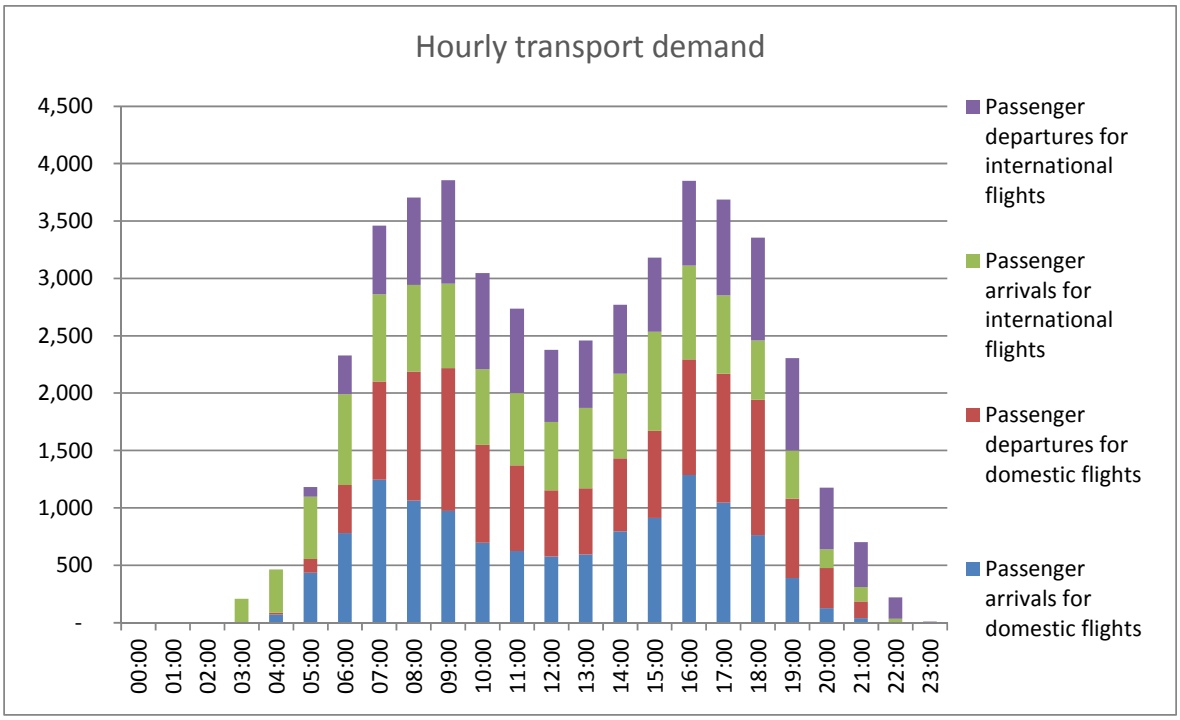
The combination of the arrival and departure profiles and the flight profiles results in a passenger distribution across the day in two minute intervals. A two-minute interval was chosen so that the longer term 2063 airport demand could be compared with the intervening years between 2031 and 2063. This is shown in Figure 6-8.

Figure 6-8 Two minute passenger ground transport demand - 2031



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

Figure 6-9 2031 ground transport demand per hour



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

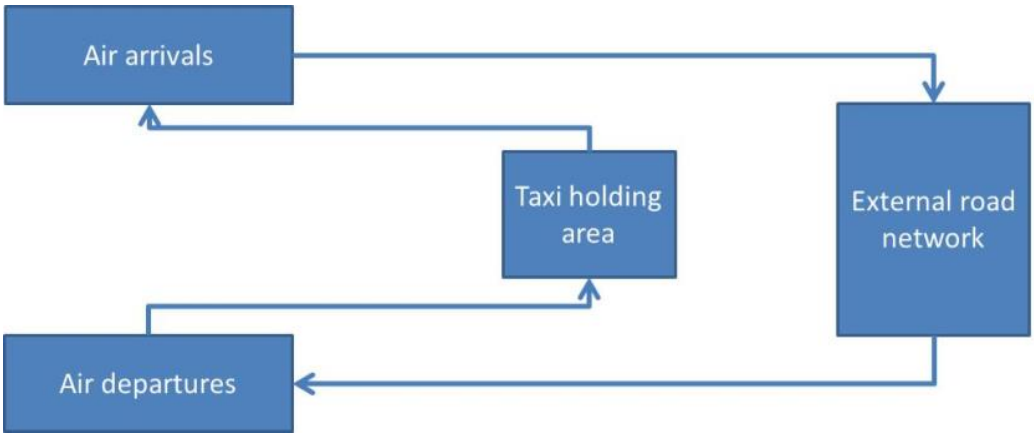
Park ‘n’ fly is the term used to describe air passengers driving themselves and parking in all day or longer term parking prior to flying and exiting the airport later in the same or subsequent days.

It has been assumed that each Park ‘n’ fly vehicle will contain 1.5 Park ‘n’ fly 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 1.5 taxi 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 15 passengers, representing a full mini bus.

Bus

Regular bus services would serve the proposed airport as part of their normal service. These buses provide in-direct 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 one stop at each of the domestic and international terminals.

It has also been assumed that each 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 only after 2031. Provision of rail has been considered within the concept plan, with the preservation of a corridor within the airport. The analysis of rail has been considered to as part of the metropolitan Sydney network operated by Sydney Trains.

It has been assumed that the future rail station will have one stop to serve both terminals and will carry 200 arriving and departing passengers per train (within the arrival and departure profiles).

Other modes

Due to the relative isolation of the proposed airport terminal (2.5 km from Elizabeth Drive) and the unknown size and scale of any commercial development within the airport boundary, 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 2031.

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. 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 2031 assumed mode split

Mode	2031 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%
Train	0%	0%	0%	0%

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 2031 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
Train	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 Domestic air departures – ground arrival at the proposed airport

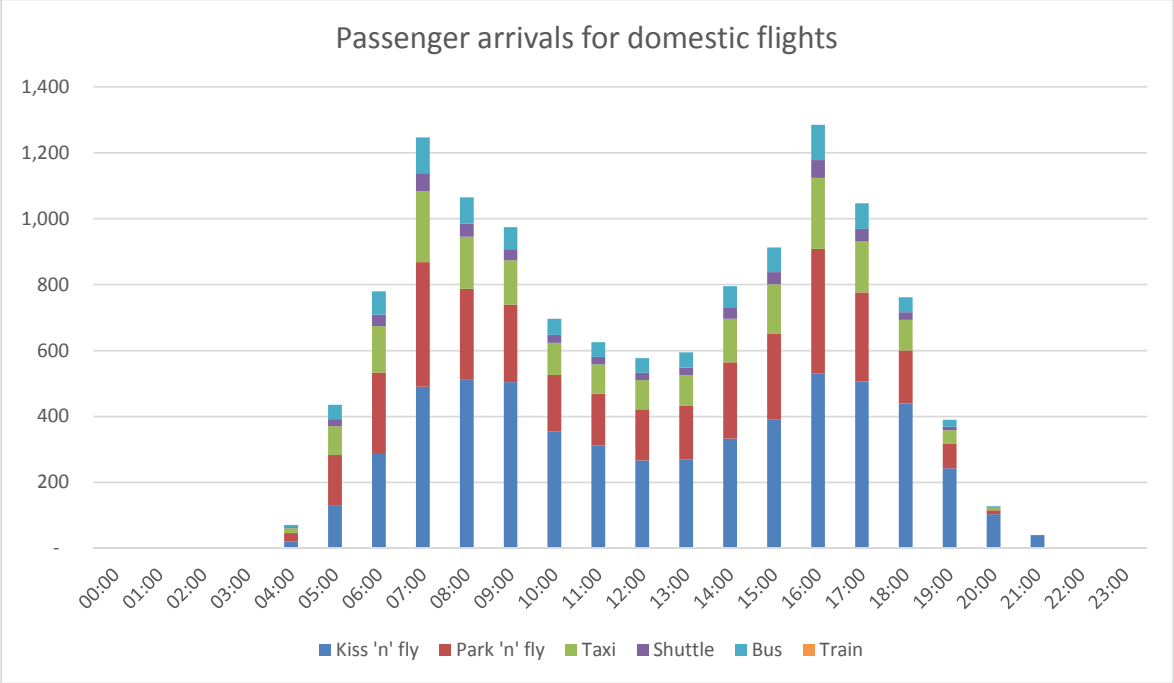


Figure 6-12 Domestic air arrivals – ground departure from the proposed airport

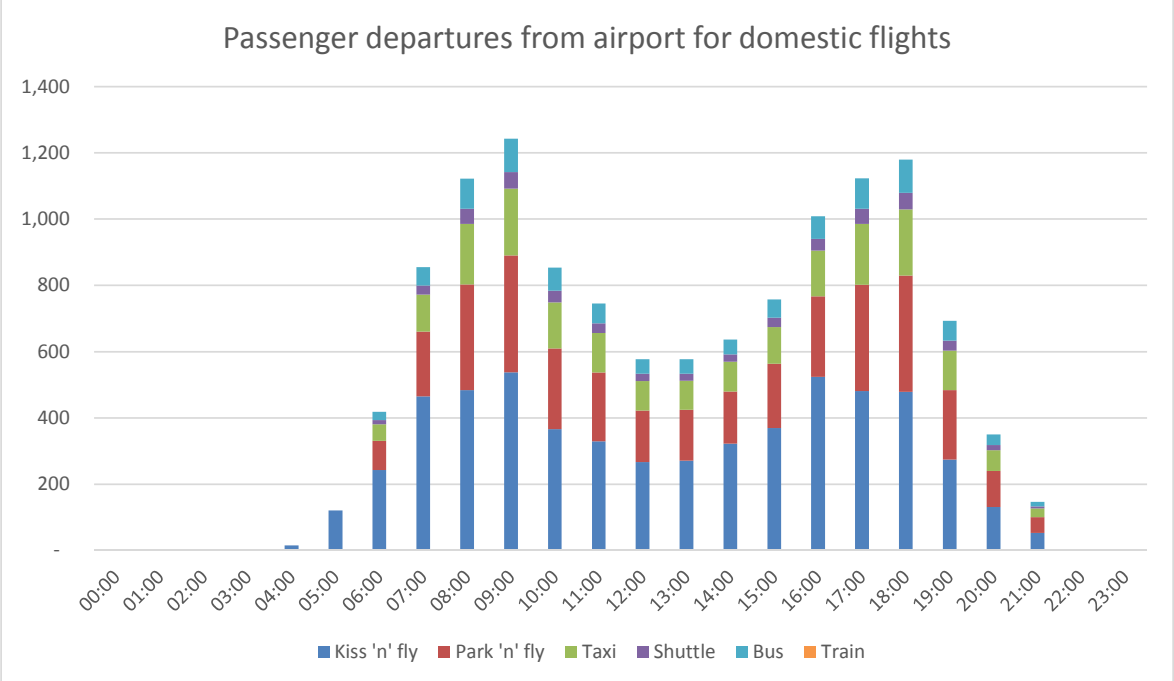


Figure 6-13 International air departures – ground arrival at the proposed airport

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

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

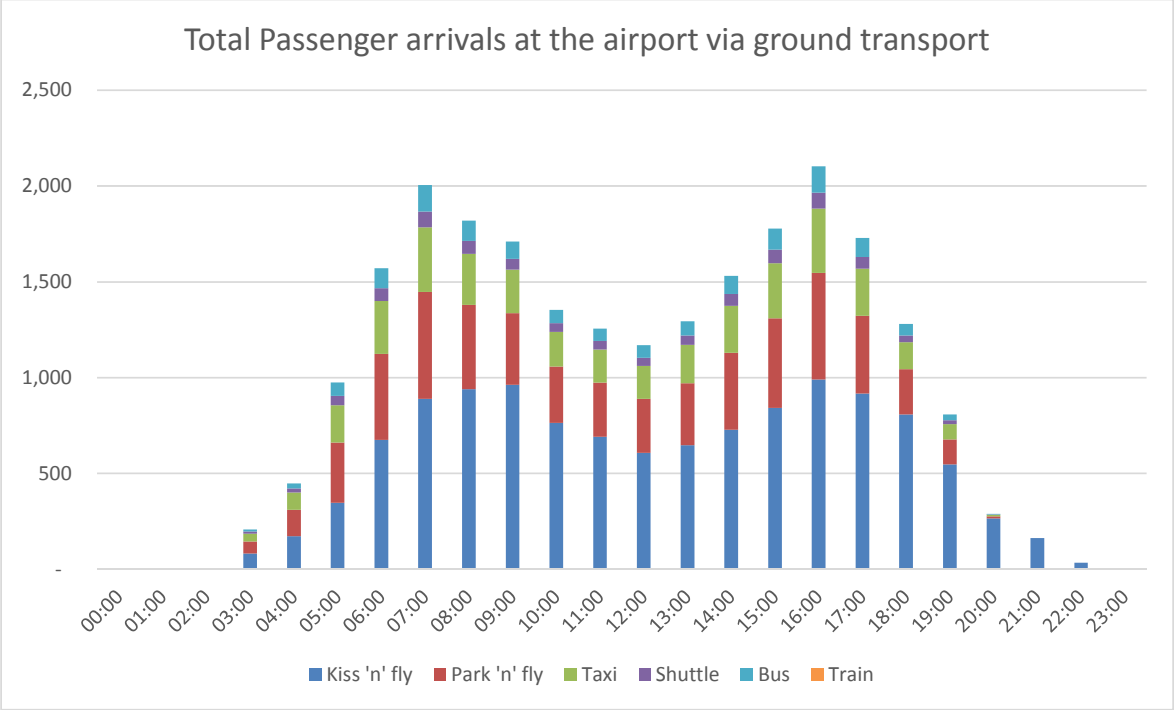
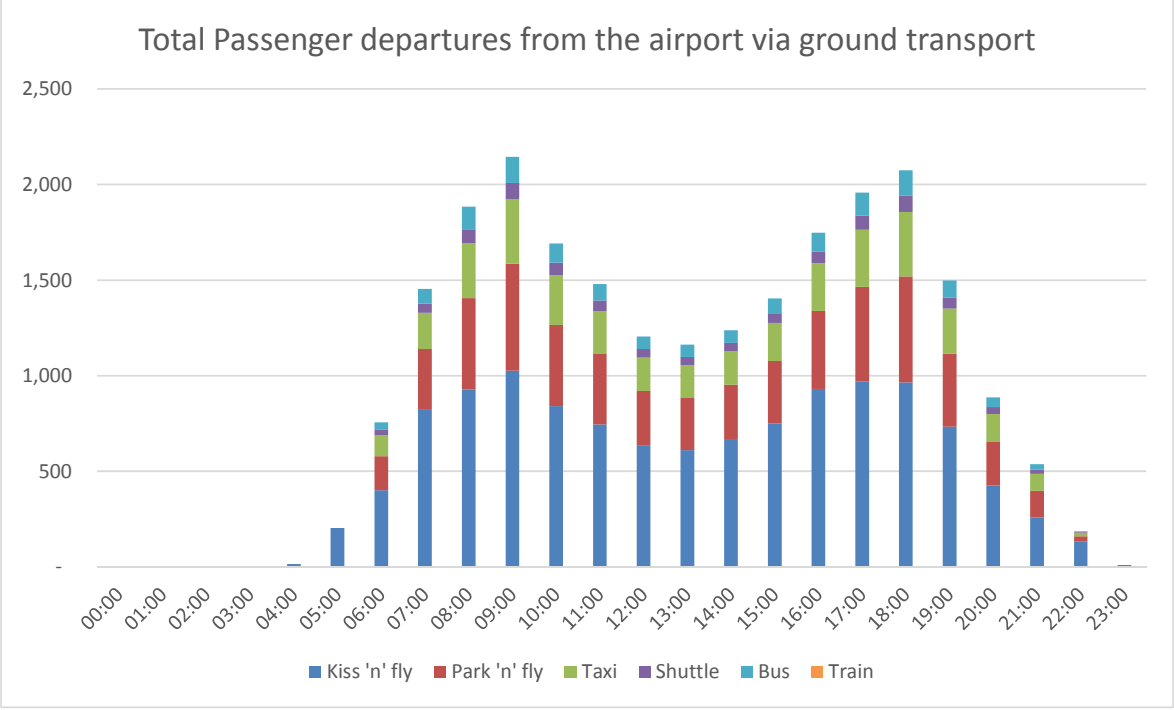


Figure 6-16 Total air arrivals – ground departure from the proposed airport



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 Passenger vehicles entering at the northern boundary of the proposed airport by mode

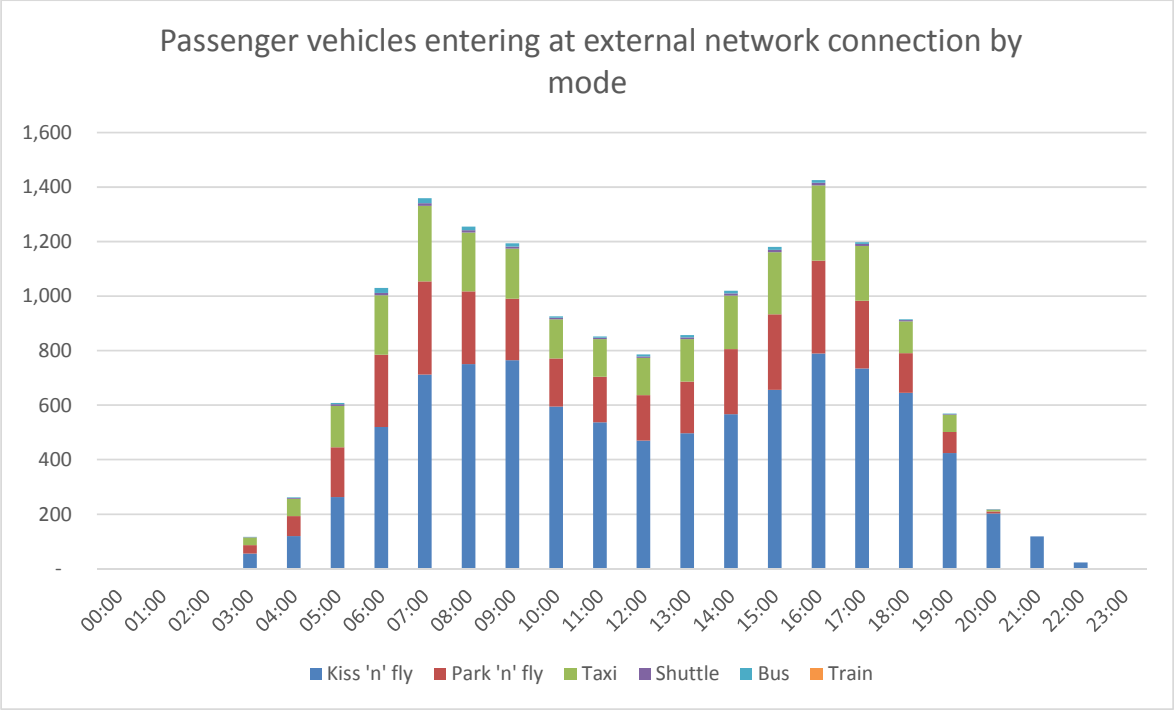


Figure 6-18 Passenger vehicles exiting at the northern boundary of the proposed airport by mode

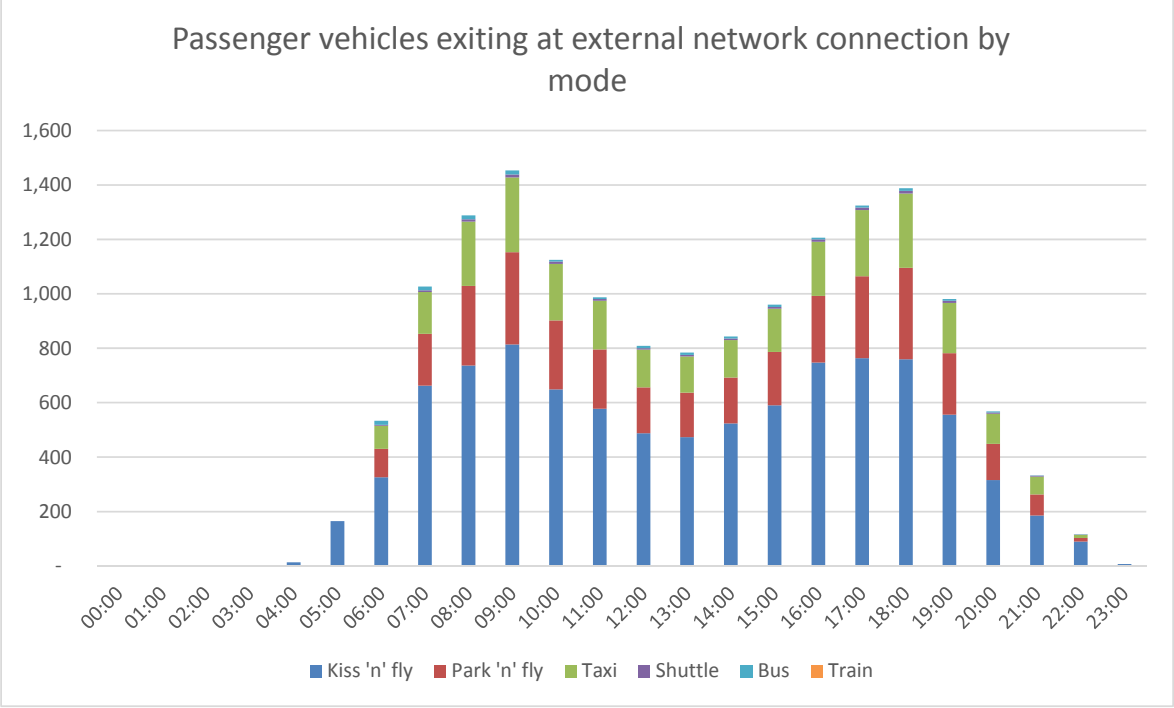


Figure 6-19 Passenger vehicles entering at the northern boundary of the proposed airport by vehicle type

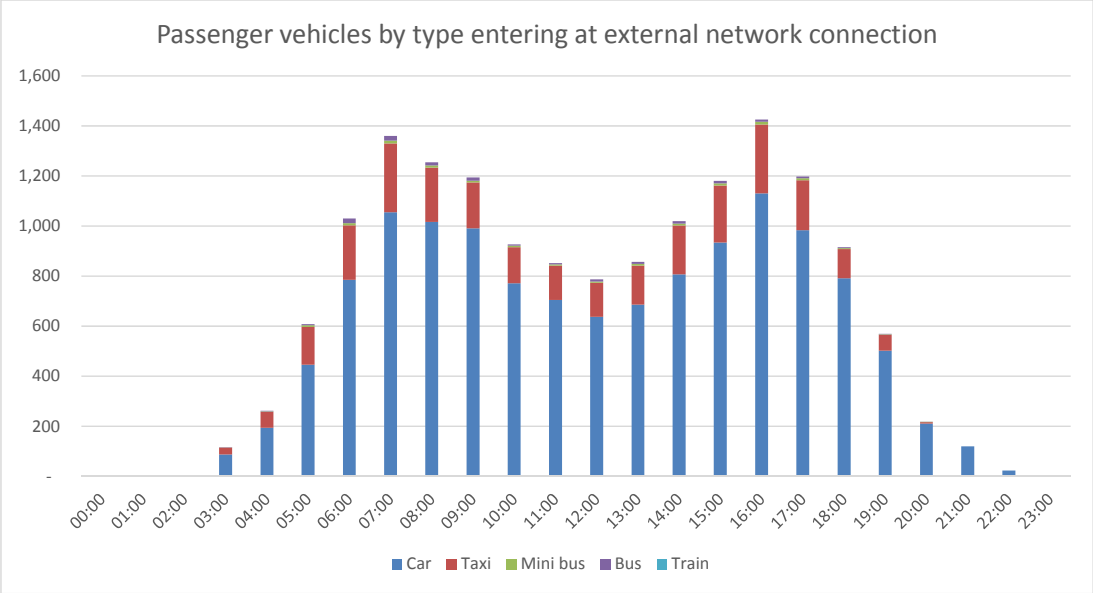


Figure 6-20 Passenger vehicles exiting at the northern boundary of the proposed airport by vehicle type

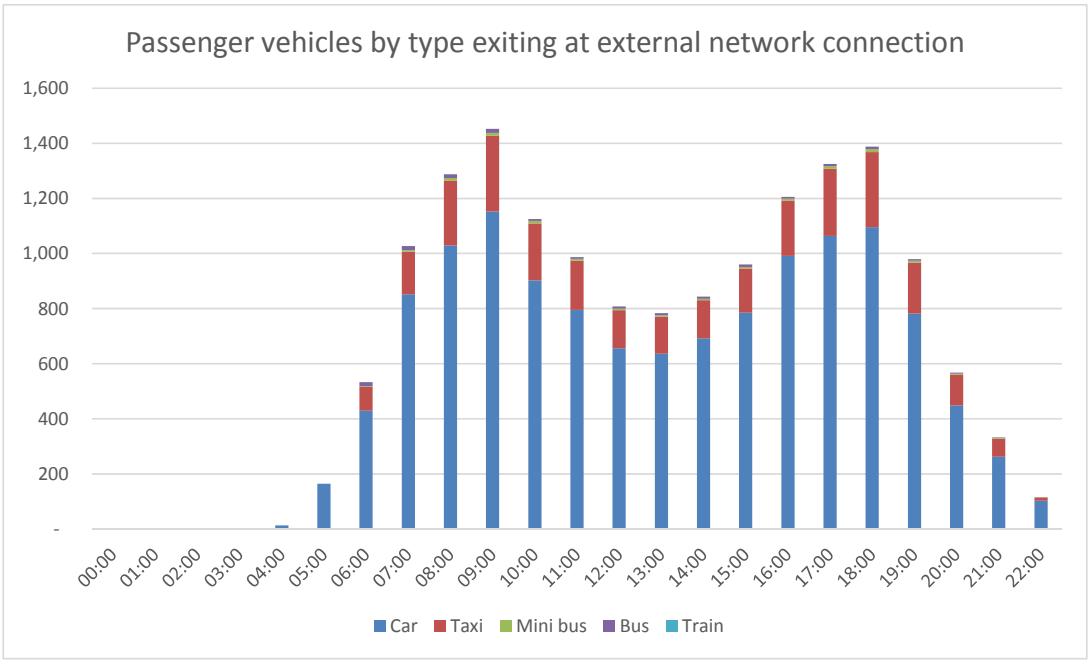


Figure 6-19 shows that the projected vehicle demand is 1,359 vehicles entering the proposed airport during the AM traffic peak and 1,425 vehicles entering the proposed airport during the PM peak period.

Figure 6-20 shows 1,453 vehicles leaving the proposed airport during the AM peak and 1,388 leaving the proposed airport during the PM peak.

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 Passenger vehicles arriving at terminal and car park entrances

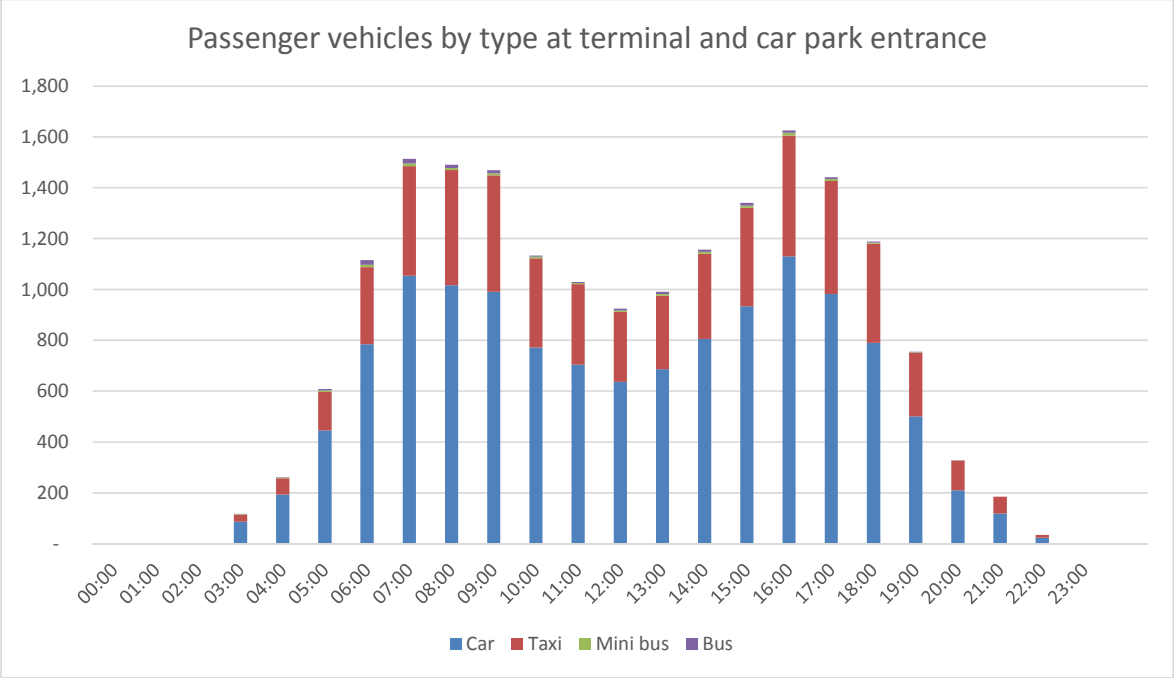


Figure 6-22 Passenger vehicles leaving the terminal and car park exits

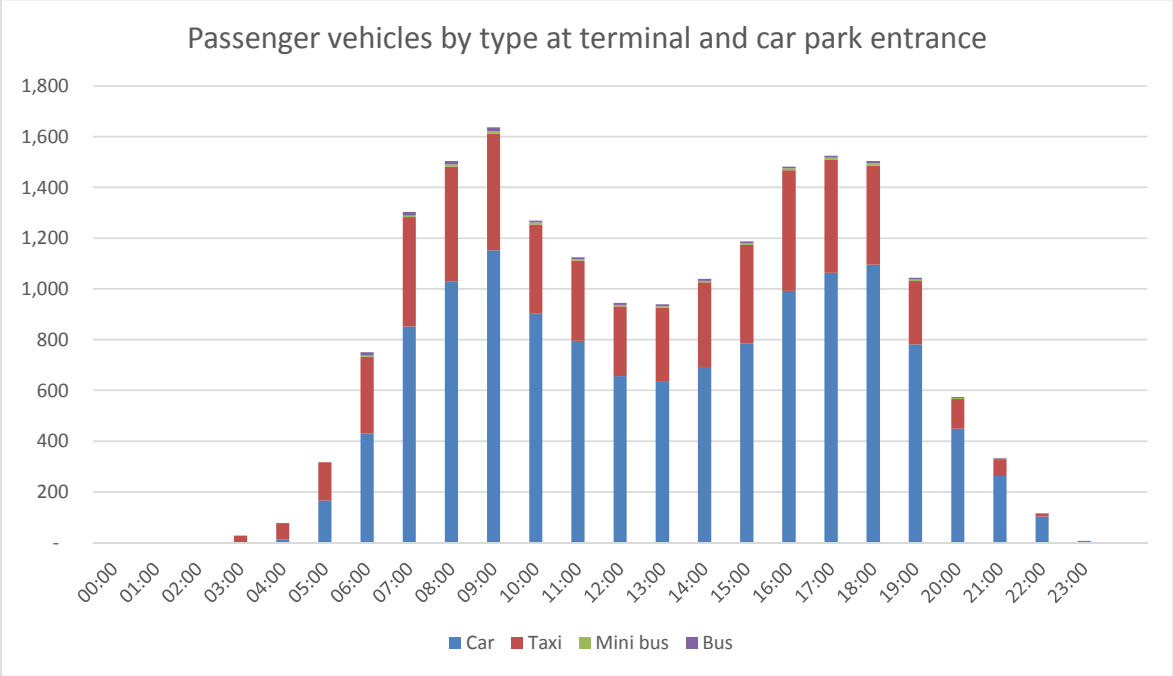


Figure 6-21 shows that the vehicle demand is 1,625 vehicles entering the terminal area in the AM peak and 1,441 vehicles entering the terminal area during the PM peak.

Figure 6-22 shows that the vehicle demand is 1,637 vehicles leaving the terminal area of the airport during the AM peak and 1,525 vehicles leaving the terminal area of during the PM peak.

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.

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 MAP has been used for estimating employee trip generation.

The application of this ratio results in an employee level of approximately 7,600 for the 2031 airport operation.

Only airport-related employees are included in the traffic modelling. As noted on page 1, non-aeronautical commercial operations could be allowed on the site, which could generate extra traffic, from workers and potentially customers. While these potential operations are not part of the proposed action, it is acknowledged that these operations and their consequential traffic impacts have not been factored into 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

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 over the next 48 years to 2063. This results in the proposed airport having 6,158 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 and 8 AM and the remainder commencing work between 9 and 10 AM, with a 9 hour shift for each group.

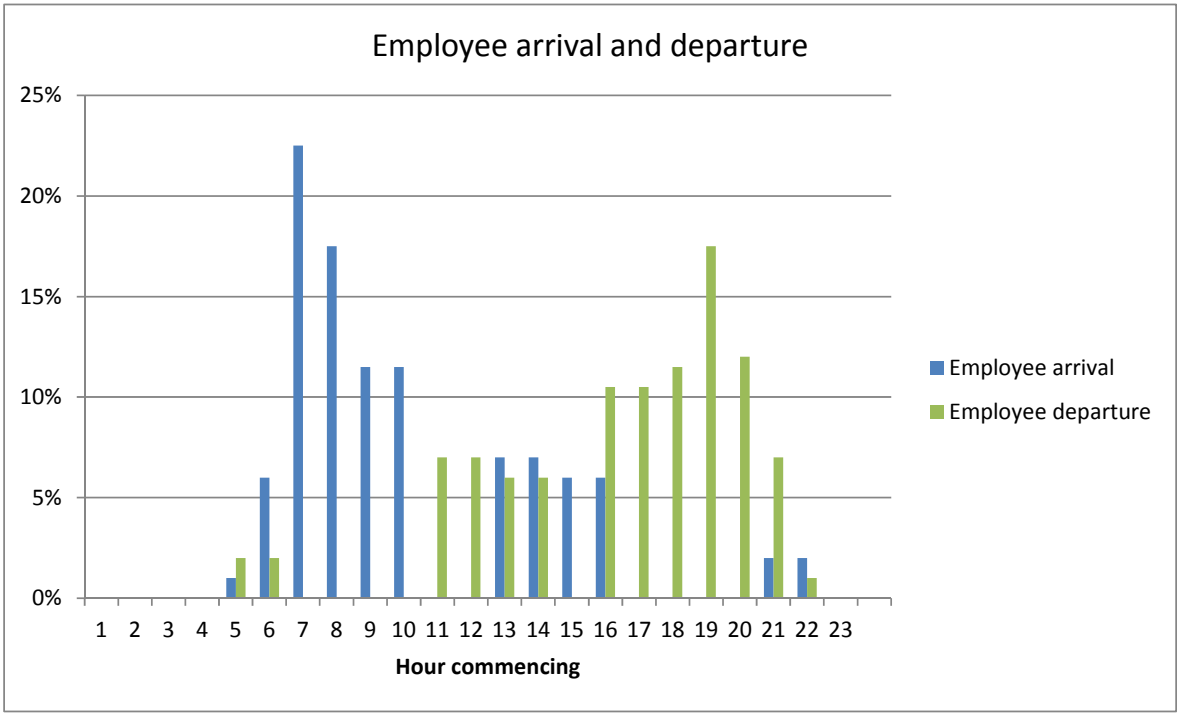
Table 6-6 WSA assumed 2031 shift profiles

Worker type	Start	Finish	Percent of total employees	No. of employees
Airfield and terminal overnight	21:00	05:00	2	220
Airfield day	05:00	13:00	3	123
Airfield afternoon	13:00	21:00	3	123
Terminal support morning	06:00	13:00	10	616
Terminal support afternoon	13:00	20:00	10	739
Terminal supplementary morning	06:00	11:00	14	862
Terminal supplementary afternoon	15:00	19:00	14	739
Office early start	07:00	17:00	21	1,293
Office later start	09:00	19:00	23	1,416
		Total	**100**	**6,158**

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 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 Employee arrival and departure profile - volume

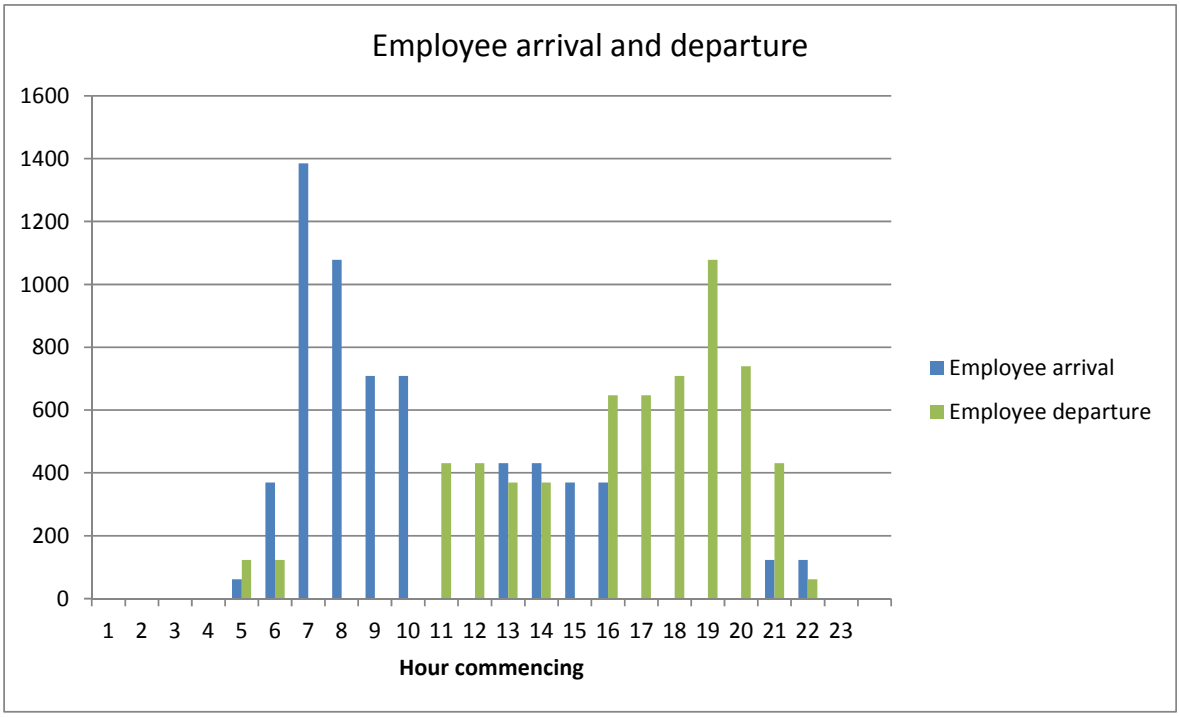
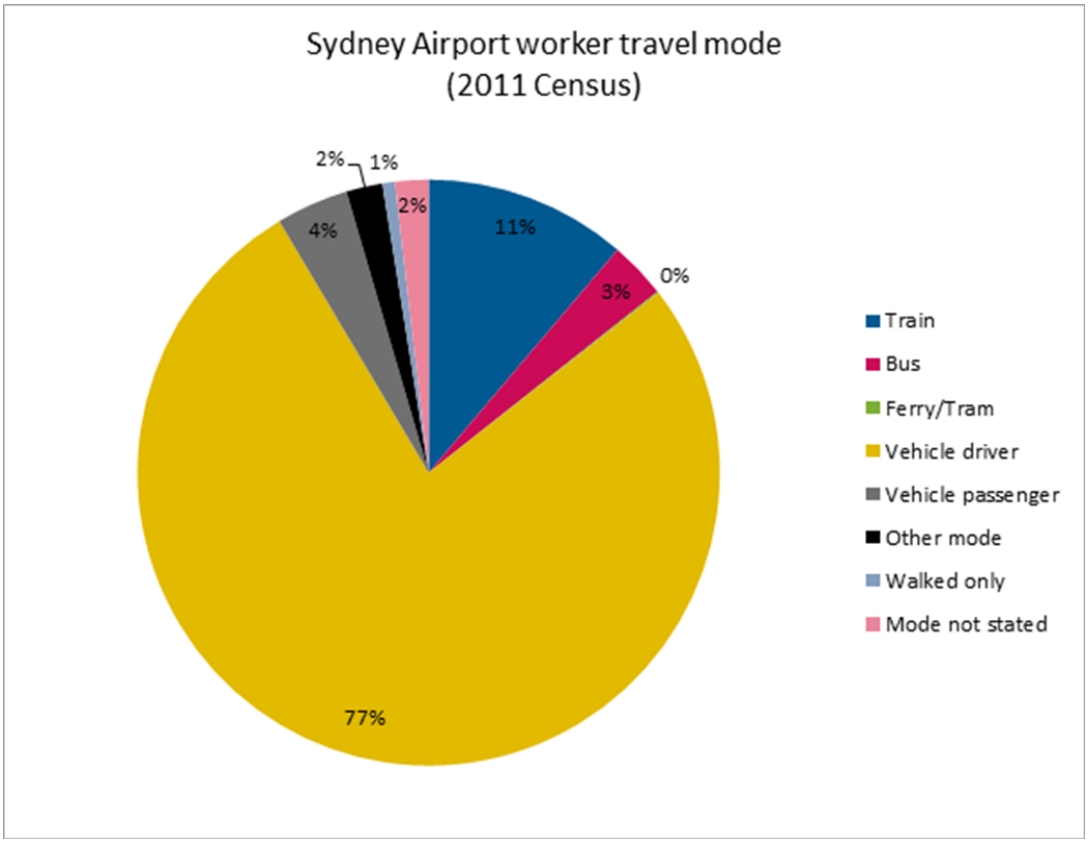


Figure 6-24 shows that the peak arrival for the AM peak period is 1,386 employees and the PM peak departure for employees is after the main transport network peak between 7 and 8 pm, with 1,086 employees leaving in this hour.

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 line 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).

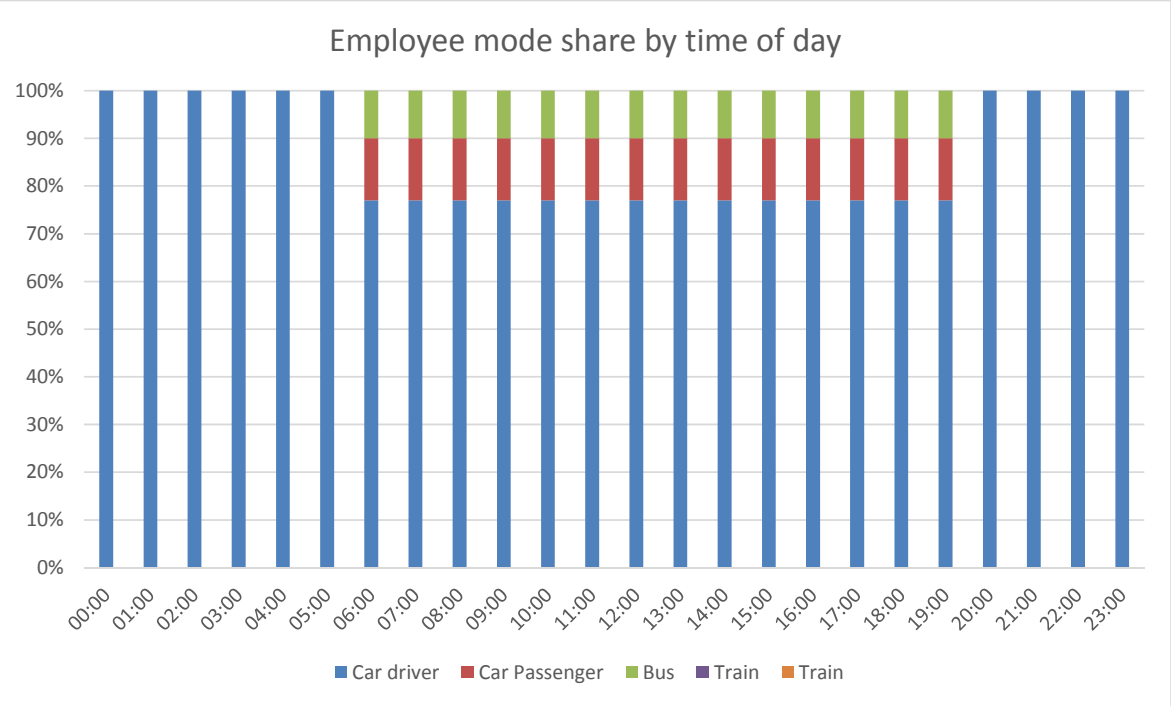
Table 6-7 Employee mode split for areas adjacent to WSA in 2011

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 2031 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 Employee arrivals by mode by time of day

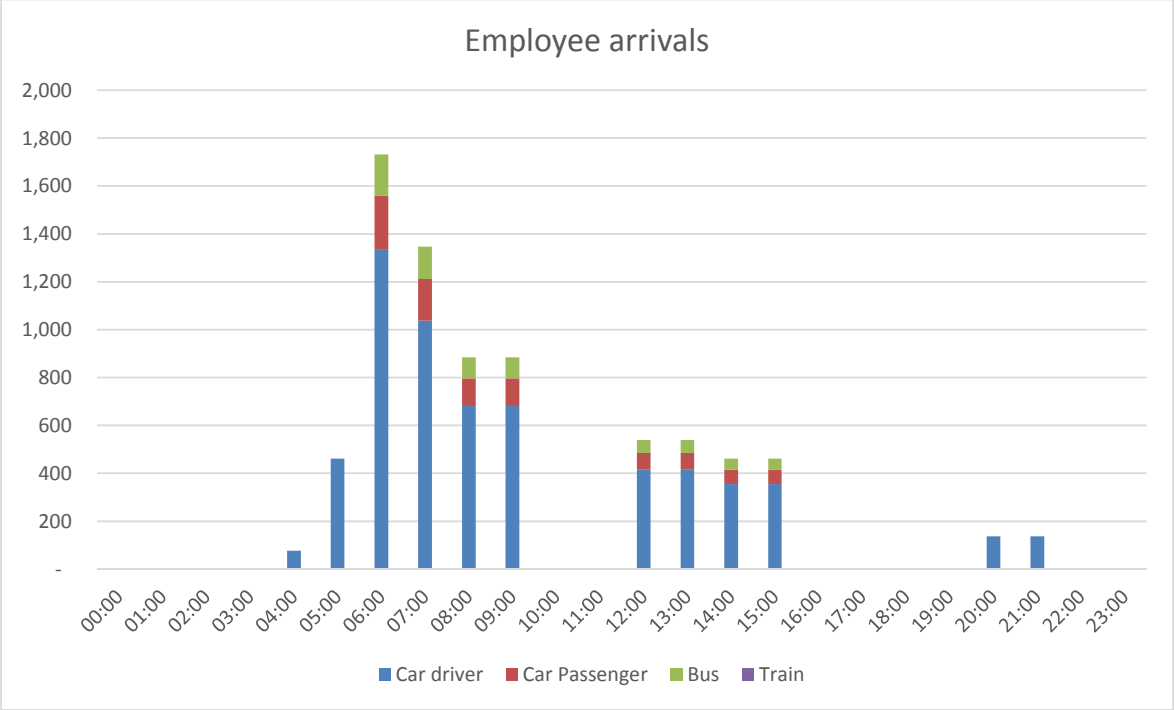


Figure 6-28 Employee departures by mode by time of day

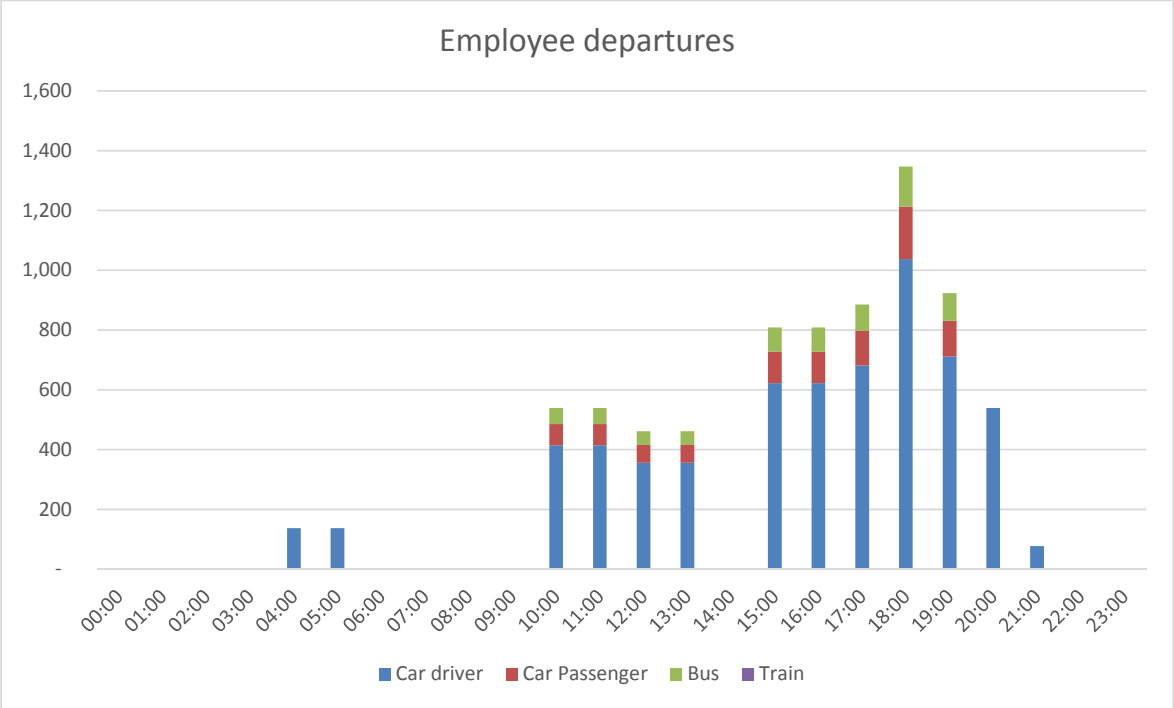


Figure 6-27 shows that the AM peak hour arrival volume for employees is greater than 1,700 arriving during the 7-8 am traffic peak time period, with the majority being car drivers.

Figure 6-28 shows that the PM peak hour departure volume for employees is greater than 1,300 during the PM peak period.

6.3.1 Traffic generation

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

Figure 6-29 2031 employee vehicle arrivals by mode

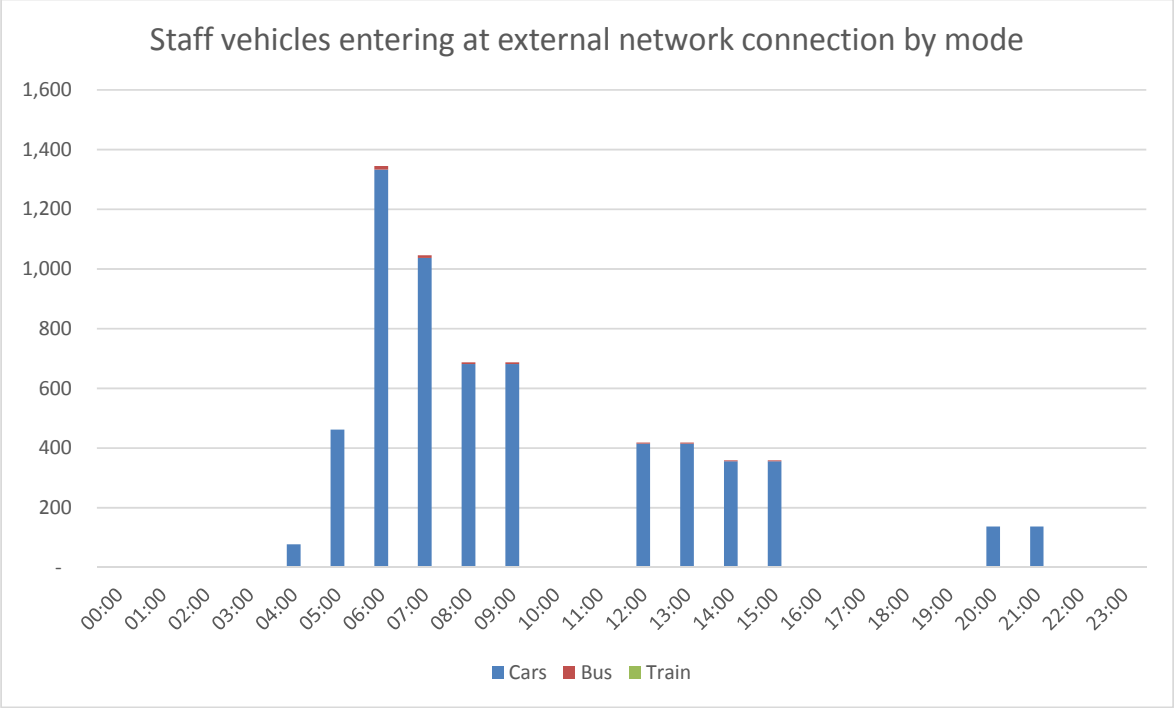


Figure 6-30 2031 employee vehicle departures by mode

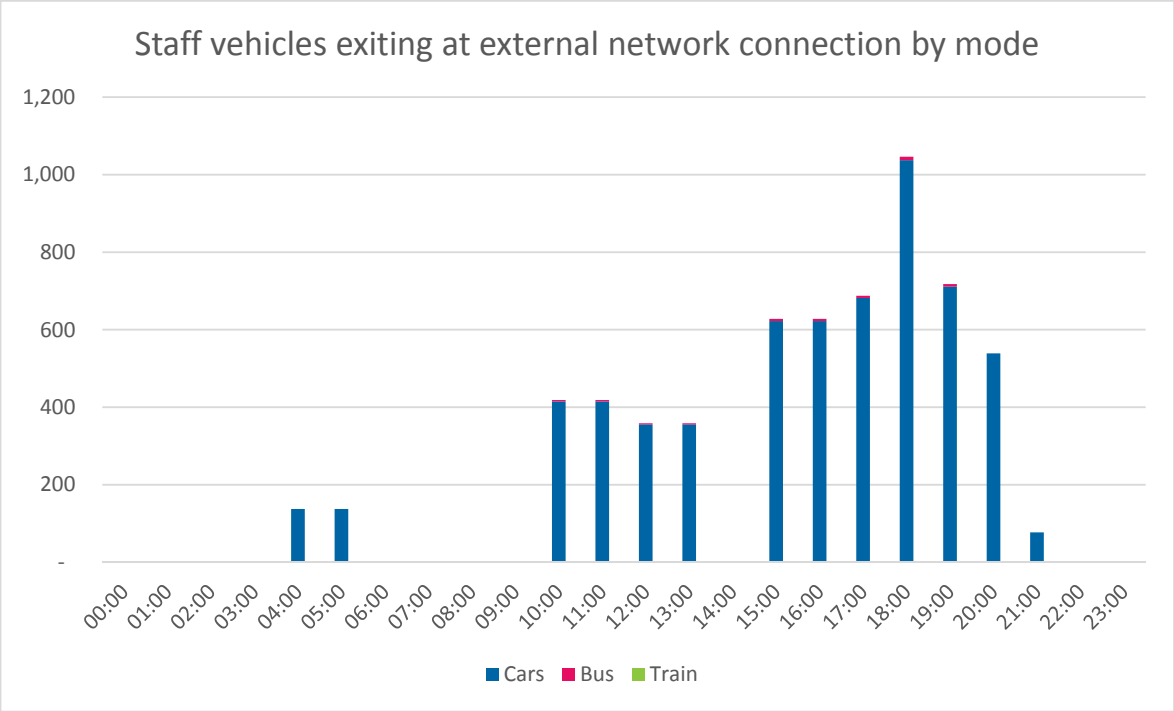


Figure 6-29 and Figure 6-30 show that the employee traffic generation peaks are outside the nominal main traffic peaks (of 7-9 AM and 4-6 PM as used in the STM) for both the arrival and departure of employees.

6.4 Combined air passenger and employee trip generation

The total trip generation for air passengers and employees for 2031 based on the total trips for each hour is shown in Figure 6-31 and Figure 6-32.

Figure 6-31 Total arrival trip generation by mode

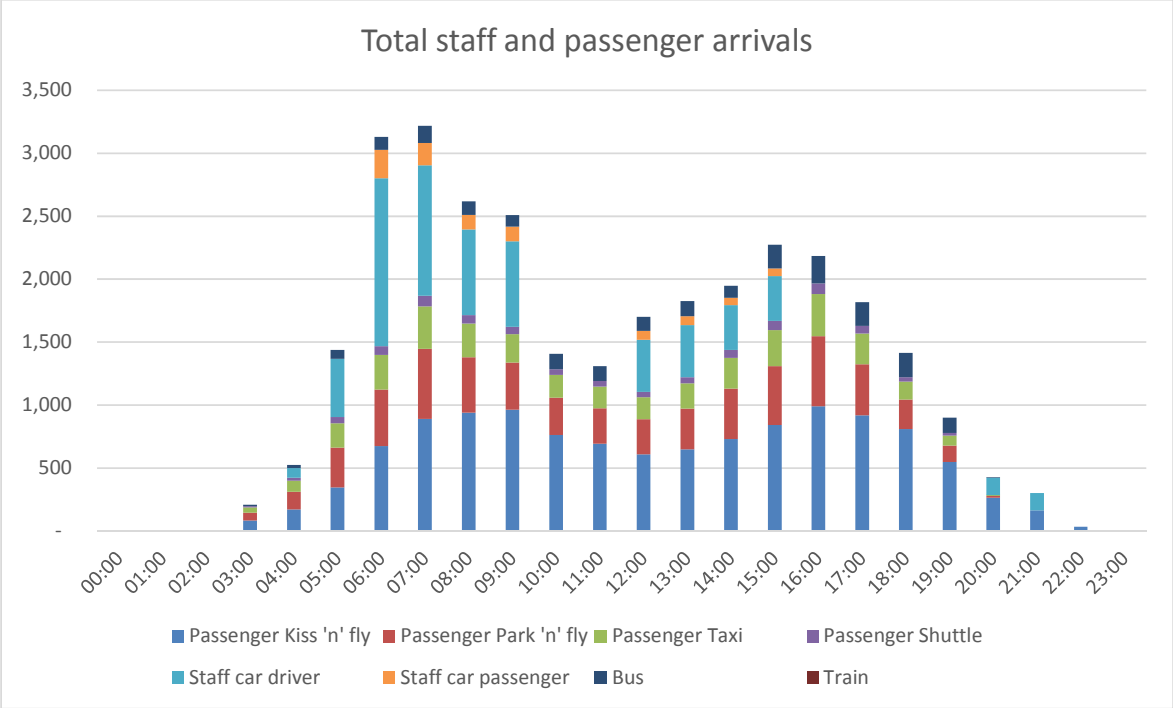


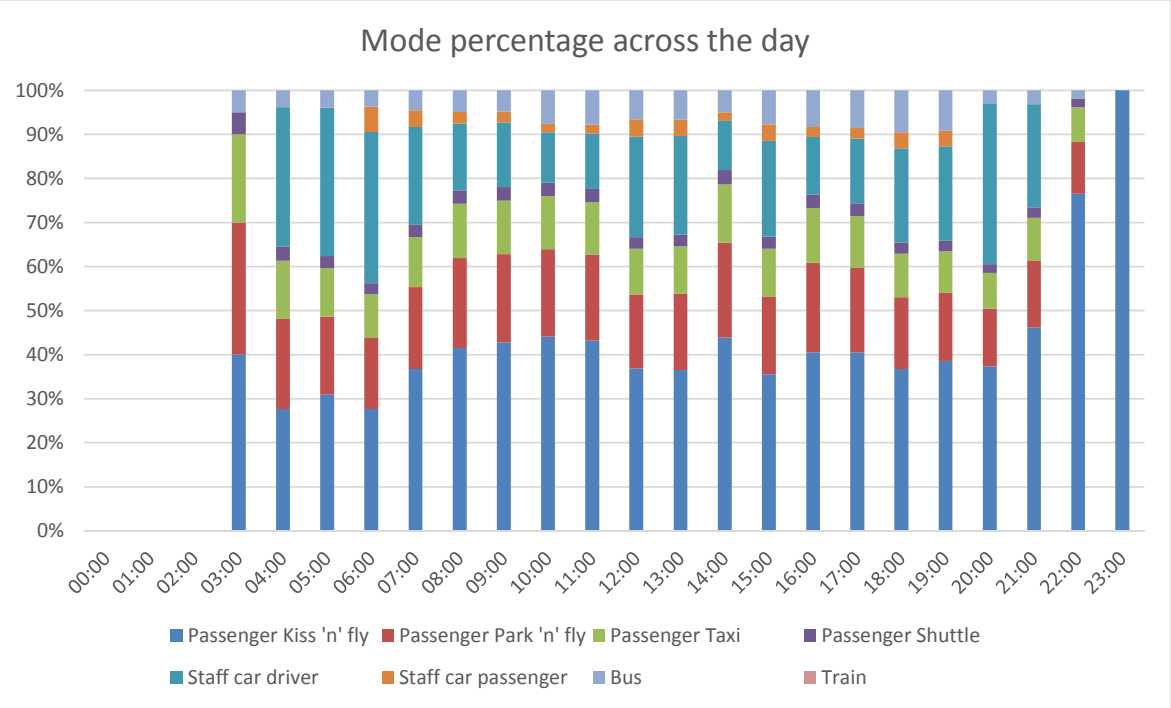
Figure 6-32 Total departure trip generation by mode

Figure 6-31 shows that the peak trip generation to the proposed airport occurs between 7 and 8 AM and is 3,218 trips.

Figure 6-32 shows that the peak trip generation from the proposed airport occurs between 6 and 7 PM and is 3,422 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 to Figure 6-37.

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

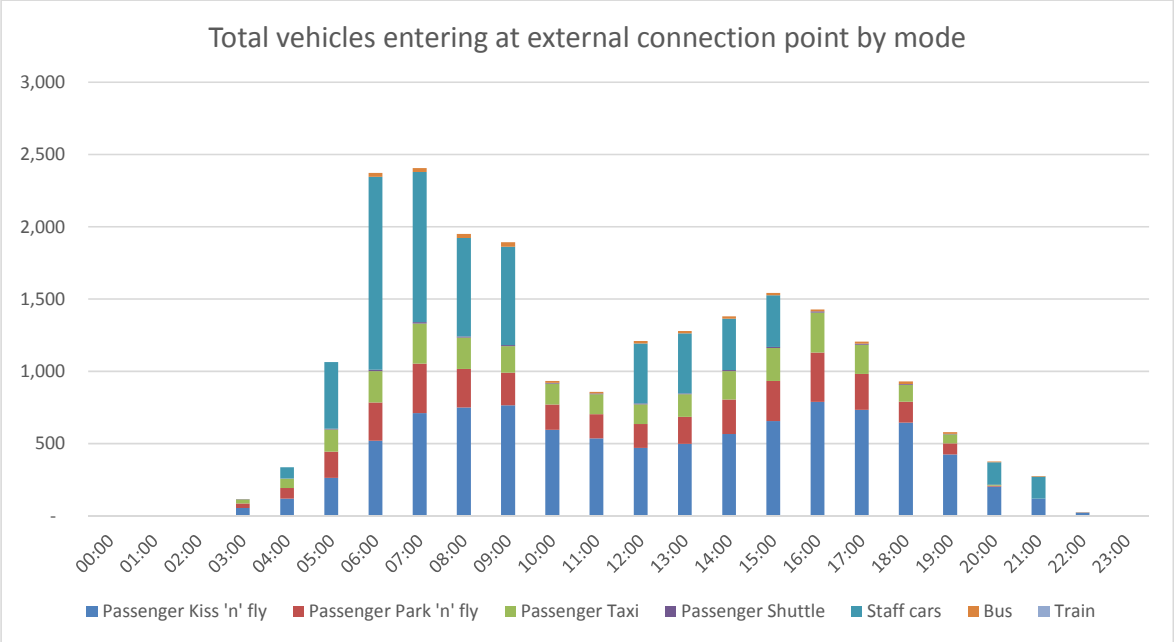


Figure 6-35 Traffic generation from the main entrance of the proposed airport by mode

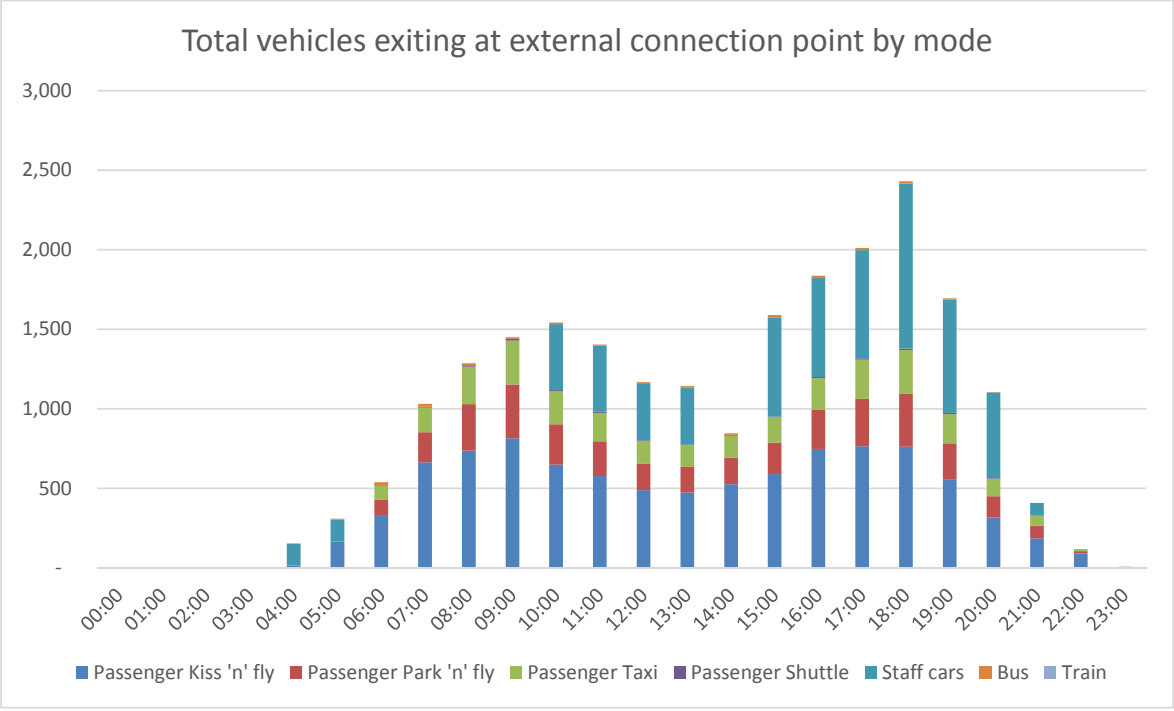


Figure 6-36 Traffic generation to the main entrance of the proposed airport by vehicle type

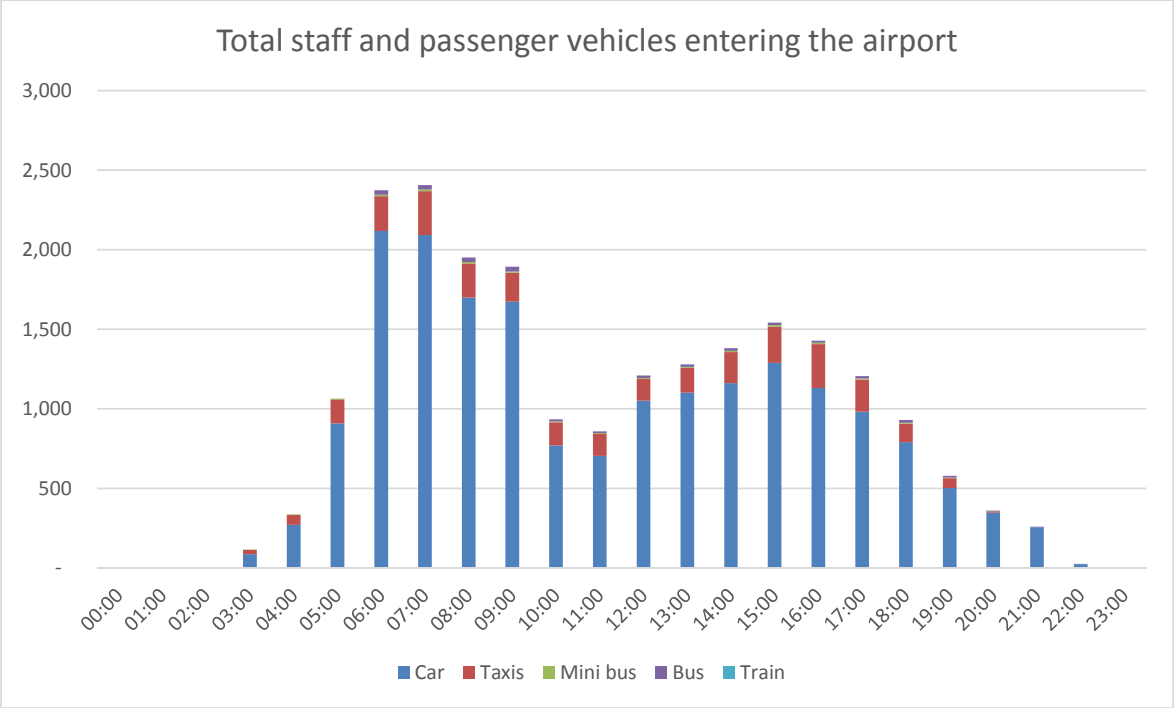


Figure 6-37 Traffic generation from the main entrance of the proposed by vehicle type

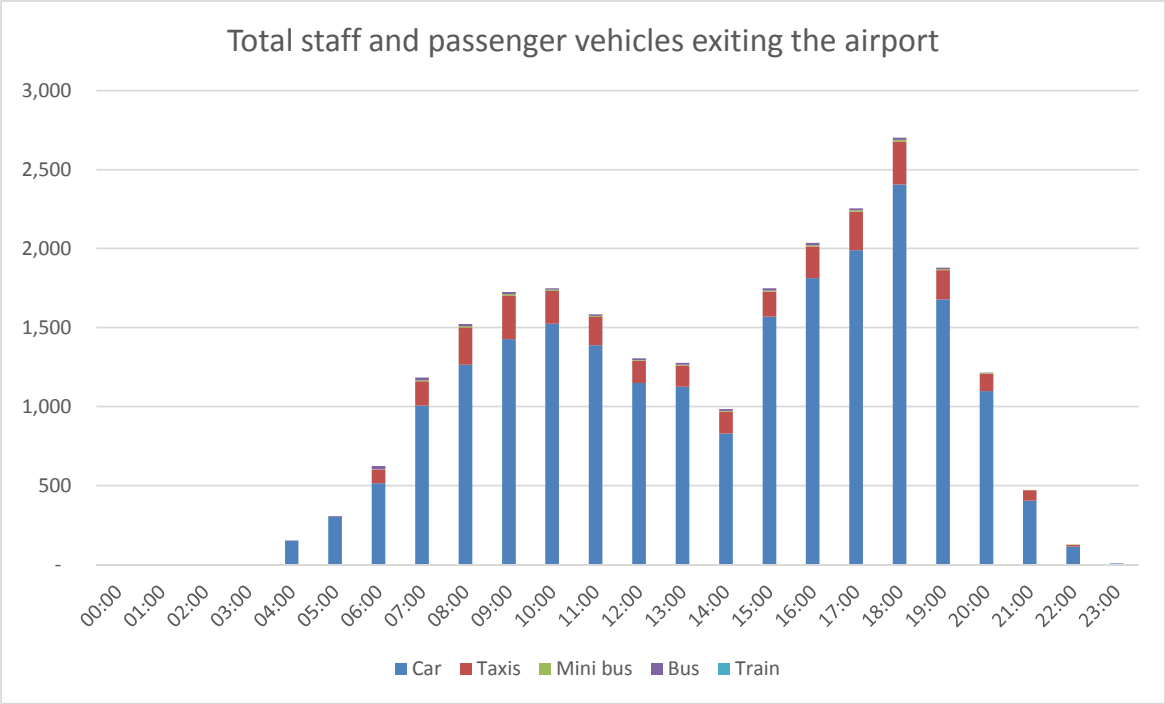


Figure 6-36 shows that the peak vehicle demand to the proposed airport is between 7 and 8 AM and is 2,406 vehicles per hour.

Figure 6-37 shows that the peak vehicle demand away from the proposed airport is between 6 and 7 PM and is 2,702 vehicles per hour.

6.6 Freight trip generation

Freight demand has been provided for air freight cargo 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 is estimated to be 190,793 tonnes in 2031.

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 2031 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	12.5
Semi-Trailer (19 metres long)	25	3	40
B-Double (23 -26 metres long)	10	5	56

Table 6-9 2031 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)	53,051	152	6	13
Semi-Trailer (19 metres long)	6,376	17	1	2
B-Double (23 -26 metres long)	1,822	5	0	1

6.6.2 Fuel deliveries

It has been estimated that in 2031, approximately 43 B-Doubles of fuel per day would be required serve the operations at the proposed airport until such time as a fuel pipeline is provided.

Based on the expansion factors used in section 6.6.1, this would result in two B-Doubles per hour, or 35 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. The figures are presented for the representative 2-hour periods used in STM3, with a 24 hour total. Table 6-10 provides the collation of trip generation estimates developed in the section.

Table 6-10 Total modelled traffic to/from the proposed airport in 2031

	AM Peak 2 hour	Interpeak 2 hour	PM Peak 2 hour	Evening 2 hour	24 Hour
Accessing Airport					
Passengers	2,582	1,862	2,518	1,276	15,774
Airport Workers	1,375	498	190	573	4,871
Freight (TNR)	9	26	13	57	277
Total (Accessing)	**3,966**	**2,386**	**2,721**	**1,905**	**20,922**
Egressing from Airport					
Passengers	2,286	1,983	2,312	1,357	15,774
Airport Workers	0	411	1,027	704	4,885
Freight (TNR)	9	26	13	57	277
Total (Egressing)	**2,295**	**2,420**	**3,353**	**2,117**	**20,936**

Note that the analysis excludes the traffic 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.

6.8 Airport traffic distribution

The traffic generated from the Airport was distributed using STM3. This calculates traffic distribution from first principles, by using the land use inputs combined with the generalised costs of travel from origin to destination zone. As such, this source is considered the best available for the proposed airport generation, considering the condensed timeframes for this stage of the study.

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 Growth Area
- Broader Western Sydney Employment Area
- Greater Macarthur Land Release Investigation Area
- the proposed Western Sydney Airport
- smaller growth centres

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

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

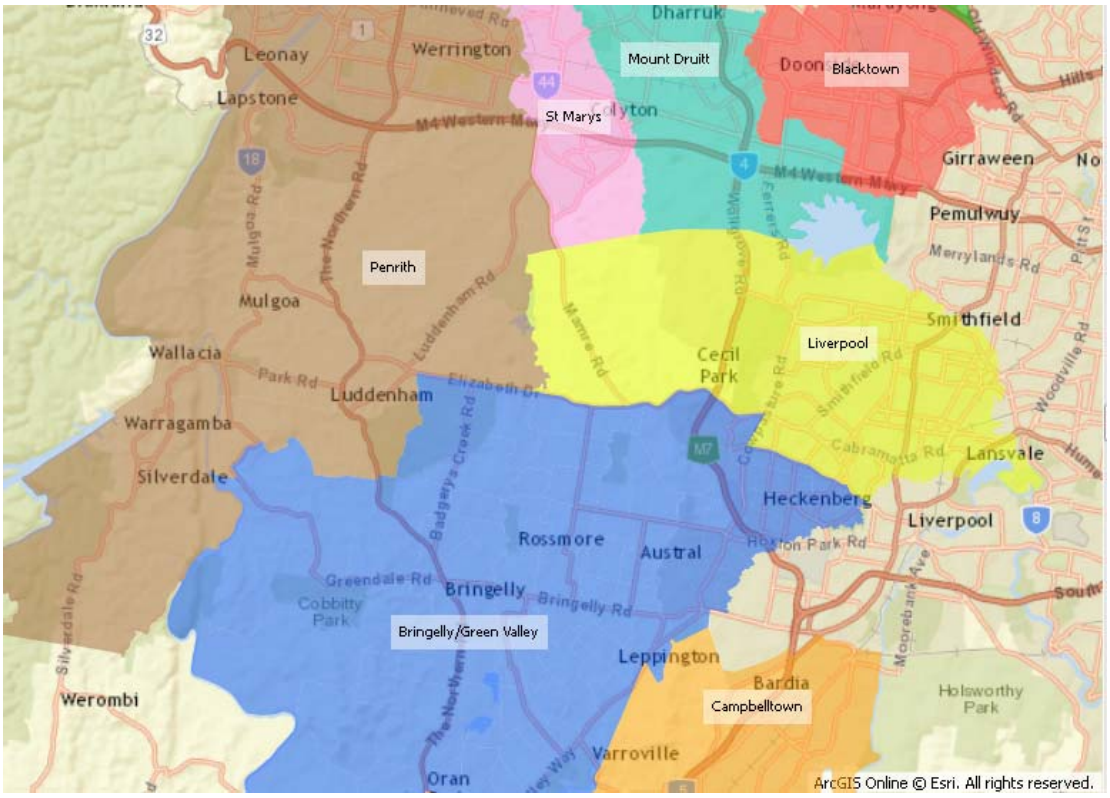
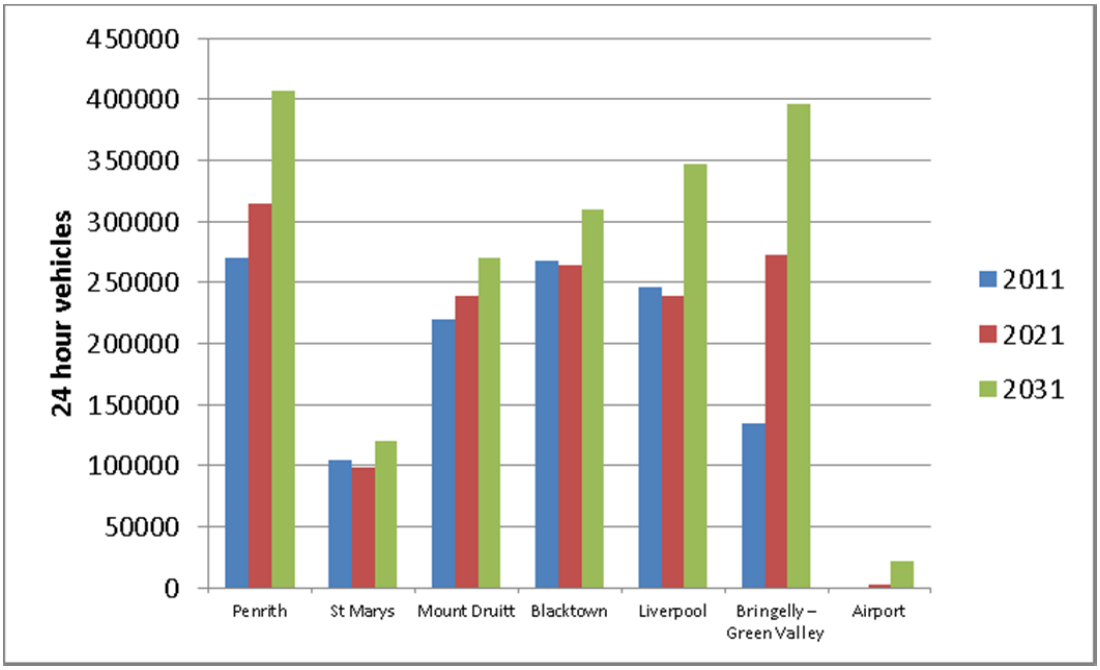


Figure 7-2 provides a summary of the magnitude of trips in the vicinity of the proposed airport, and shows the expected growth to 2031. It indicates that the proposed airport would be a very small component of overall trip demand in 2031.

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



Data Source: STM3 model outputs

7.2 Future road network performance

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

Figure 7-3 and Figure 7-4 show the changes in traffic volumes in 2031 between the Do Minimum and With Airport scenarios. The differences are in pcu for the 2-hour peak periods.

The M12 is included in the 'With Airport' scenarios only. The M12 is included in the difference plots and therefore, in effect, displays the total volume forecast on the M12.

Figure 7-3 and Figure 7-4 show:

- the opening of the M12 attracts traffic from the M4 corridor, Elizabeth Drive, Bringelly Road and Fifteenth Avenue, reducing the volumes on these east-west routes.
- the reduction in volumes on the parallel routes is greatest eastbound in the AM peak and westbound in the PM peak
- attracting traffic to the M12 increases the traffic volumes on The Northern Road
- the WSA increases the volume of traffic on the north-south routes in the study area, including the Northern Road, where no additional infrastructure is currently assumed beyond the upgrade to a four-lane road in the vicinity of the airport scheduled to be complete by 2025.

There are two drivers of the changes in volumes. Firstly, the airport introduces more trips on the network in this area. Secondly the M12, introduced to provide sufficient access to the airport, has a diversionary effect on traffic movements in the wider area, attracting vehicles to the M12 corridor that would otherwise have used Bringelly Road or the M4. This has the effect of:

- reducing volumes on the M4;
- reducing volumes on Bringelly Road; and

- increasing volumes on The Northern Road.

The M12 as included within the assessment transport model also reduces congestion in the M12 /Elizabeth Drive corridor, as can be seen in the comparative volume/capacity plots in Figure 7-6 and Figure 7-7.

Figure 7-3 Traffic volume difference plot 2031 with Proposed Airport – 2031 Do Minimum AM Peak

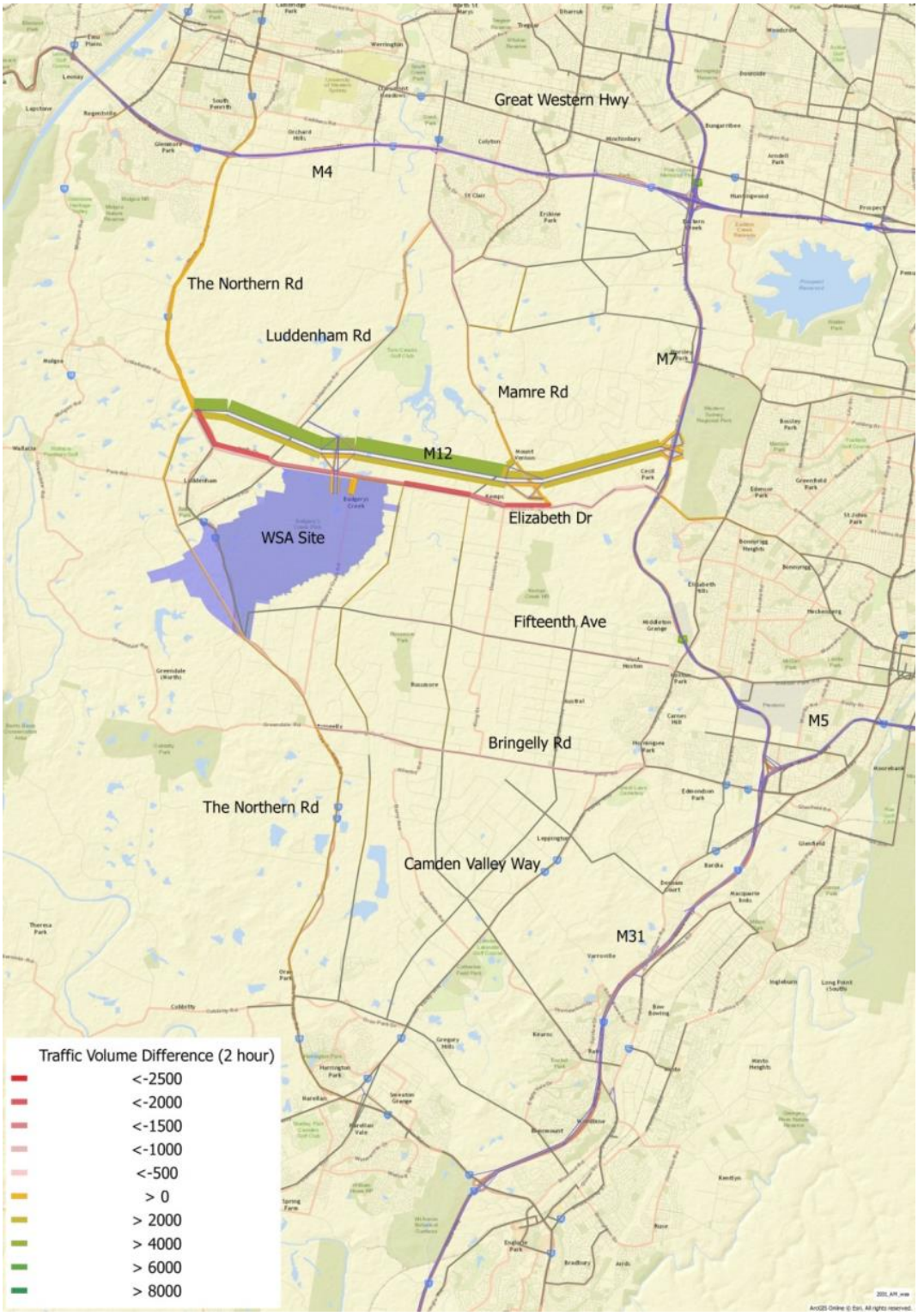
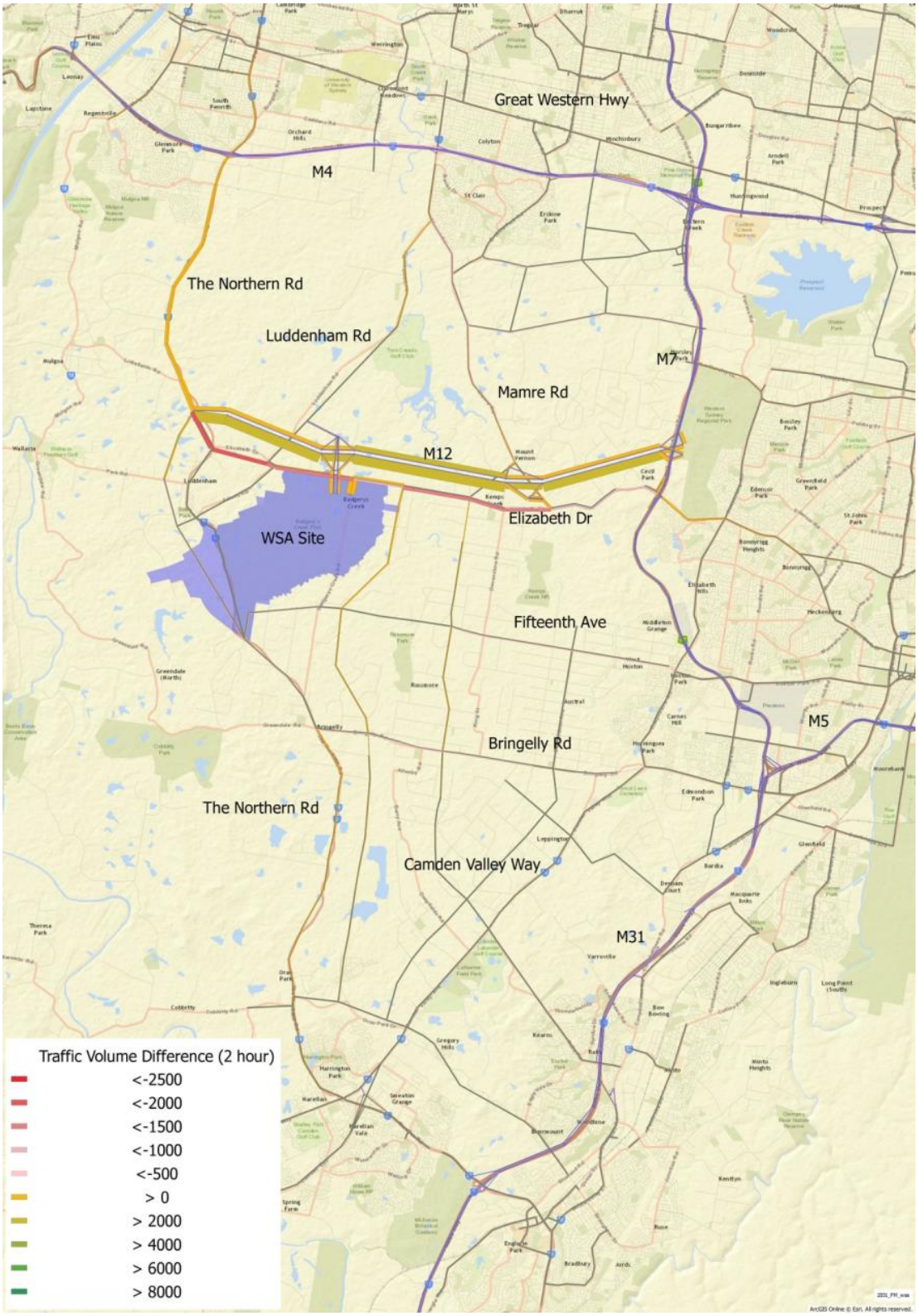


Figure 7-4 Traffic volume difference plot 2031 with Proposed Airport – 2031 Do Minimum PM Peak



An analysis has been carried out on the mid-block level of service for the Do Minimum and the With Airport scenarios. The Level of Service is shown figuratively 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

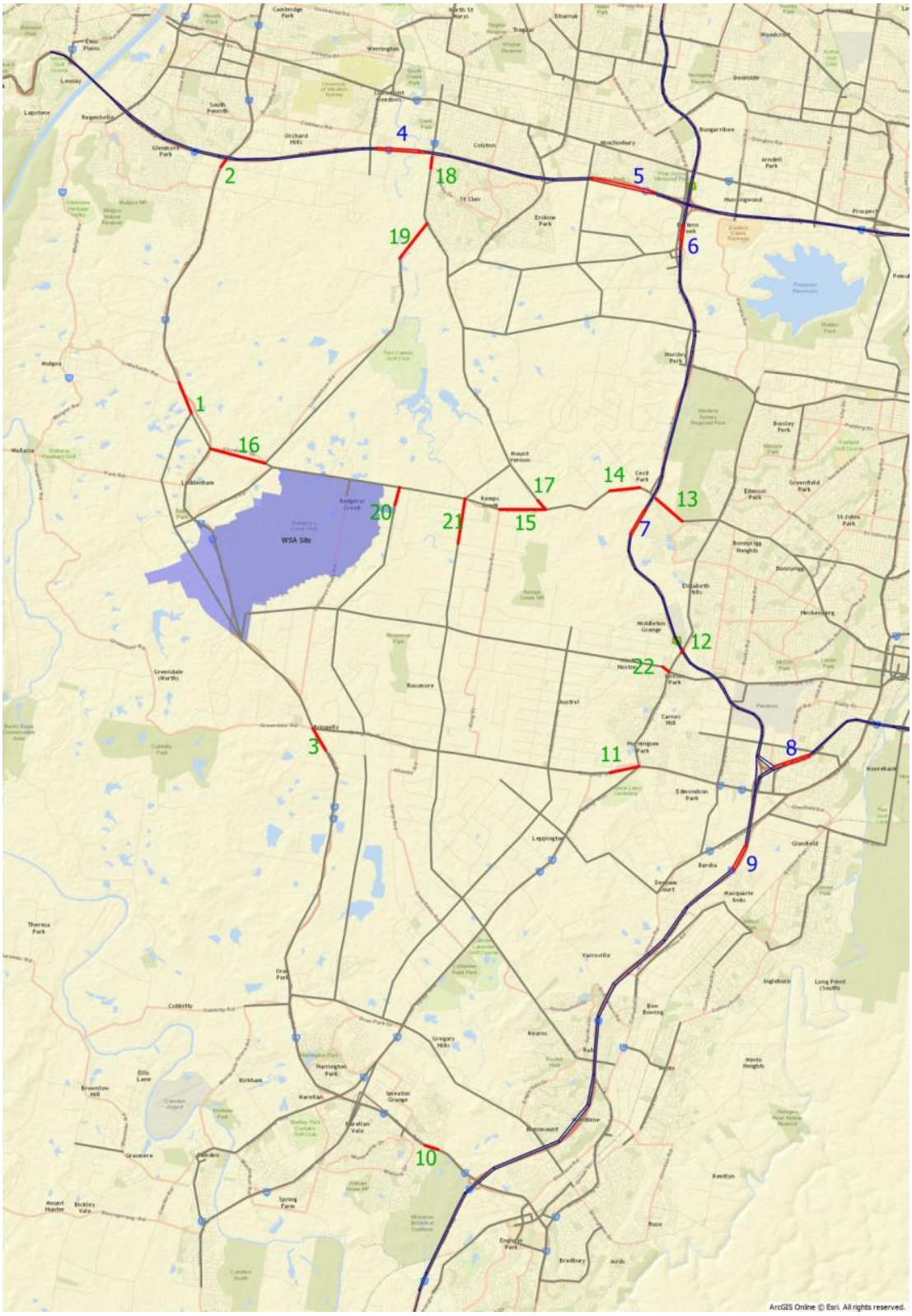


Table 7-1 Level of Service for 2031 With and Without Western Sydney Airport

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 Dr	C	D	C	C	C	**E**	**D**	C
2	The Northern Road	South of M4	F	C	D	F	F	D	D	F
3	The Northern Road	South of Bringelly Rd	C	B	B	C	**D**	B	B	C
4	M4	West of Mamre Road	F	D	D	F	F	D	D	F
5	M4	West of M7	F	D	D	E	F	D	D	E
6	M7	South of M4	F	F	F	E	F	F	F	E
7	M7	South of Elizabeth Drive	F	D	D	D	F	D	D	**E**
8	M5	East of M7	F	E	E	F	F	E	E	F
9	M31	South of Campbelltown Road	F	E	D	E	F	E	D	E
10	Narellan Road	North of Tramway Dr	D	F	D	D	D	F	D	D
11	Bringelly Road	West of Cowpasture Road	D	C	C	C	D	C	C	C
12	Cowpasture Road	At M7	F	E	D	F	F	E	D	F
13	Elizabeth Dr	East of M7	D	F	D	C	**E**	F	**E**	**D**
14	Elizabeth Dr	West of M7	E	D	C	D	**D**	**C**	C	**C**
15	Elizabeth Dr	West of Mamre Road	F	B	B	D	**C**	B	B	**C**
16	Elizabeth Dr	East of the Northern Road	C	A	A	B	**A**	A	A	**A**
17	Mamre Road	North of Elizabeth Dr	F	C	C	F	F	**E**	**D**	F
18	Mamre Road	South of M4	D	F	E	D	D	F	E	D
19	Luddenham Dr	West of Mamre Road	D	C	C	C	**C**	C	C	**D**
20	Lawson Rd	South of Elizabeth Dr	C	A	A	C	**D**	A	A	C
21	Western Rd	South of Elizabeth Dr	D	A	B	C	D	**B**	B	**D**
22	Fifteenth Ave	West of Cowpasture Rd	C	A	A	C	C	A	A	C
23	M12	West of M7	-	-	-	-	A	A	A	A
24	M12	West of Mamre Road	-	-	-	-	B	A	A	A
25	M12	East of the Northern Road	-	-	-	-	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 deterioration.

Figure 7-6 2031 AM Peak Volume/Capacity - Do Minimum (Left), with Proposed Airport (Right)

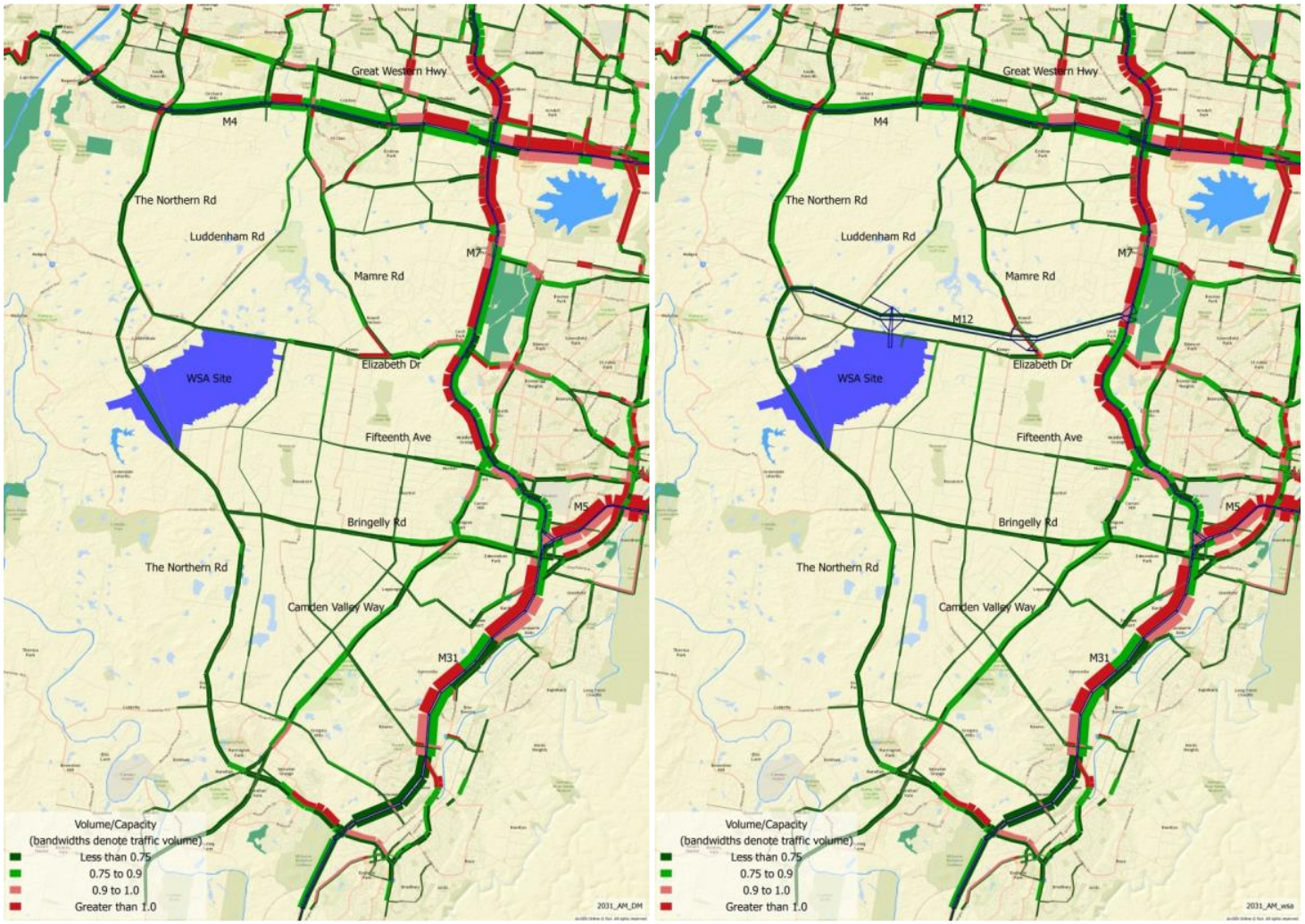
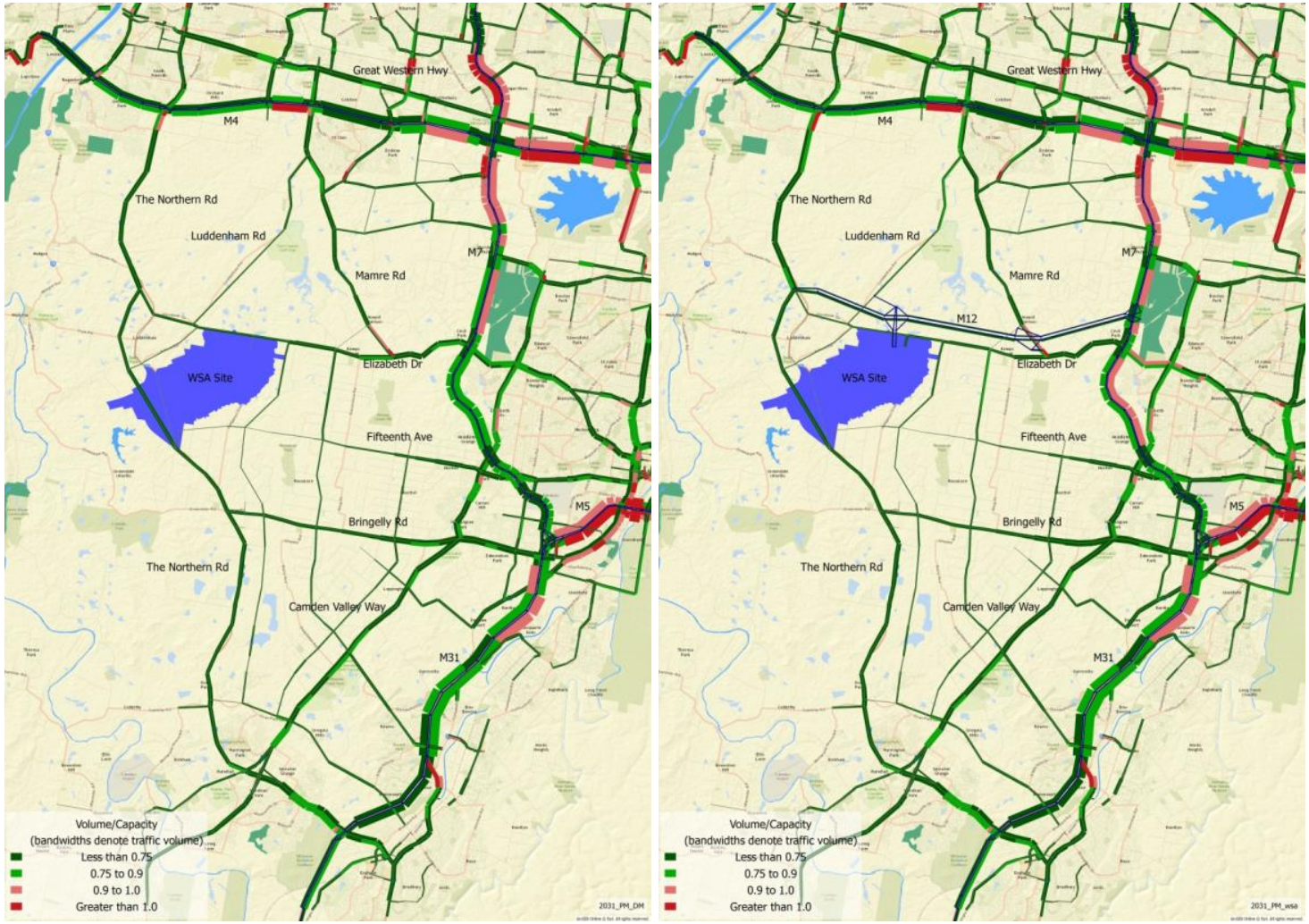


Figure 7-7 2031 PM Peak Volume/Capacity - Do Minimum (Left), with Proposed Airport (Right)



7.3 Impacts on roads and access

The road upgrades identified as part of the WSIP have been determined to support the proposed airport. The evaluation of the impacts is a comparative assessment of the WSIP (including the airport) and M12 with the airport and the WSIP without the airport. Therefore, the overall improvements to the transport system as a consequence of the WSIP have been included within the 'without airport' scenario.

The introduction of the proposed airport and the M12 would have the following effects on the capacity of the strategic road network (over and above the scenario without the airport), as shown in Figure 7-6 and Figure 7-7.

- a worsening of LoS on Elizabeth Drive as a result of the diversion of trips on to the M12;
- a worsening of LoS on The Northern Road:
    - to LoS D on sections of The Northern Road between the M12 and M4 (AM/PM peaks)
    - to LoS E just north of Elizabeth Drive (AM peak)
    - to LoS F just south of the M4 (AM/PM peaks)
- a worsening of LoS on sections of Mamre Road near the M12.
- an improvement of LoS on Mamre Road north of Erskine Park Road; and
- the M12 operates at LoS B or better.

Overall, by 2031 the proposed initial airport development would not generate the level of traffic required significantly to impact the operation of the surrounding road network.

7.4 Key findings

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

- daily passenger and employee vehicle trip generation of 22,134 vehicles to the proposed airport and 24,857 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 7:00 AM and 8:00 AM and is 2,406 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 2,429 vehicles per hour;
- daily freight vehicle trip generation of 20,922 vehicles to the proposed airport and 20,936 vehicles from the airport;
- the freight AM peak (2 hour) vehicle demand is 3,966 to the proposed airport and 2,295 from the airport; and
- the freight PM peak (2 hour) vehicle demand is 1,905 to the proposed airport and 2,117 from the airport.

The introduction of the proposed airport and the M12 has the following effects on the capacity of the strategic road network:

- some increase in congestion at The Northern Road/M4;
- a small increase in congestion on Mamre Road; and
- overall by 2031, the initial airport development does not generate the level of traffic required significantly to impact on the operation of the surrounding road network.

As demonstrated in this Chapter, the proposed initial airport operations would not have a significant impact on the capacity of the 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 BWSEA and SWGC, 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 to the expected airport passenger and employee demand.

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

Part B – Assessment of the longer term airport development

8. Airport facilities and road network conditions

Key details of the longer term 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 longer term airport development would involve construction 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. The EIS assessment assumes 2063 as the appropriate year to analyse the potential impacts of the longer 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. This motorway has a long term design of 3 traffic lanes plus a bus lane in each direction. 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 in based on current airport passenger volumes 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

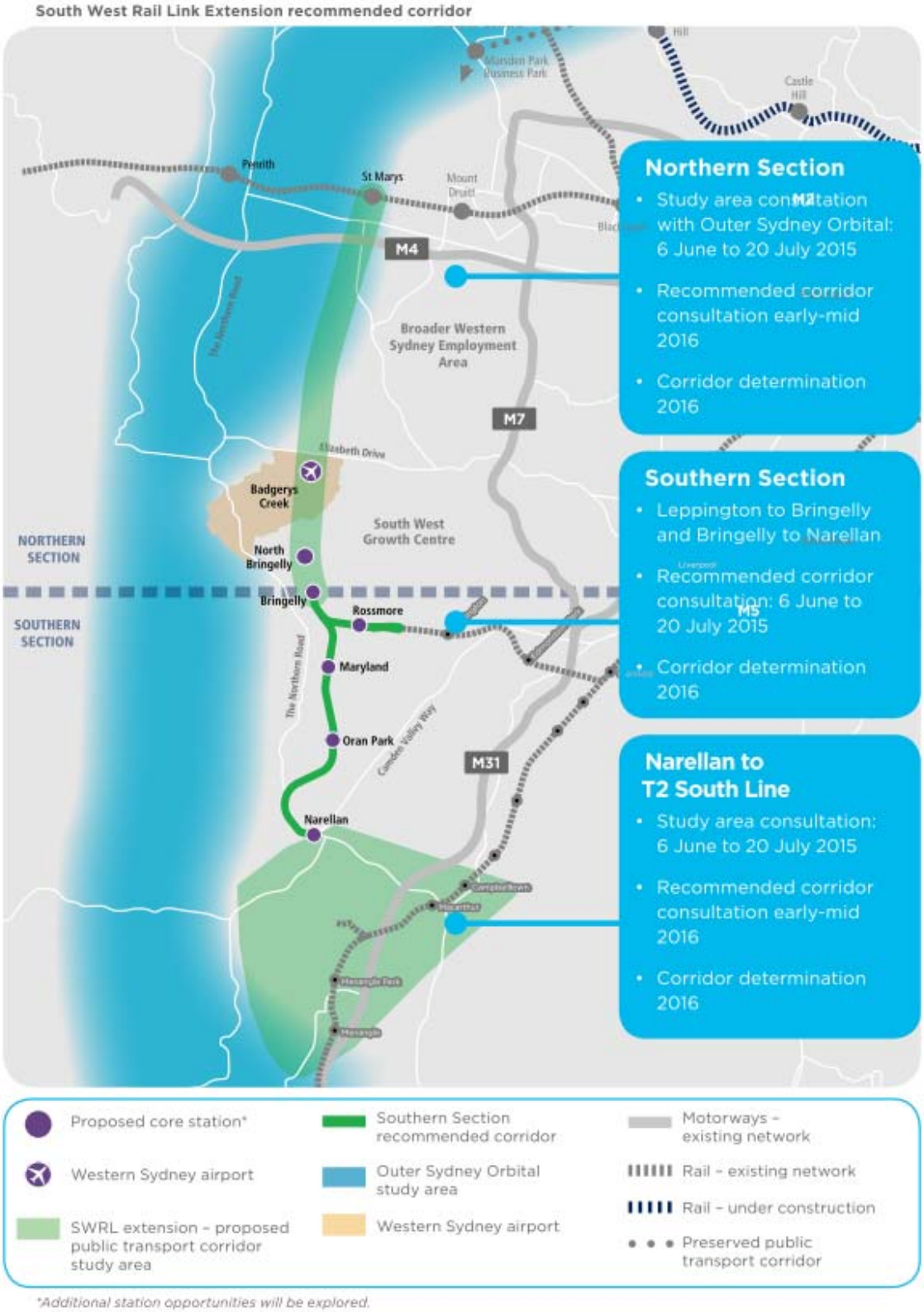
The assumed road network for the 2063 assessment year is generally consistent with the 2031 model, with the addition of the proposed Castlereagh Highway. The Castlereagh Highway would provide a new link between Bells Line of Road at Kurrajong, with the north-western section of the M7 Motorway near Dean Park. This new road link will provide two traffic lanes in each direction along the entire corridor. The Outer Sydney Orbital (while shown in Figure 8-1) is not included in the network and is subject to investigation by the NSW Government.

8.3 Public transport

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

The NSW Government has started planning for a continuation of the South West Rail Link to extend to Badgerys Creek and on to St Marys, where it would connect with Western Line services, as well as south to Narellan as shown in Figure 8-1.

Figure 8-1 Southwest Rail Link extension and Badgerys Creek Airport



Source: Transport for New South Wales 2014

8.4 Pedestrian and cycling facilities

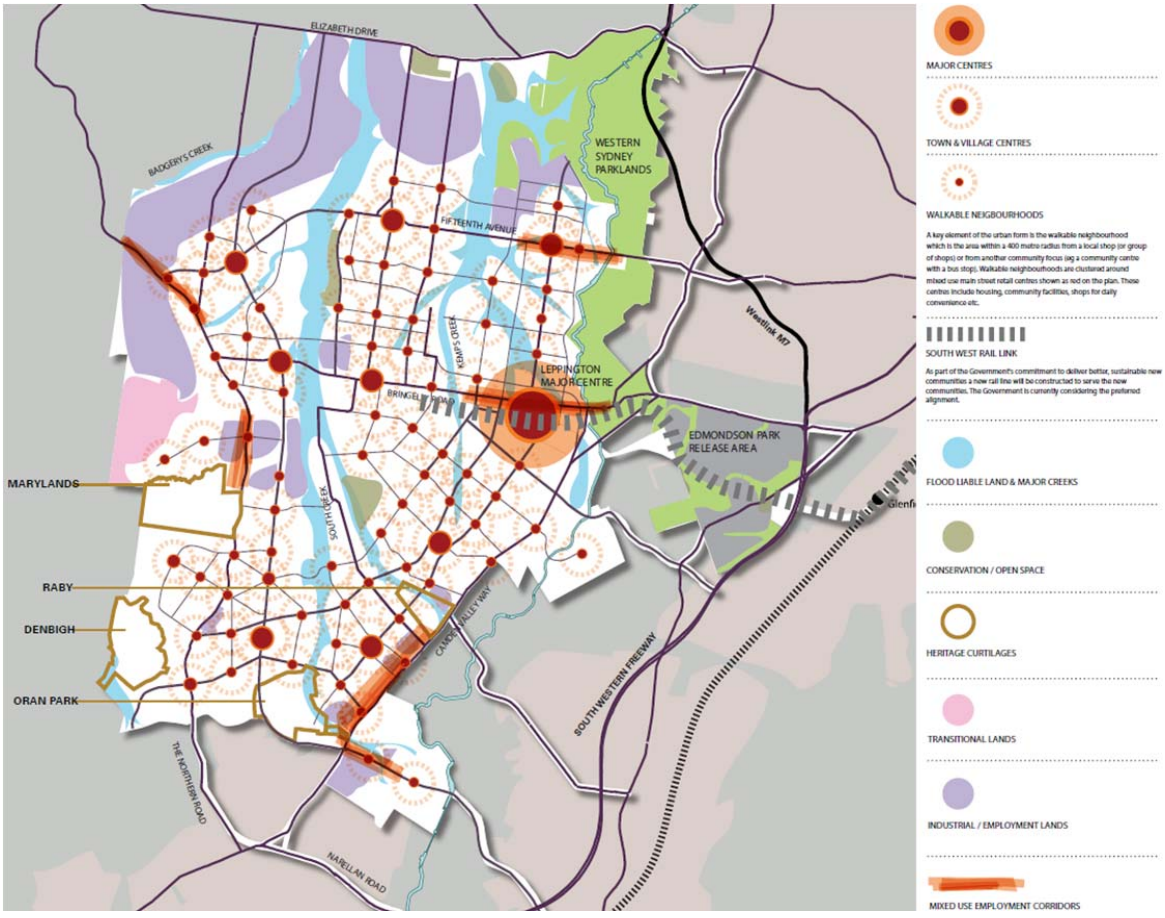
Future planned walking and cycling links in the vicinity of the airport site are identified in the South West Growth Centre Structure Plan and the BWSEA Structure Plan.

8.4.1 South West Priority Growth Area

The South West Growth Centre Structure Plan is shown in Figure 8-2, 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



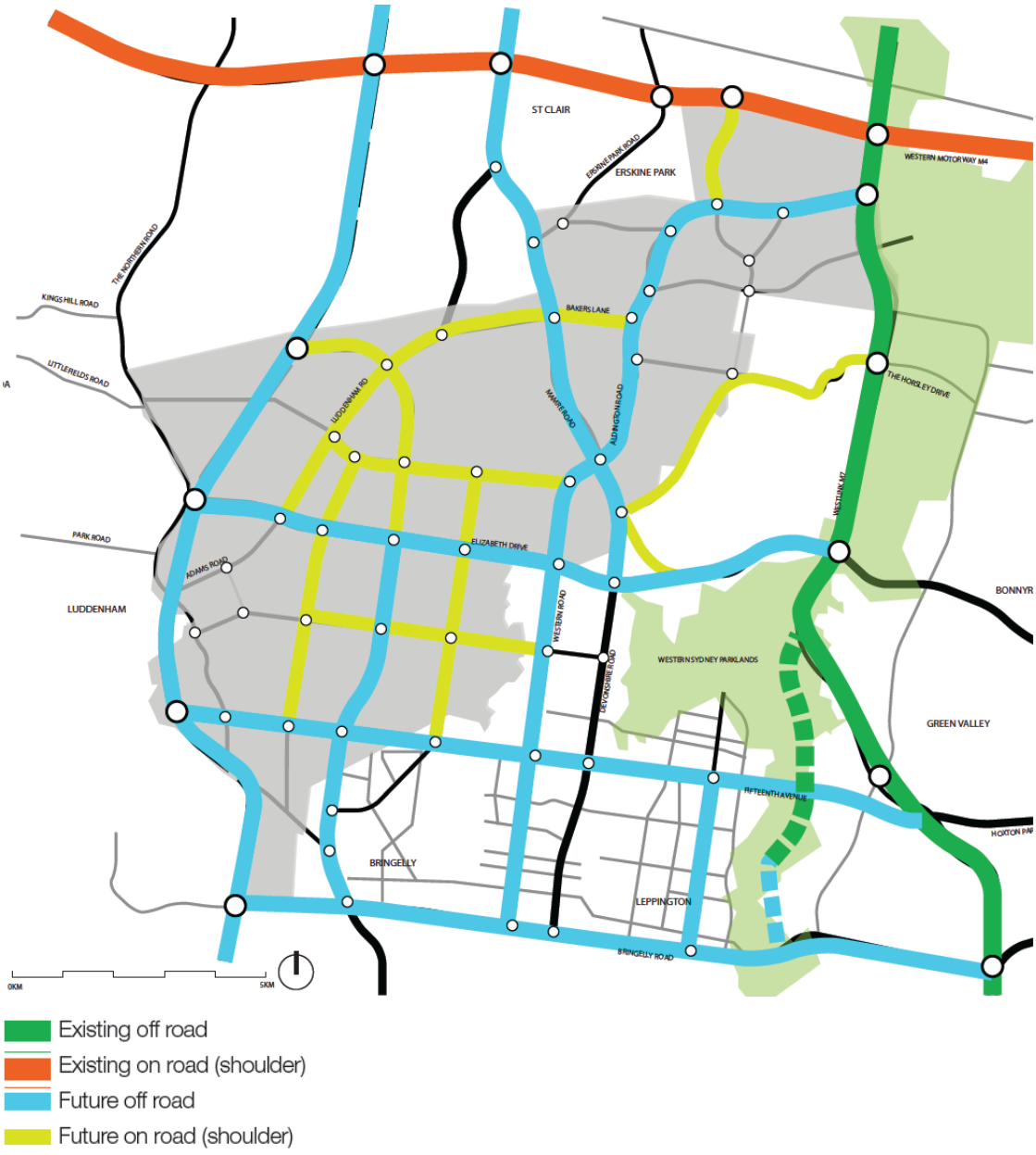
Source: http://growthcentres.planning.nsw.gov.au/LinkClick.aspx?fileticket=DIxdhdNT1b8%3d&tabid=91

8.4.2 Broader Western Sydney Employment Area

The proposed strategic bicycle network for 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 longer 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 longer 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 59,500 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 flight movements 2063

Design Day Passenger Air Traffic Movements	2063
Domestic Passenger flights	604
International Passenger flights	397
Total	**1,001**

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

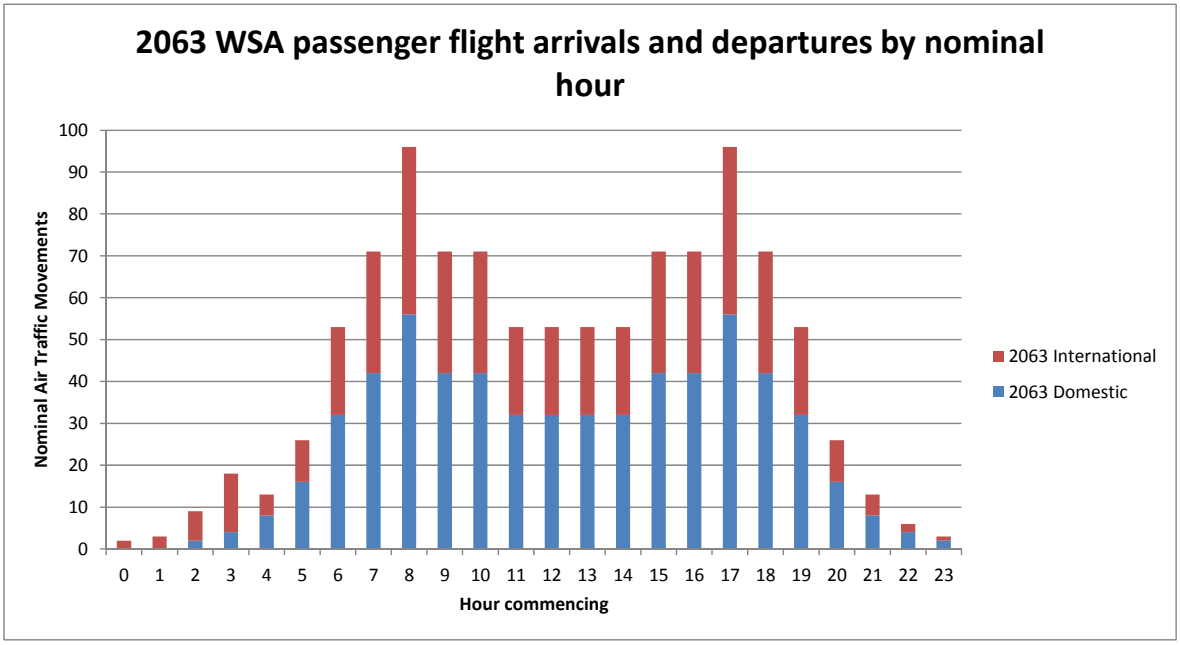
Table 9-2 Peak hour flight movements 2063

Peak hour flights	No flights	% of daily total
Arrivals (Domestic and International.)	46	4.6
Departures (Domestic and International)	48	4.8
Total	**94**	**9.4**

The operations of 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. Based on the high ratio of the peak hour to the other hours of the day there would be limited flights outside of the peak travel hours. A synthetic plane arrival and departure profile has been developed by the traffic and transport specialist team to account for the peak to non-peak profiling of flight arrivals and departures. This is shown in Figure 9-1.

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

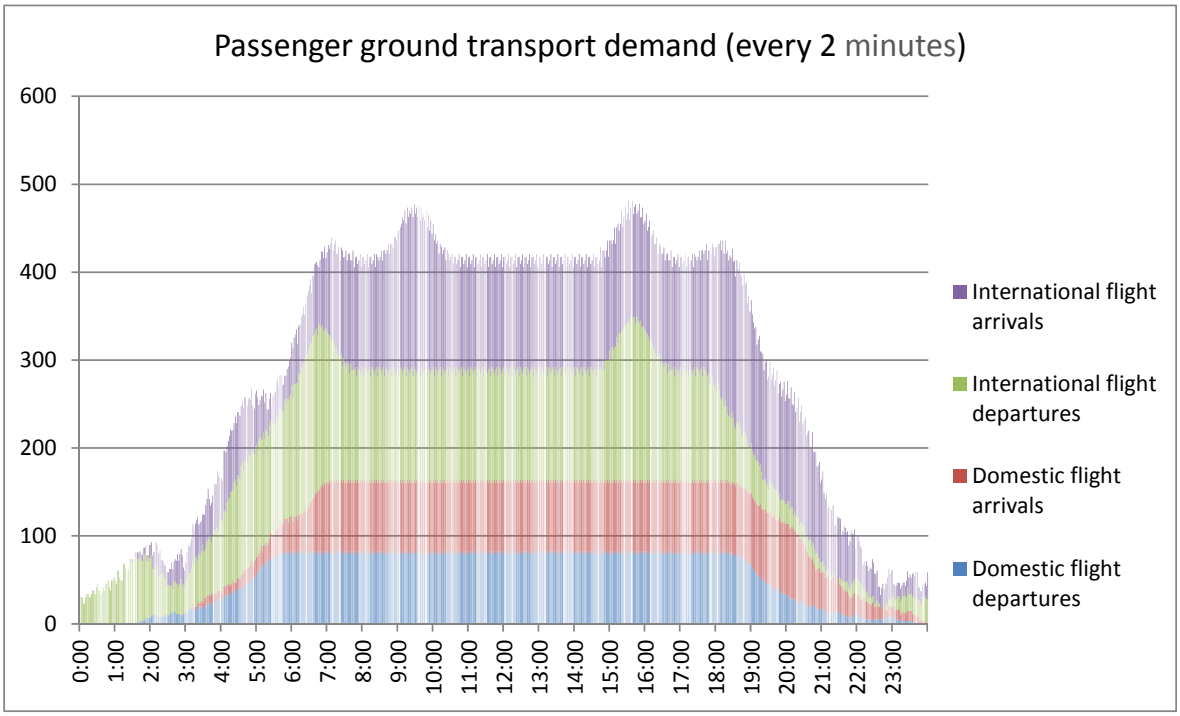
Figure 9-1 Synthesized 2063 daily flight profile



9.2.2 Passenger arrival profiles

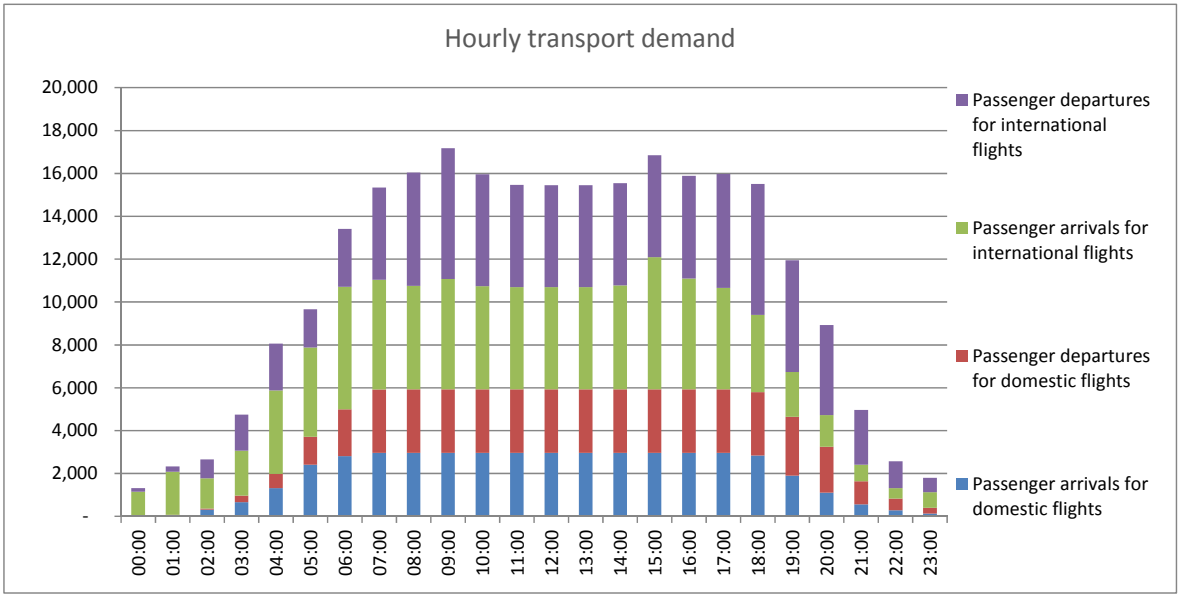
The two minute interval passenger profile for 2063 is shown in Figure 9-2.

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 Table 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%
Train	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
Train	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 Domestic air departures – ground arrival at the proposed airport

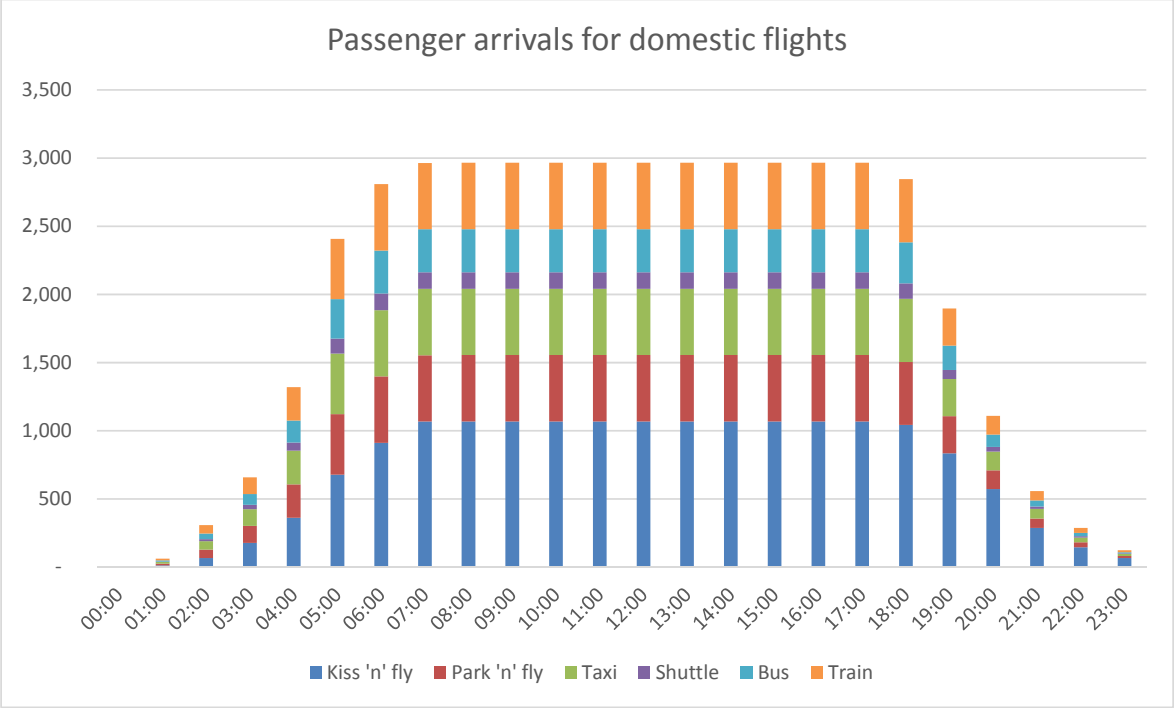


Figure 9-5 Domestic air arrivals – ground departure from the proposed airport

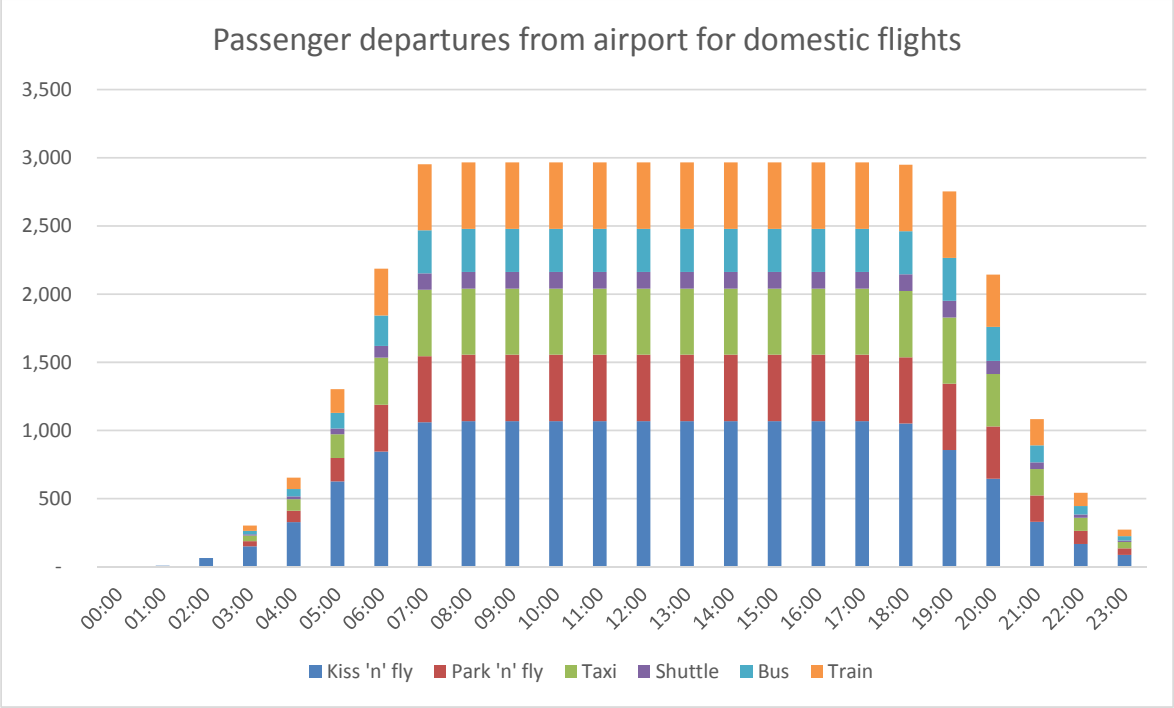


Figure 9-6 International air departures – ground arrival at the proposed airport

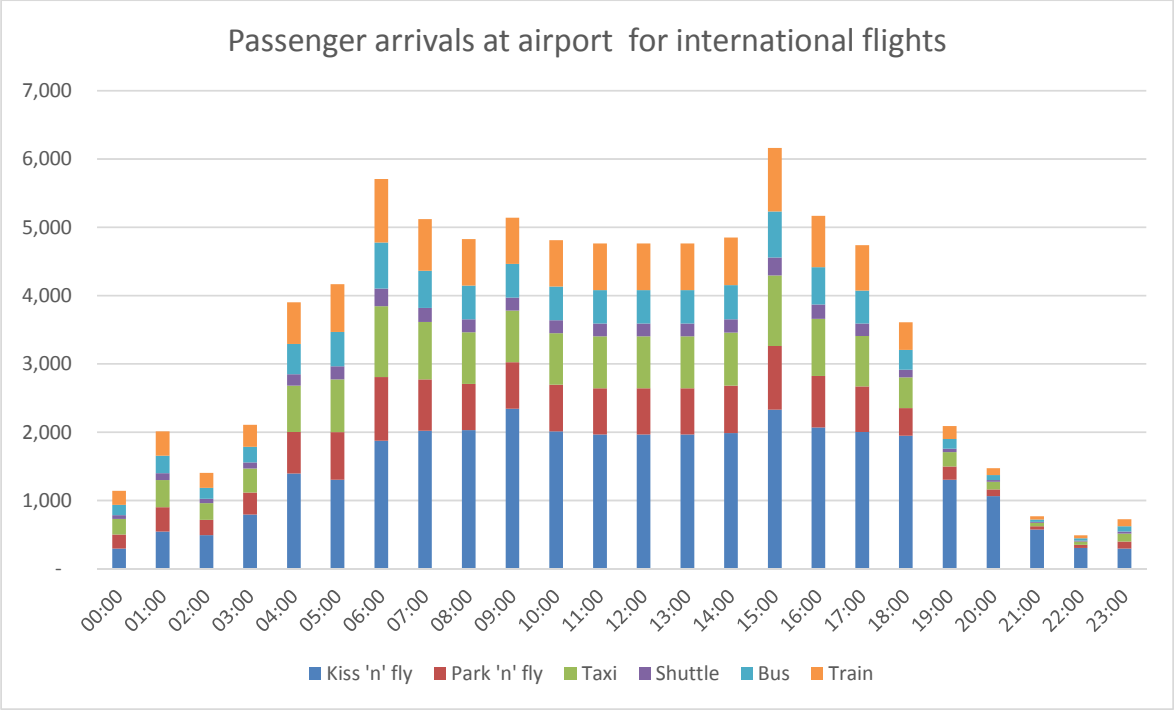


Figure 9-7 International air arrivals – ground departure from the proposed airport

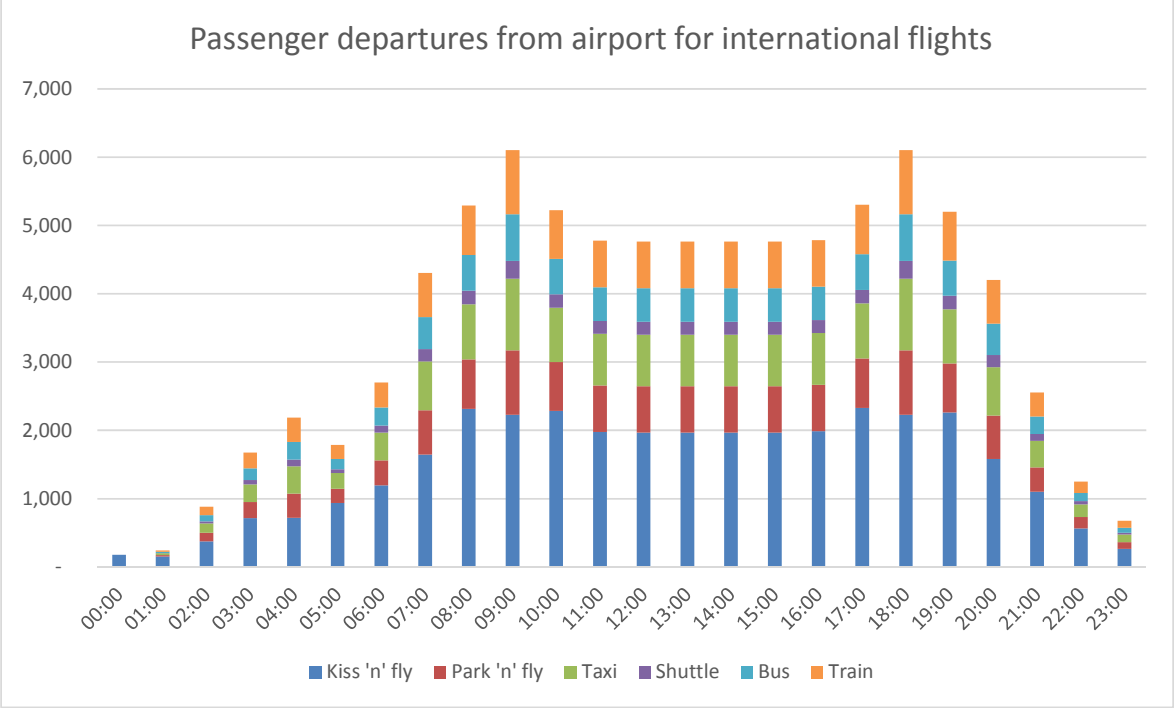


Figure 9-8 Total air departures– ground arrival at the proposed airport

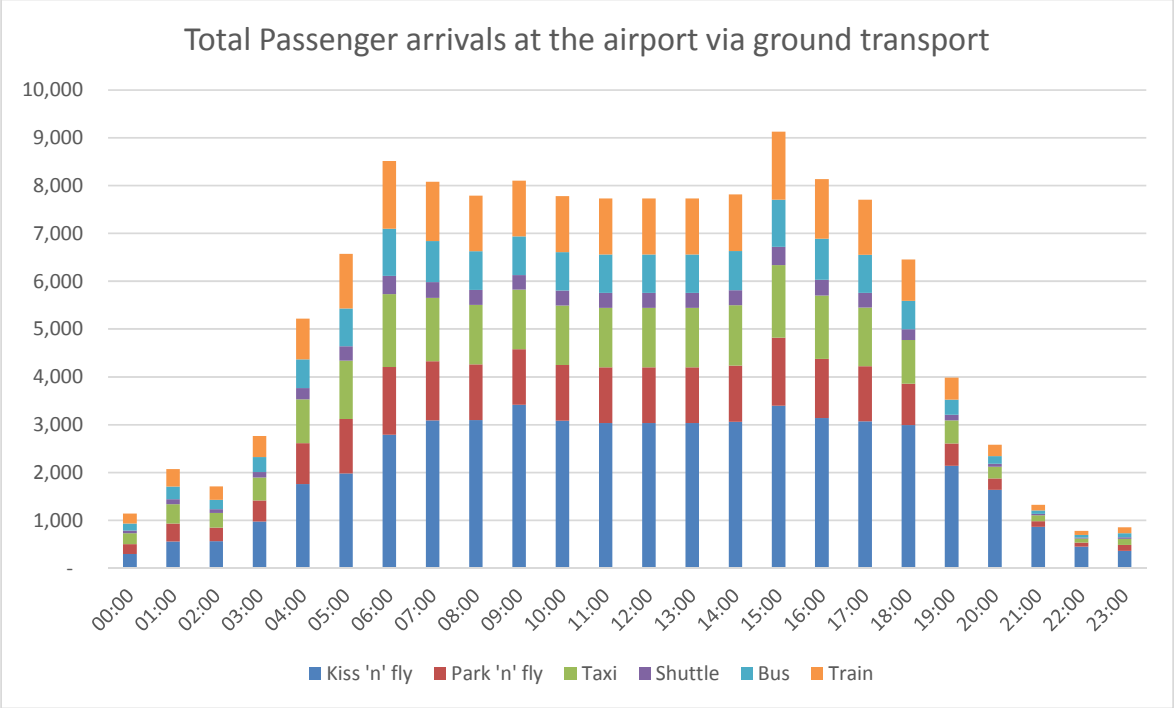
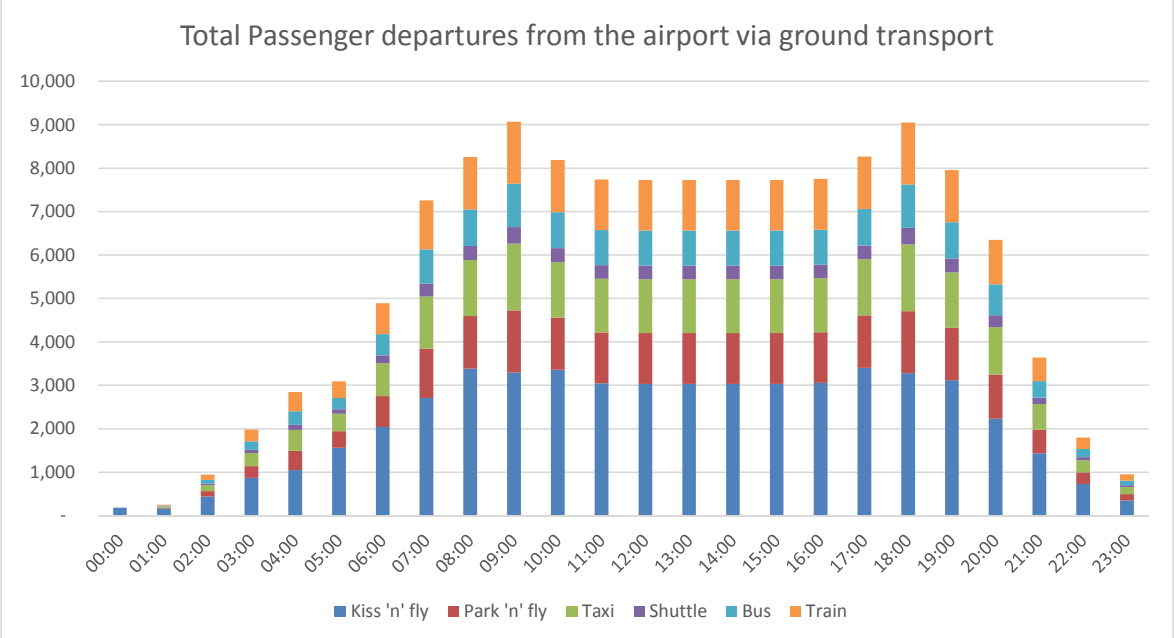


Figure 9-9 Total air arrivals – ground departure from the proposed airport



9.2.7 Traffic generation

The trips developed in section 9.2.6 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 9-15.

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

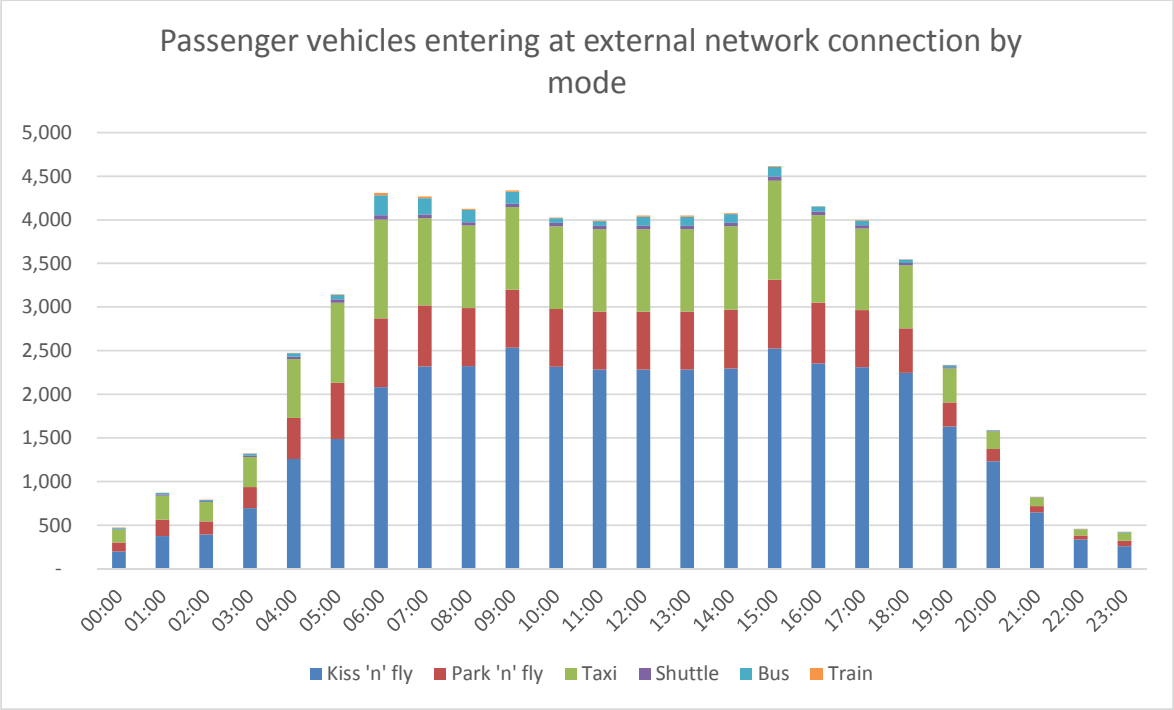


Figure 9-11 Passenger vehicles exiting at the northern airport boundary by mode

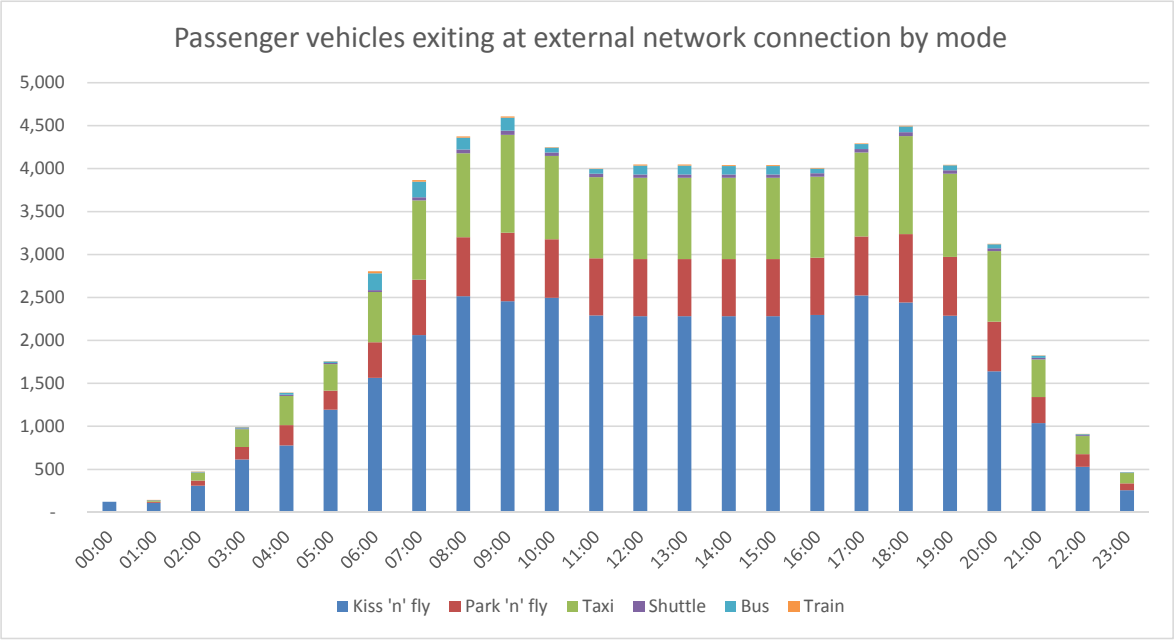


Figure 9-12 Passenger vehicles entering at the northern boundary by vehicle type

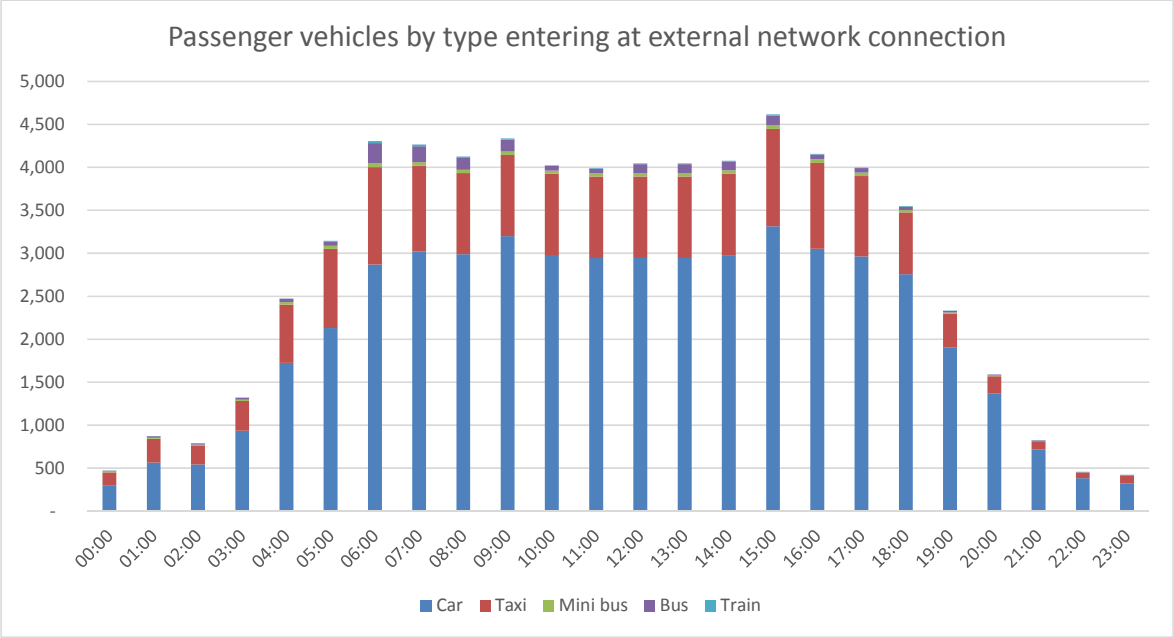


Figure 9-13 Passenger vehicles exiting at the northern boundary by vehicle type

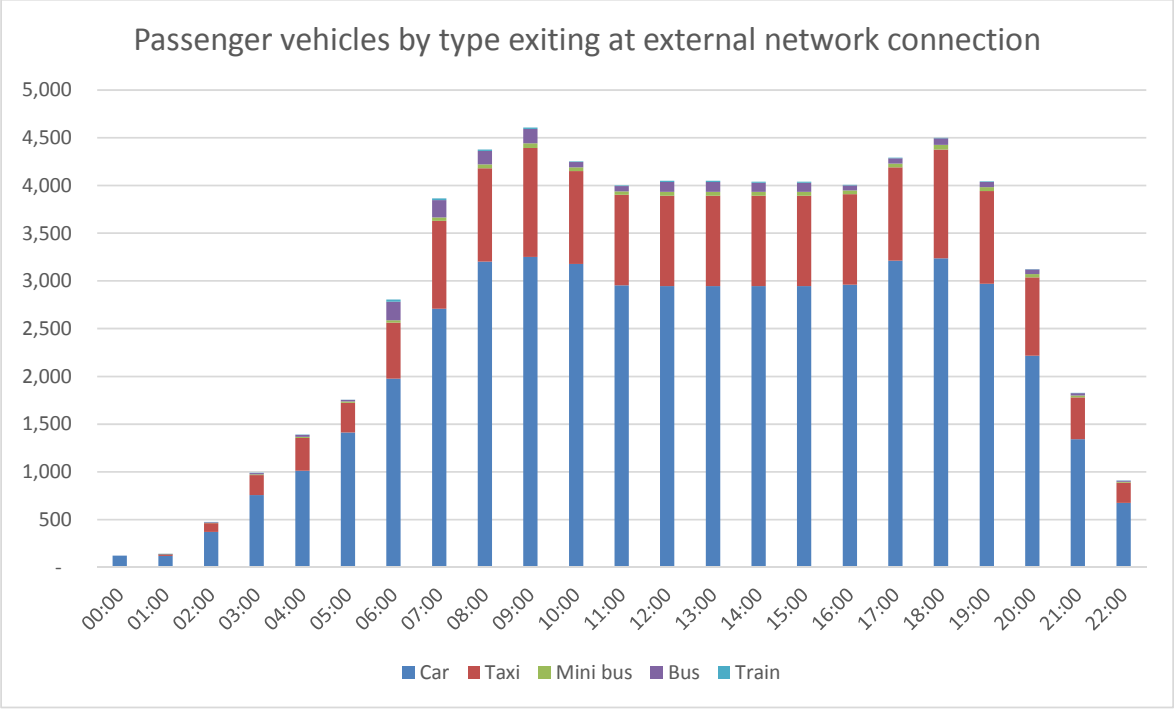


Figure 9-12 shows that the vehicle demand at 4,332 vehicles entering the proposed airport during the AM traffic peak on the external road network and 4,152 vehicles entering the proposed airport during the PM traffic peak on the external road network.

Figure 9-13 shows 4,361 leaving the proposed airport during the AM traffic peak on the external road network and 4,492 leaving the proposed airport during the PM traffic peak on the external road network.

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

Figure 9-14 Passenger vehicles arriving at the terminal and car park entrances

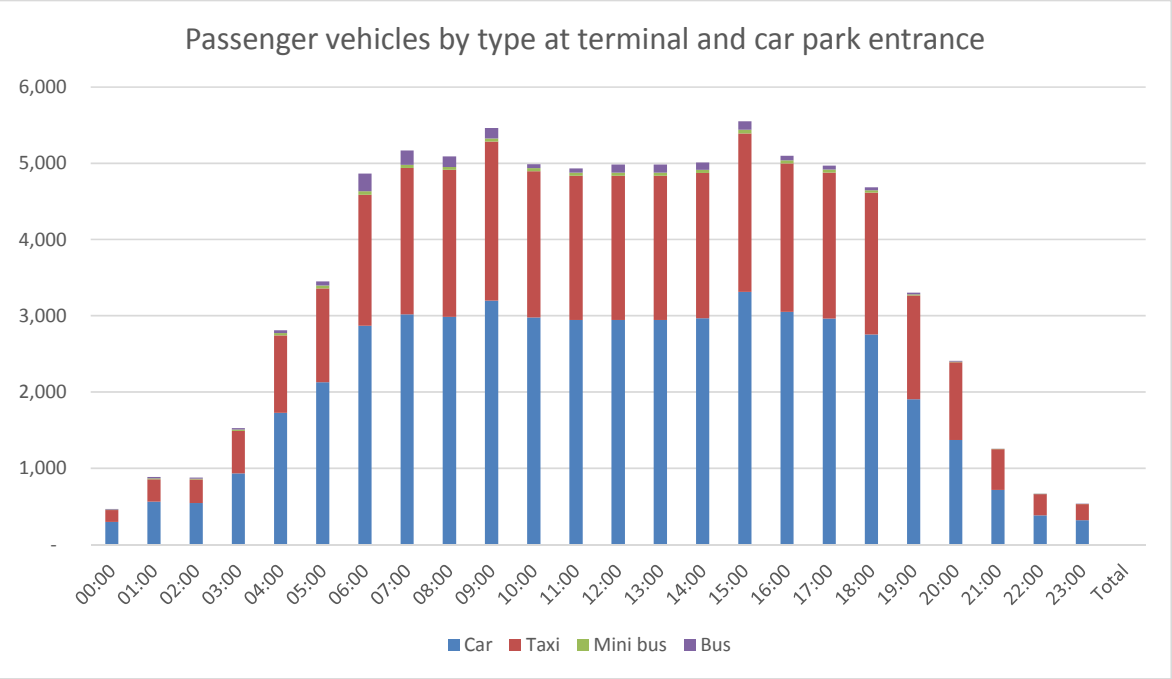


Figure 9-15 Passenger vehicles leaving at the terminal and car park exits

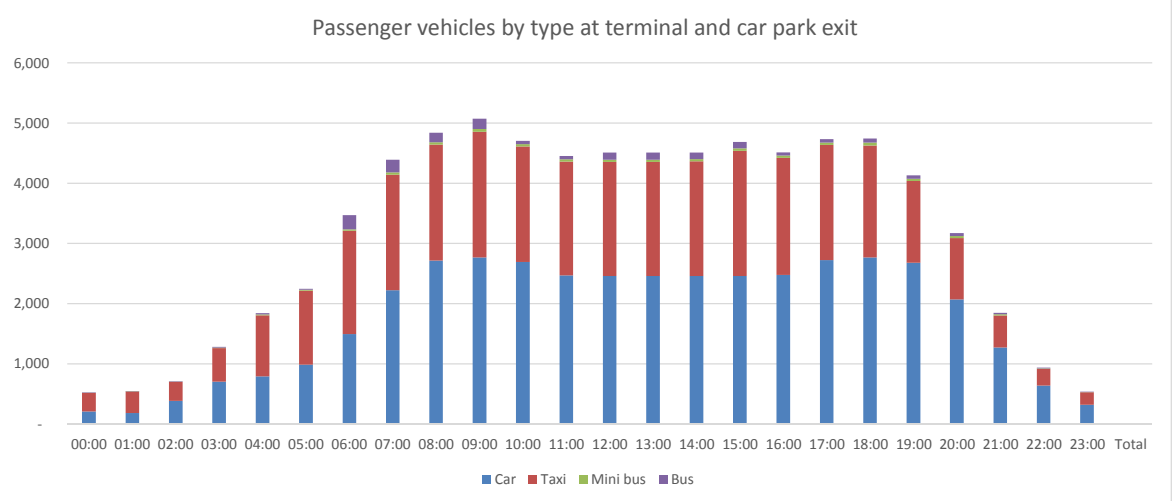


Figure 9-14 shows the vehicle demand entering the terminal area in the AM peak and vehicles entering the proposed airport during the PM peak.

Figure 9-15 shows the vehicle demand leaving the airport during the AM peak and leaving the proposed airport during the PM peak.

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 80 million annual passenger movements has been used for the analysis. This results in a total staffing requirement of 59,500. Applying the same 80 per cent staff on site ratio as in section 6.3.2, 47,392 staff will be on site in any one day.

Table 9-5 shows how these staff will be broken into the 10 employee groups.

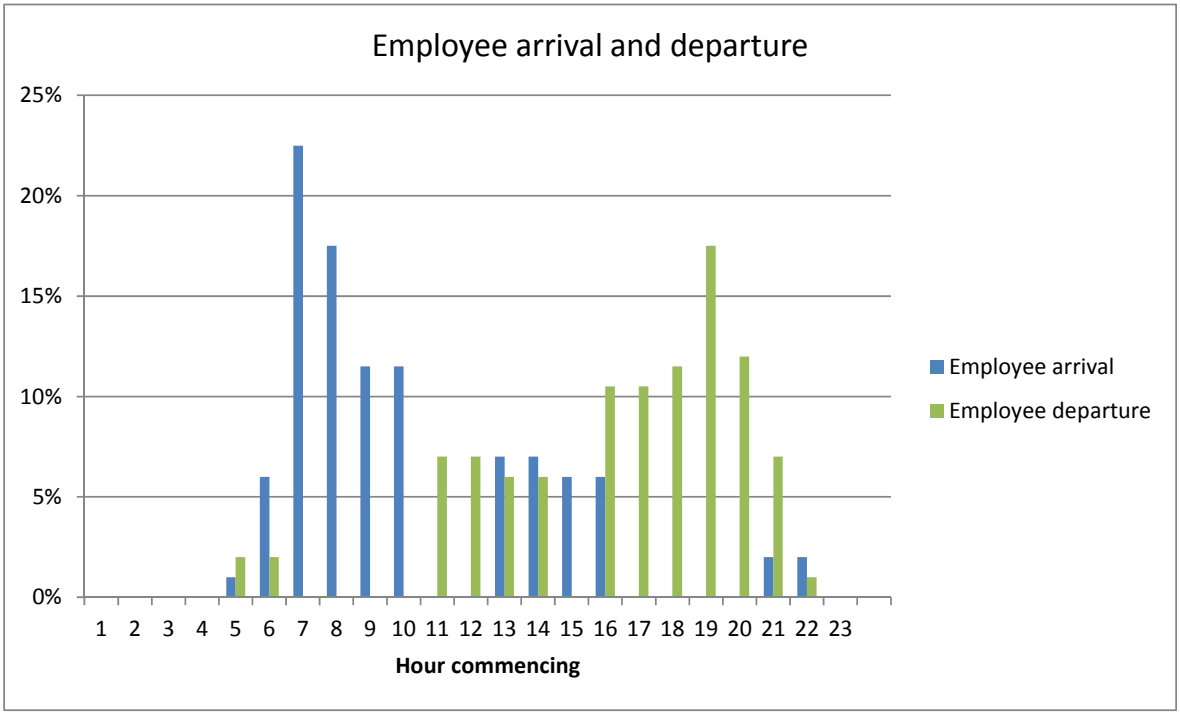
Table 9-5 Proposed WSA assumed 2063 shift profiles

Worker type	Start	Finish	Percent of total employees	No of employees on site
Airfield and terminal overnight	21:00	05:00	2	1,700
Airfield day	05:00	13:00	3	950
Airfield afternoon	13:00	21:00	3	950
Terminal support morning	06:00	13:00	10	4,760
Terminal support afternoon	13:00	20:00	10	5,712
Terminal supplementary morning	07:00	11:00	14	6,664
Terminal supplementary morning	15:00	17:00	14	5,712
Office early start	07:00	17:00	21	9,996
Office later start	09:00	19:00	23	10,948
		Total	**100**	**47,392**

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 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 9-16.

Figure 9-16 Employee arrival and departure profile - percentage



This translates into the volume of employees arriving and departing in each hour as shown in Figure 9-17.

Figure 9-17 Employee arrival and departure profile - volume

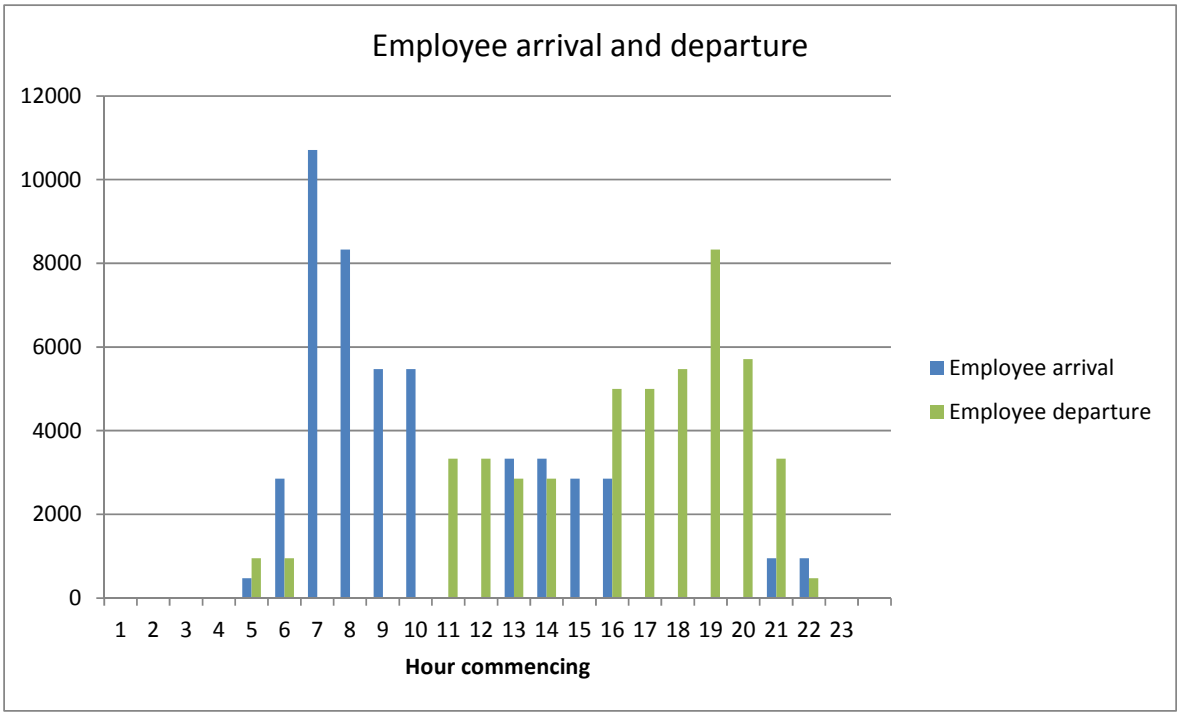


Figure 9-17 shows that the peak arrival for the AM peak period is 10,710 employees and the PM peak departure for employees is after the main transport network peak between 7 and 8 PM, with 8,330 employees leaving in this hour.

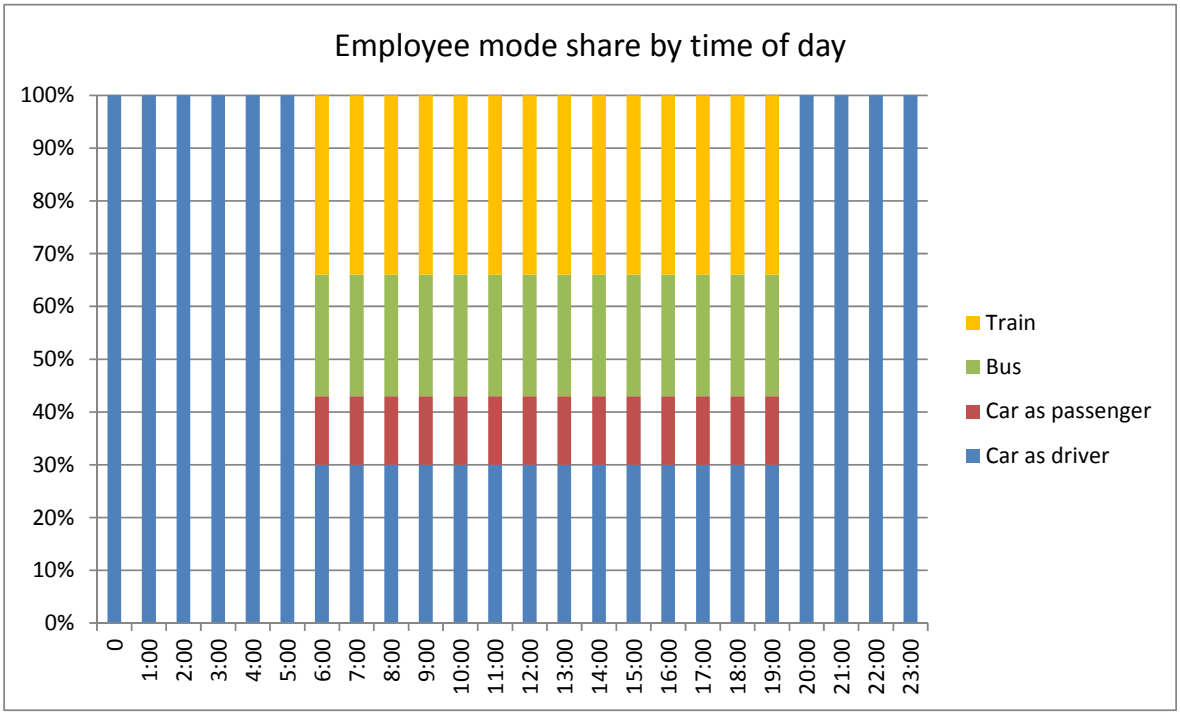
9.3.2 Mode split

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

- a base mode split based on section 6.3.5 was determined, with the addition of the 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 pm and 6 am are assumed to solely use cars, due to the lack of connectivity in the public transport system 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 9-18.

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



Using the distributions applied in the previous sections, the employee trips have been assigned to the employee modes. These are shown in Figure 9-19 and Figure 9-20 for arrivals and departures respectively.

Figure 9-19 Employee arrivals by mode by time of day

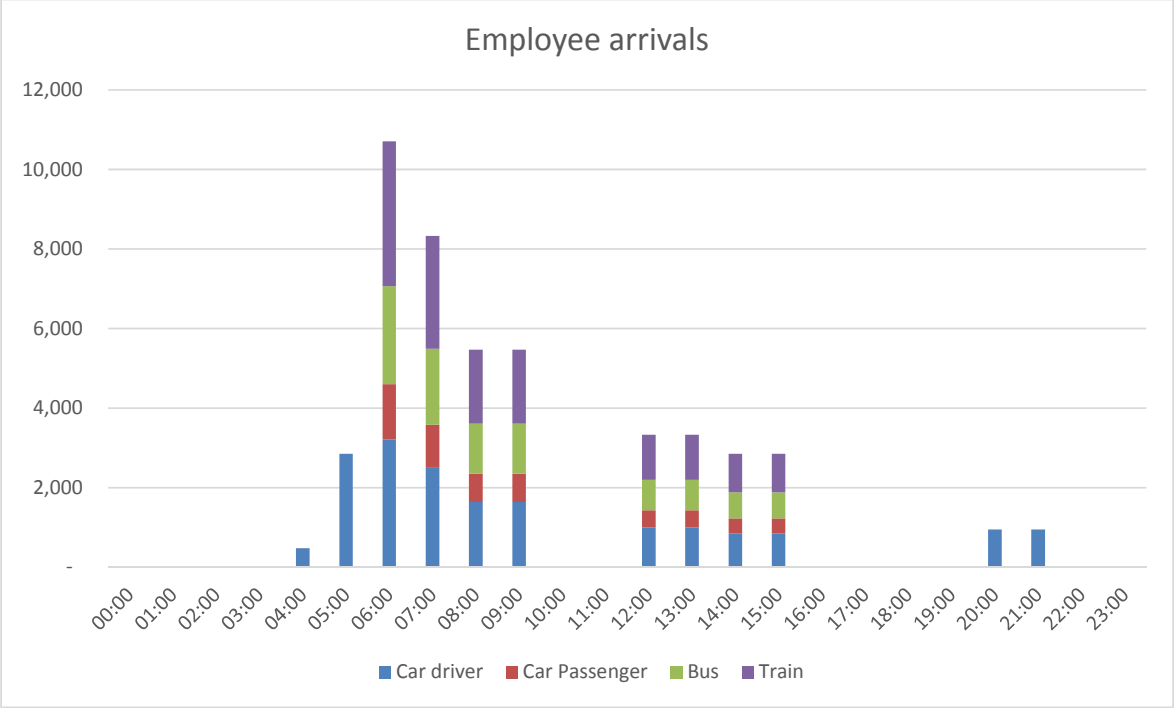


Figure 9-20 Employee departures by mode by time of day

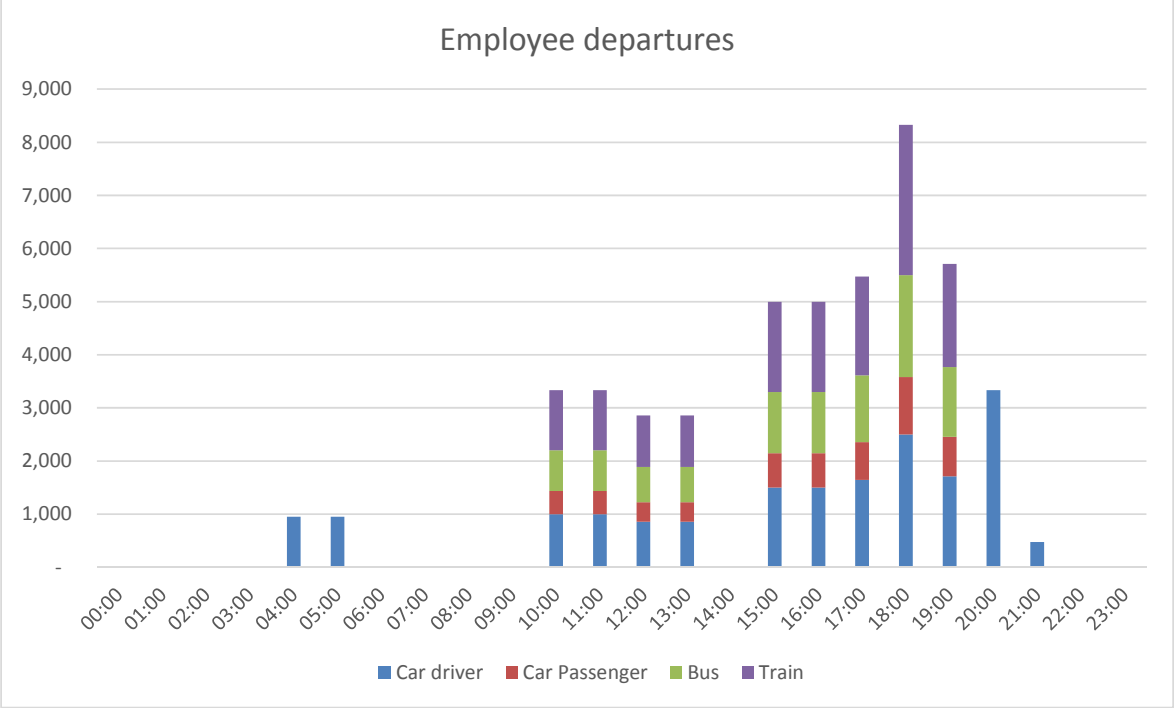


Figure 9-19 shows that the AM peak arrival volume for employees is 3,213 cars.

Figure 9-20 shows that the peak PM departure volume for employees is 3,332 cars.

9.3.3 Traffic generation

The traffic generation for employees is shown in Figure 9-21 and Figure 9-22.

Figure 9-21 2063 employee vehicle arrivals by mode

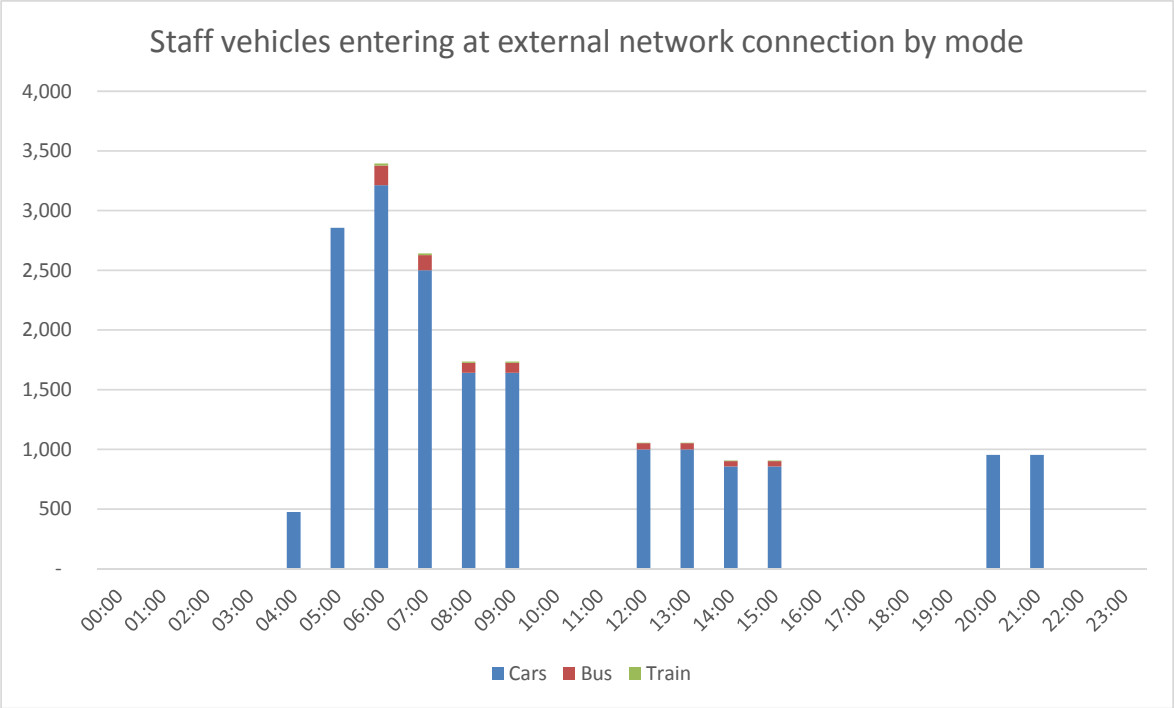


Figure 9-22 2063 employee vehicle departures by mode

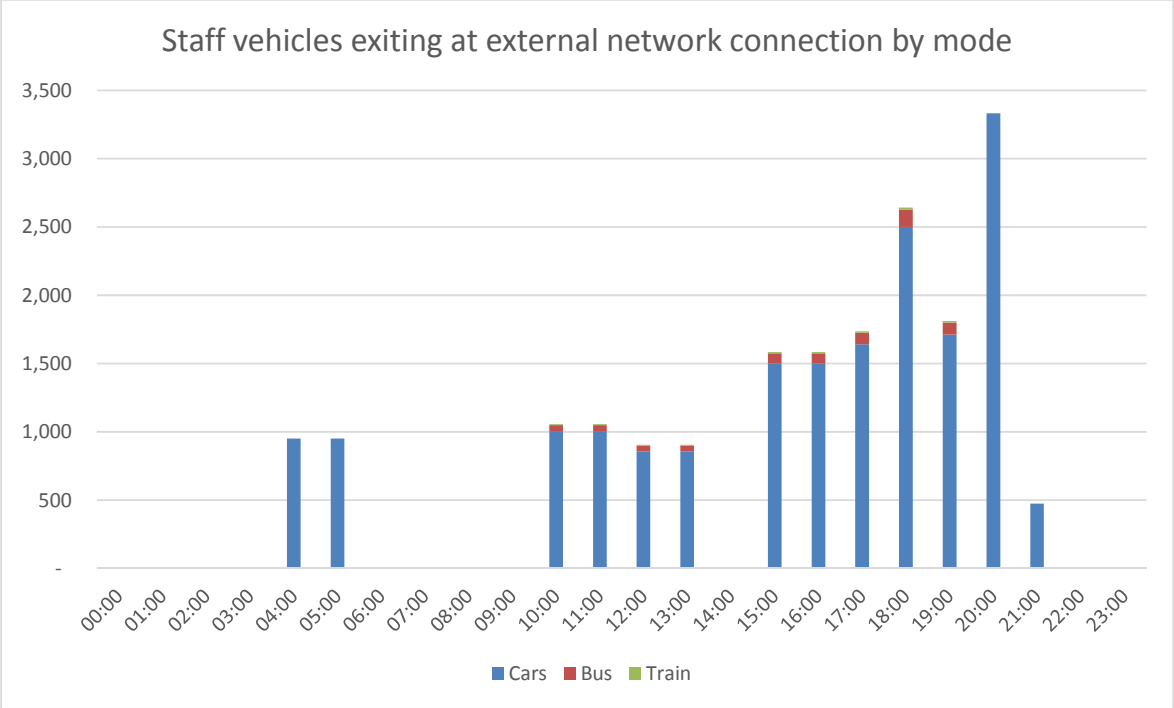


Figure 9-21 and Figure 9-22 show that the employee traffic generation peaks outside the main traffic peaks for the surrounding road network for both the arrival and departure of employees.

9.4 Combined air passenger and employee trip generation

The total employee trip generation for 2063 based on the total trips for each hour is shown in Figure 9-23 and Figure 9-24.

Figure 9-23 Total arrival trip generation by mode

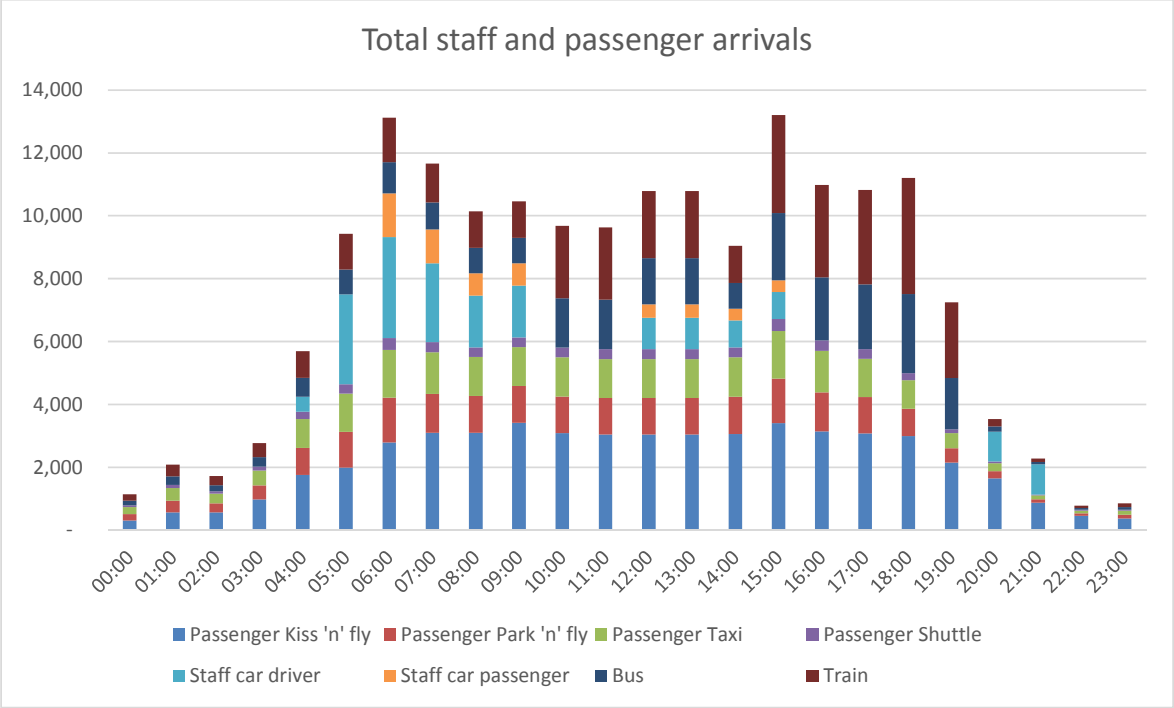


Figure 9-24 Total departure trip generation by mode

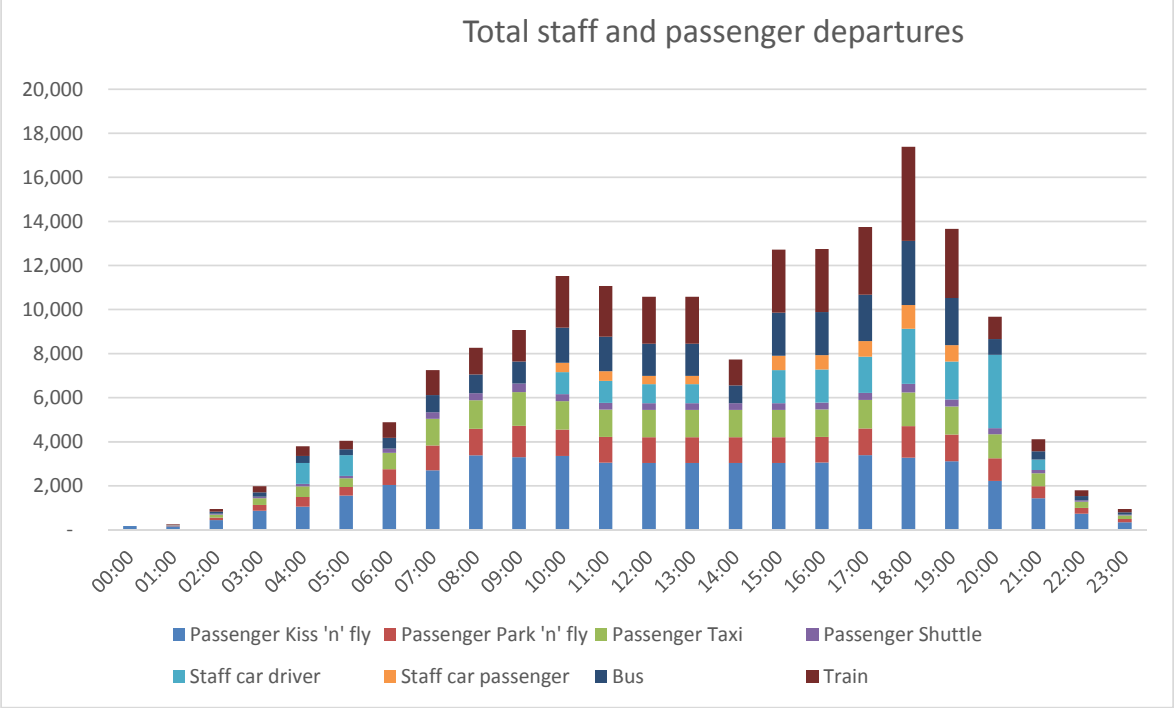
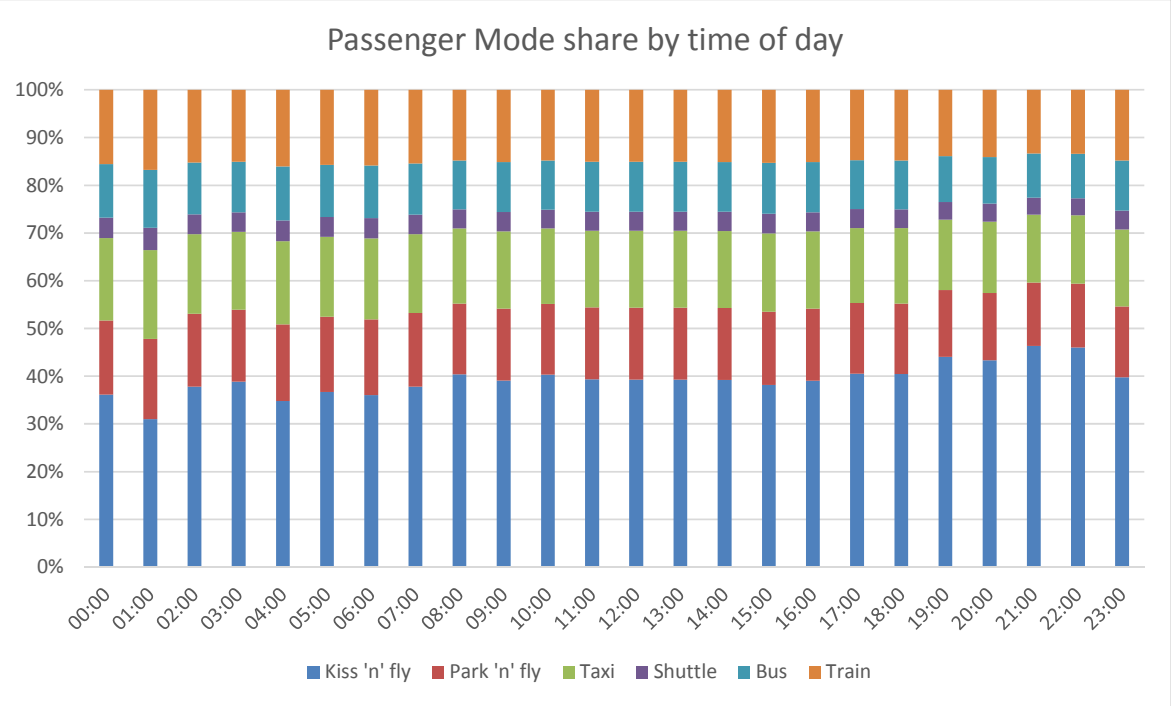


Figure 9-23 shows that the peak trip generation to the proposed airport occurs between 6 and 7 AM and is 13,122 trips.

Figure 9-24 shows that the peak trip generation from the proposed airport occurs between 6 and 7 pm and is 17,382 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 9-25.

Figure 9-25 Mode split across the day



9.5 Total air passenger and employee traffic generation

The trips identified in sections 9.2 and 9.3 and converted into traffic trips to and from the proposed airport are shown in Figure 9-26 to Figure 9-29.

Figure 9-26 Traffic generation to the main airport entrance by mode

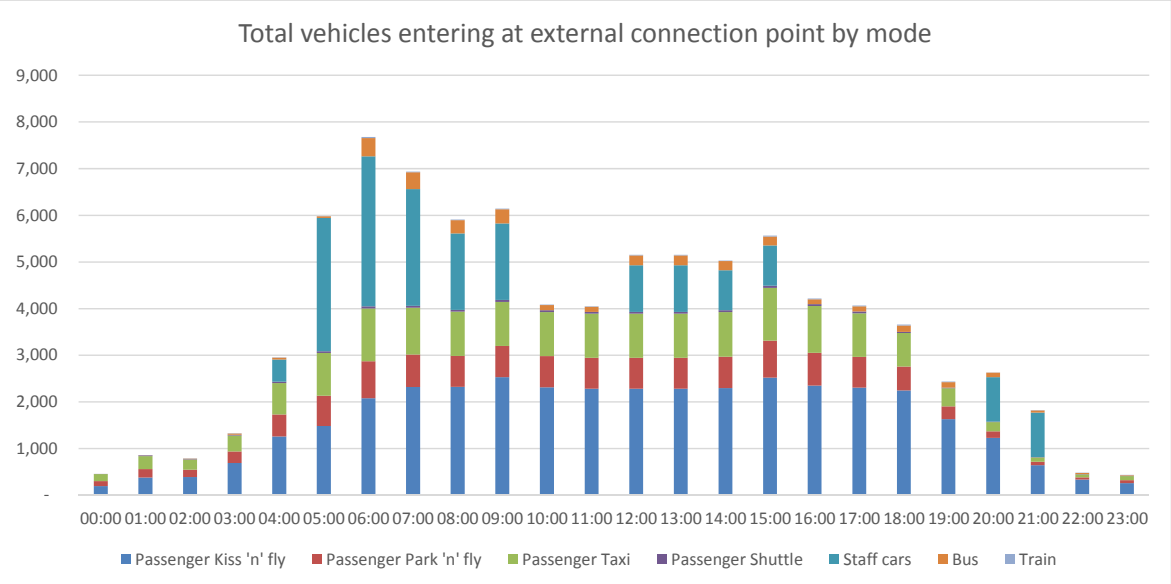


Figure 9-27 Traffic generation from the main airport entrance by mode

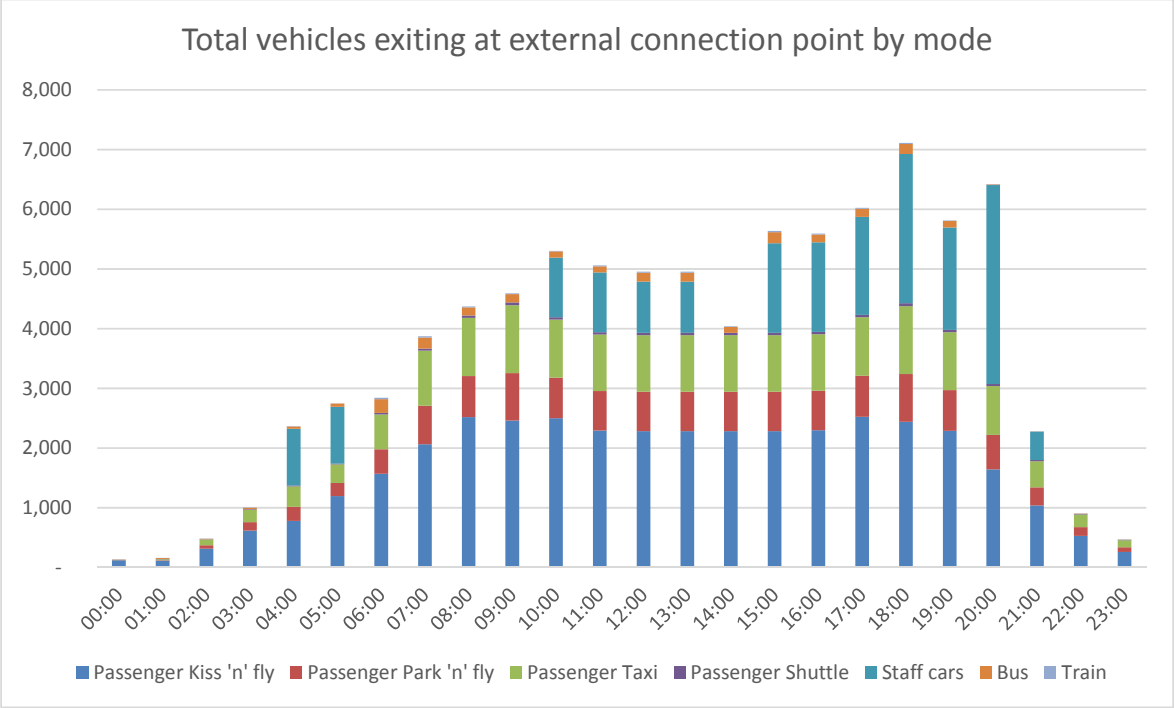


Figure 9-28 Traffic generation to the main airport entrance by vehicle type

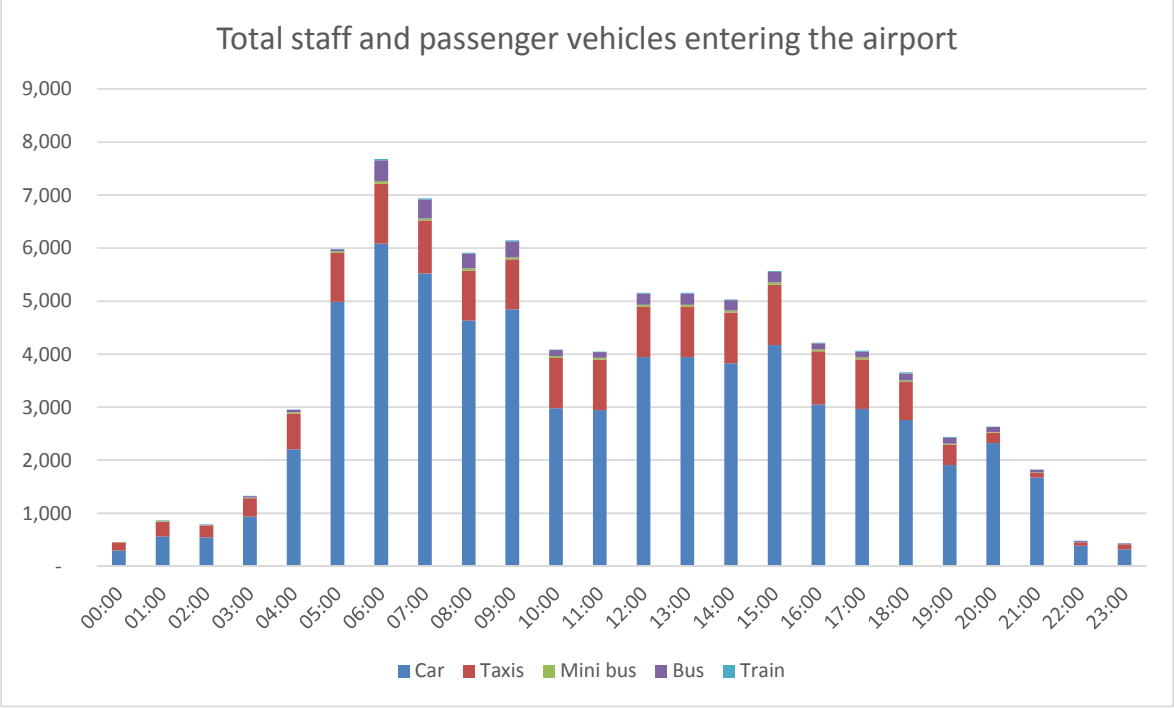


Figure 9-29 Traffic generation from the main airport entrance by vehicle type

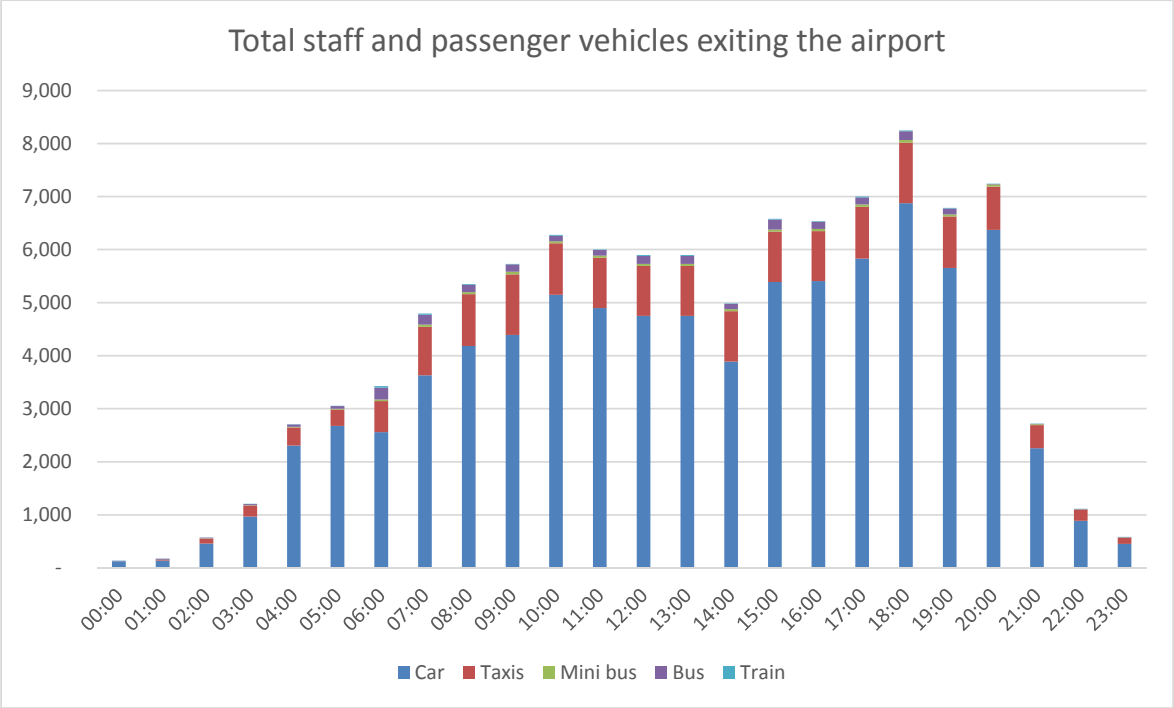


Figure 9-28 shows that the peak vehicle demand to the proposed airport is between 6 and 7 AM and is 7,608 vehicles per hour.

Figure 9-29 shows that the peak vehicle demand away from the proposed airport is between 6 and 7 PM and is 8,200 vehicles per hour.

9.6 Freight trip generation

Freight demand has been provided for air freight cargo 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 the traffic impacts of this demand. 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 1,021,210 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.

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	12.5
Semi-Trailer (19 metres long)	25	3	40
B-Double (23 -26 metres long)	10	5	56

It is anticipated that a fuel pipeline to the proposed airport will be completed by 2063, significantly 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)	112,603	308.50	12.85	25.71
Semi-Trailer (19 metres long)	13,534	37.08	1.54	4.63
B-Double (23 -26 metres long)	3,867	10.59	0.44	2.21

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. The figures are presented for the representative 2-hour periods used in STM3, with a 24 hour total. Table 9-8 provides the collation of traffic generation estimates developed in the section. The figures assume an operational rail line to the airport.

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

	AM Peak 2 hour	Interpeak 2 hour	PM Peak 2 hour	Evening 2 hour	24 Hour
Accessing Airport					
Passengers	8,034	7,969	8,351	7,345	66,504
Airport Workers	4,141	1,499	571	2,748	17,739
Freight (TNR)	26	79	39	171	834
Total (Accessing)	**12,201**	**9,547**	**8,962**	**10,263**	**85,077**
Egressing from Airport					
Passengers	7,887	8,121	8,071	7,342	66,385
Airport Workers	0	1,237	3,094	3,240	18,072
Freight (TNR)	26	79	39	171	834
Total (Egressing)	**7,914**	**9,437**	**11,205**	**10,753**	**85,291**

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 from the Airport was distributed using STM3. This calculates traffic distribution from first principles, by using the land use inputs combined with the generalised costs of travel from origin to destination zone. As such, this source is considered the best available for the proposed airport generation, considering the condensed timeframes for this stage of the study.

10. Operational impact assessment

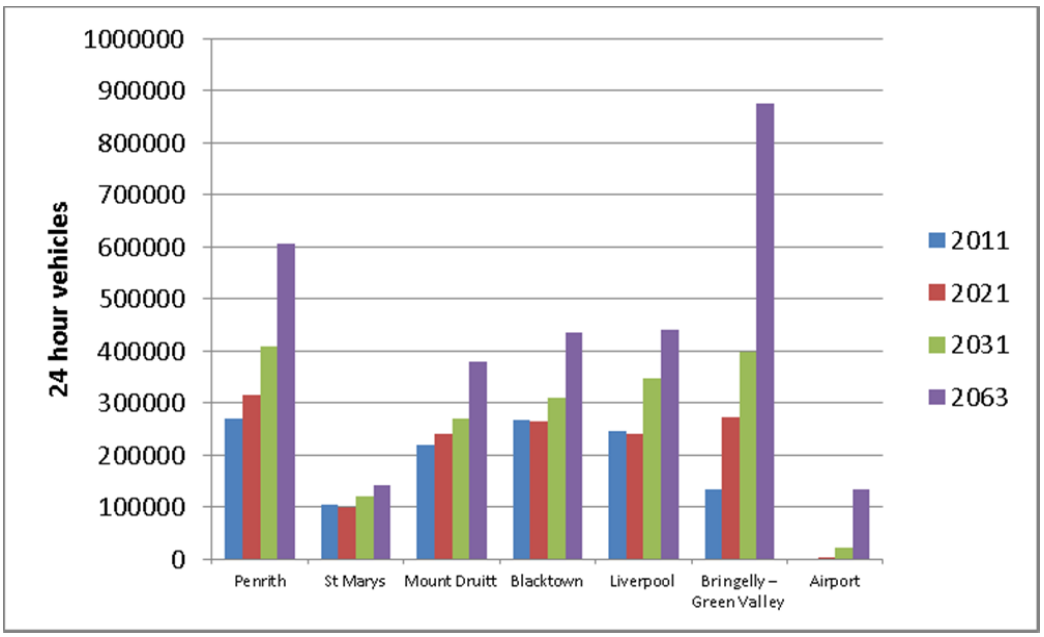
10.1 Background traffic growth

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 years, largely comprised of:

- South West Priority Growth Area
- Broader Western Sydney Employment Area
- Greater Macarthur Investigation Area
- the proposed Western Sydney Airport
- 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 the rail 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

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 Investigation Area (Bringelly/Green Valley). Although the proposed airport is projected to produce approximately 130,000 trips 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, either using the M12 or Elizabeth Drive. Freight would access the site from the south, from The Northern Road.

10.2 Future road network performance

Figure 10-2 and Figure 10-3 show the changes in traffic volumes in 2063 between the Do Minimum and With Airport scenarios. The differences are in pcu for the 2 hour peak periods.

The data in Figure 10-2 and Figure 10-3 show:

- the opening of the M12 within the model attracts traffic from the M4 corridor. However, for Elizabeth Drive, Bringelly Road and Fifteenth Avenue, the additional traffic that would be generated by the proposed airport overrides the reduction in volumes as a consequence of the M12 to create, in general, a net increase in the volumes on these east-west routes.
- The Northern Road, Luddenham Road and Mamre Road carry a significant additional amount of traffic as a consequence of the proposed airport.
- the proposed airport increases the volume of traffic on the north-south routes in the study area, including The Northern Road and Mamre Road, where no additional infrastructure is currently assumed over that proposed as part of the Western Sydney Infrastructure Plan.

Figure 10-2 2063 AM Peak Traffic Volume Difference plot (2 hour)

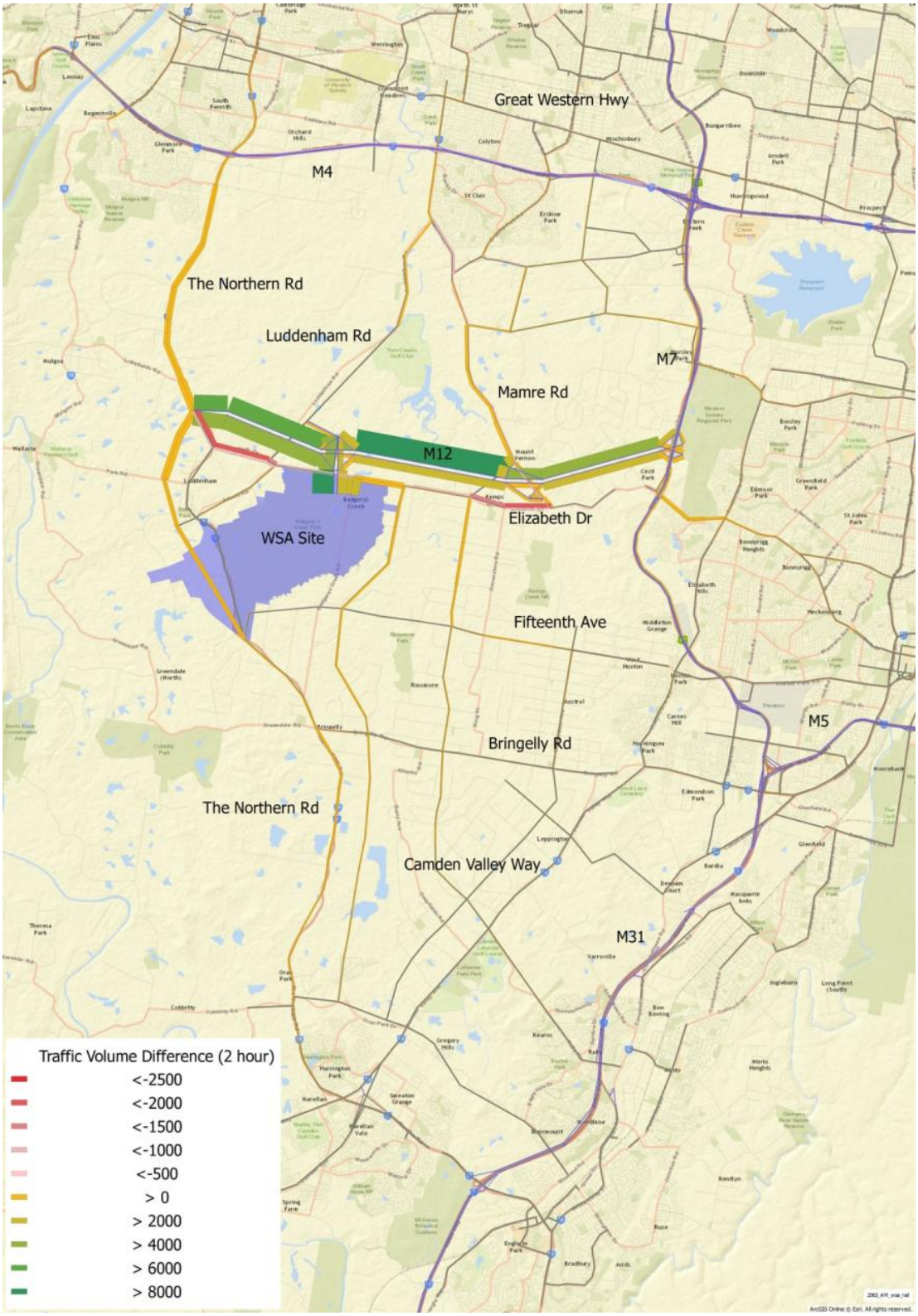
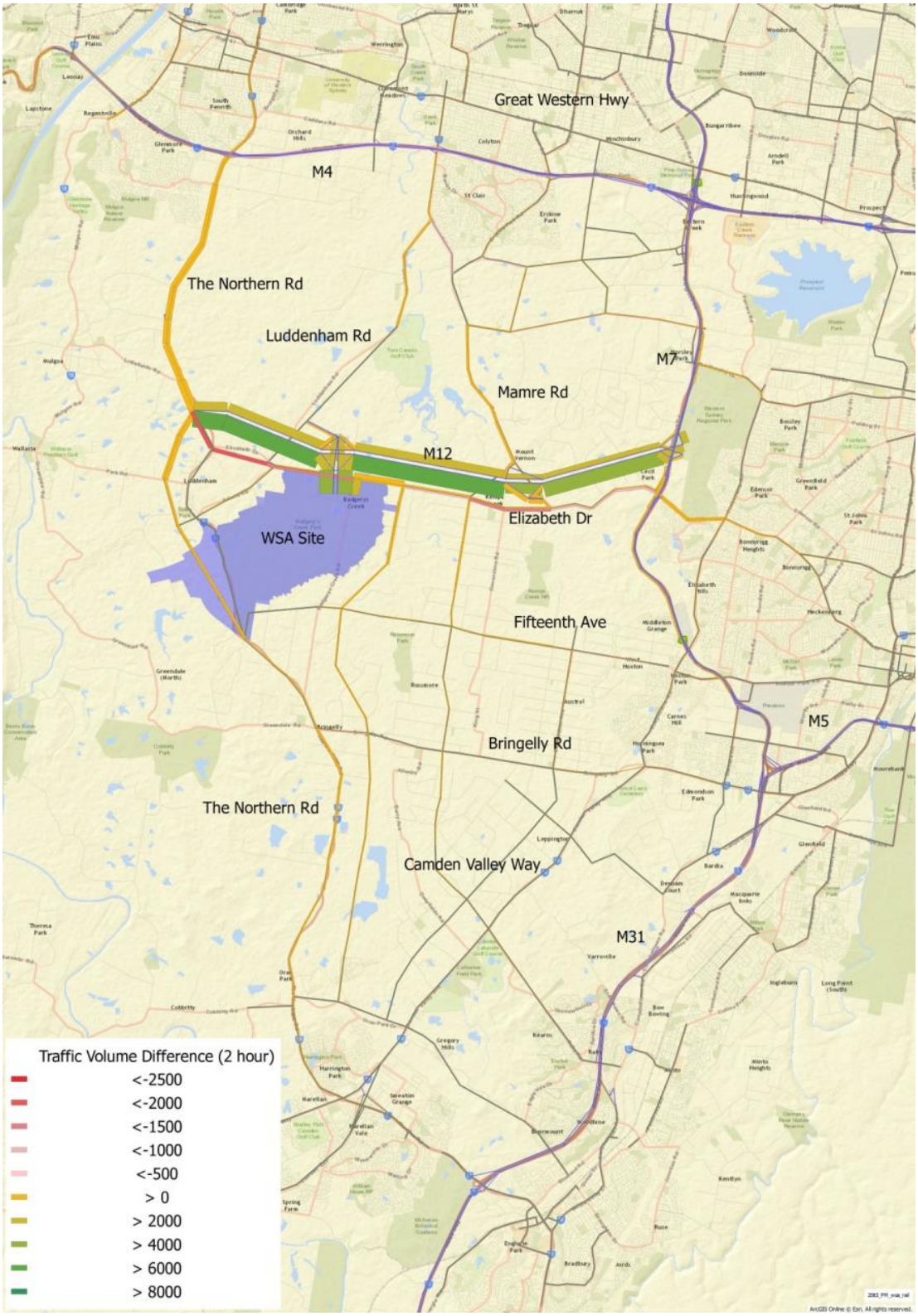


Figure 10-3 2063 PM Peak Traffic Volume Difference plot (2 hour)



10.3 Impacts on roads and access

An analysis has been carried out on the mid-block level of service for the Do Minimum and the With Airport scenarios. The Level of Service is shown figuratively in Figure 10-4, Figure 10-5 and Figure 10-6 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 10-4.

Figure 10-4 Location of Tabulated Level of Service output

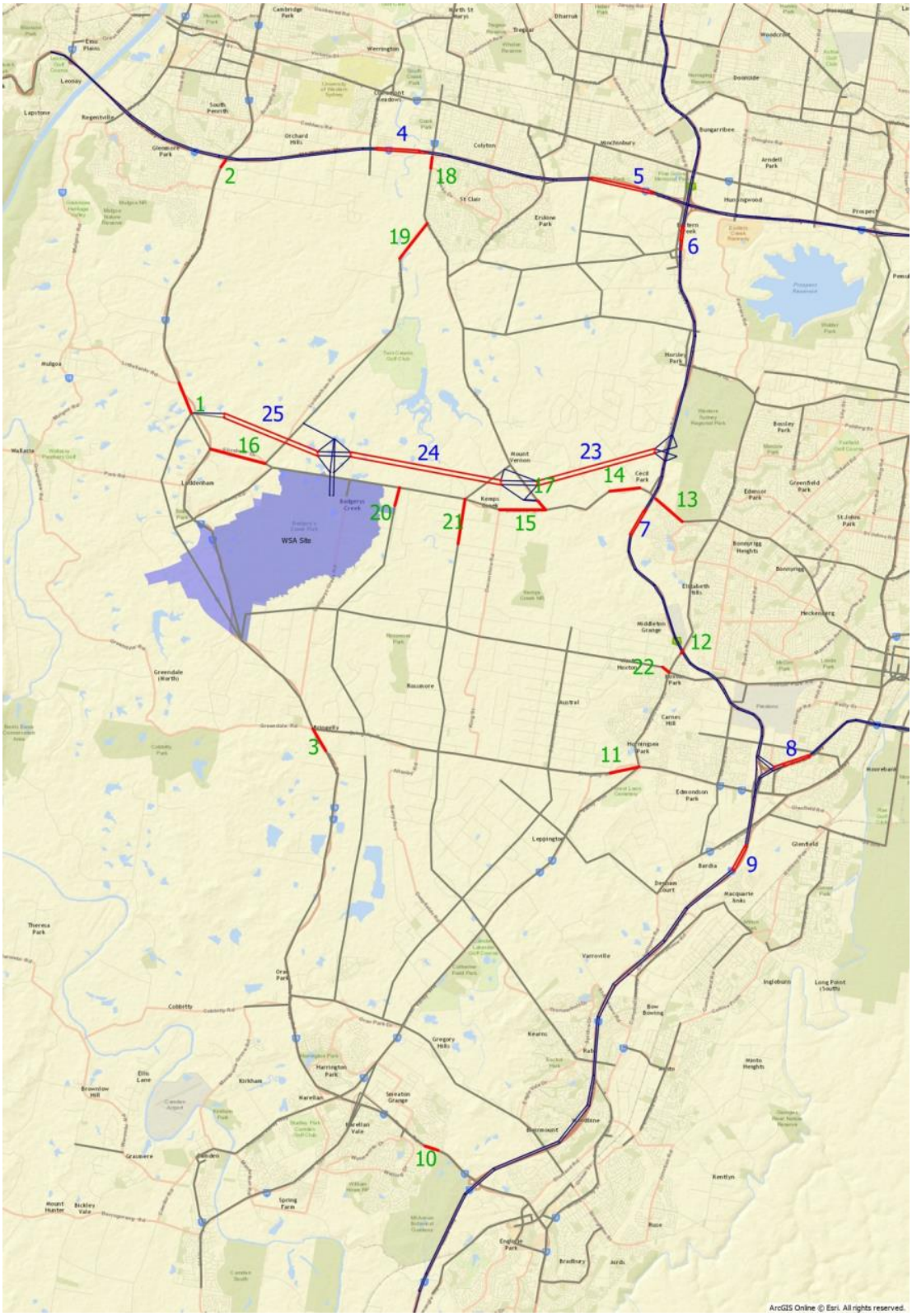


Table 10-1 Level of Service for 2063 With and Without Western Sydney Airport

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 Dr	C	C	C	C	**F**	**F**	**E**	**E**
2	The Northern Road	South of M4	F	D	D	F	F	D	**F**	F
3	The Northern Road	South of Bringelly Rd	D	C	C	F	**E**	**D**	**D**	F
4	M4	West of Mamre Road	F	E	E	F	F	**D**	E	F
5	M4	West of M7	F	E	D	F	F	E	D	F
6	M7	South of M4	F	F	F	F	F	F	F	F
7	M7	South of Elizabeth Drive	F	E	D	F	F	**F**	**E**	F
8	M5	East of M7	F	F	F	F	F	F	F	F
9	M31	South of Campbelltown Road	F	F	F	F	F	F	F	F
10	Narellan Road	North of Tramway Dr	F	F	F	E	F	F	F	E
11	Bringelly Road	West of Cowpasture Road	F	D	D	F	F	D	D	F
12	Cowpasture Road	At M7	F	F	E	F	F	F	E	F
13	Elizabeth Dr	East of M7	F	F	E	E	F	F	**F**	**F**
14	Elizabeth Dr	West of M7	F	E	D	F	F	**D**	D	**D**
15	Elizabeth Dr	West of Mamre Road	F	C	C	F	F	C	C	**E**
16	Elizabeth Dr	East of the Northern Road	C	A	A	C	**B**	A	A	A
17	Mamre Road	North of Elizabeth Dr	F	C	C	F	F	**F**	**D**	F
18	Mamre Road	South of M4	F	F	F	E	F	F	F	E
19	Luddenham Dr	West of Mamre Road	F	C	C	F	F	**F**	**D**	F
20	Lawson Rd	South of Elizabeth Dr	F	A	B	F	F	**C**	**C**	F
21	Western Rd	South of Elizabeth Dr	F	B	C	F	F	**C**	C	F
22	Fifteenth Ave	West of Cowpasture Rd	F	B	B	E	F	B	B	E
23	M12	West of M7	-	-	-	-	B	A	A	C
24	M12	West of Mamre Road	-	-	-	-	D	A	A	C
25	M12	East of the Northern Road	-	-	-	-	C	C	A	C

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

Figure 10-5 2063 AM Peak Volume/Capacity - Do Minimum (Left), with proposed Airport (Right)

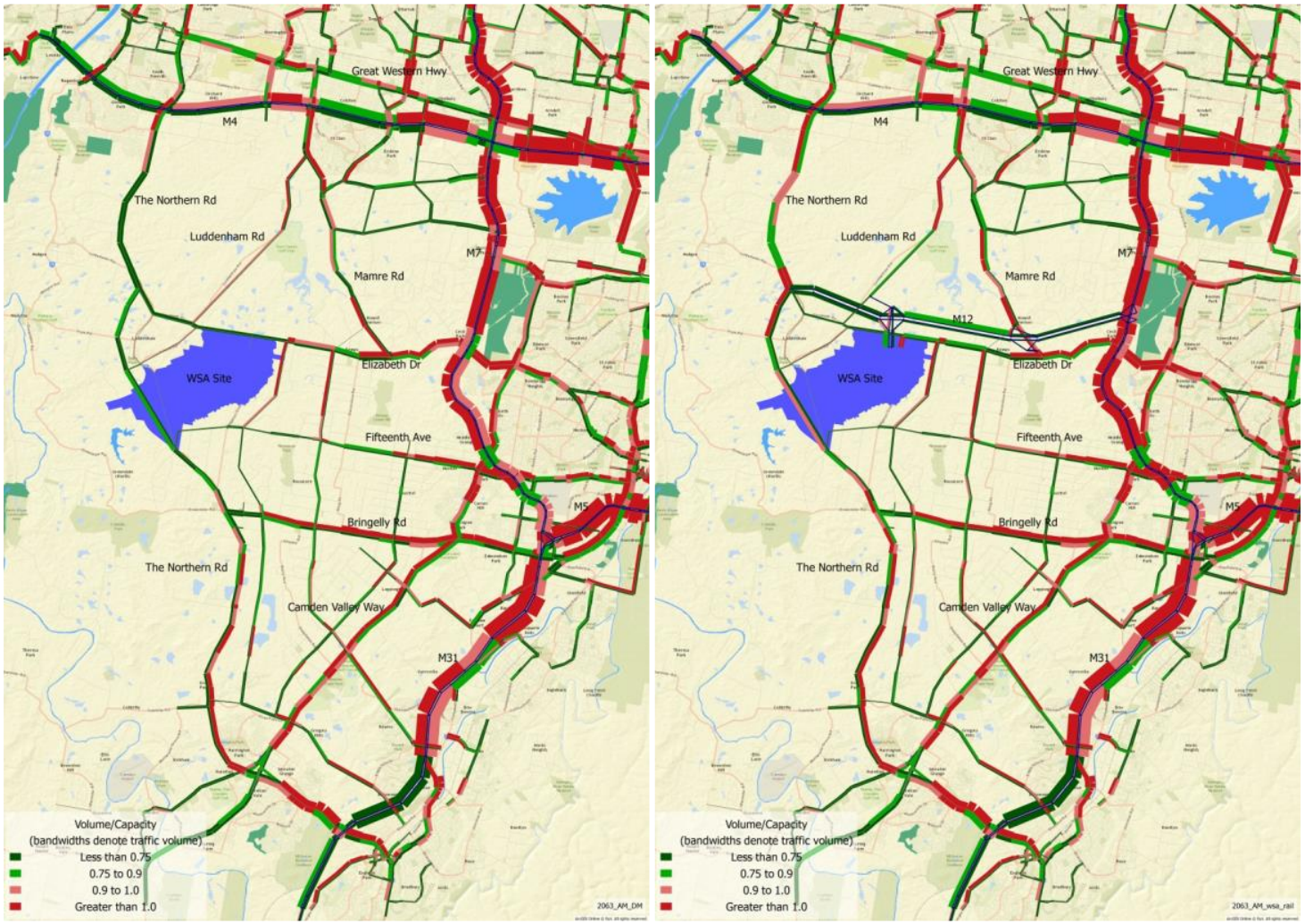
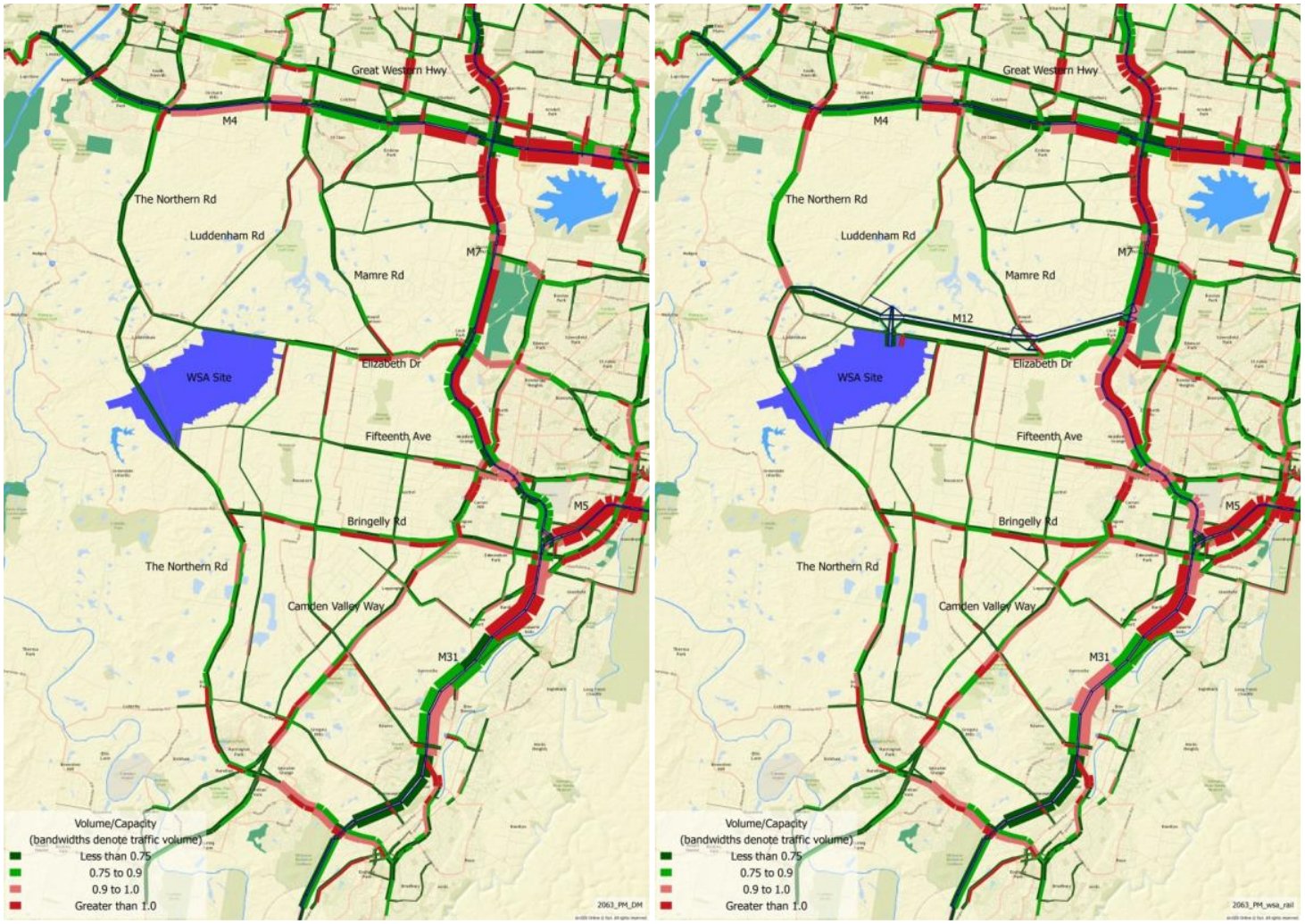


Figure 10-6 2063 PM Peak Volume/Capacity - Do Minimum (Left), with proposed Airport (Right)



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

- the M4, M5 and M7 have high volume/capacity ratios in both peak periods in both directions;
- 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.

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

- 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;
- The Northern Road carries more traffic with the airport and M12 in place, approximately an additional 1,000 vehicles per hour (with the additional two lanes in each direction supplied as part of the WSIP) in the PM peak, north of the intersection with the M12. By 2063, with the airport, it is reaching capacity;
- the M12 forms an important link to alleviate congestion on Elizabeth Drive. The M12 itself has spare capacity; and
- the M4 shows a lower LoS in certain sections as a result of diversion to the M12.

It should be noted that because of the significant time horizon being forecast and the lack of available information on the future road network in 2063, the 2063 airport demand forecasts have been assigned to a 2041 road network as road networks for a later horizon year are not available. 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. In particular, if the proposed M9 is built, this would relieve some of the congestion identified from the current modelling.

10.4 Public transport impacts

No assessment of the changes to the capacity requirements for the longer 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 longer 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 and employee road vehicle trip generation of 87,575 vehicles to the airport and 102,785 vehicles from the proposed airport, with 242 trains per day.
- the peak passenger and employee vehicle demand to the proposed airport is between 7 and 8 AM and is 13,122 vehicles per hour.
- the peak passenger and employee vehicle demand away from the proposed airport is between 6 and 7 PM and is 17,382 vehicles per hour.
- daily freight vehicle trip generation is expected to be 85,077 vehicles to the proposed airport and 85,291 vehicles from the airport.
- peak AM (2 hour) vehicle demand is 12,201 to the proposed airport and 7,914 from the airport.
- peak PM (2 hour) vehicle demand is 10,263 to the proposed airport and 10,753 from 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 longer term airport development and forecast growth in Western Sydney will have a significant combined impact on both the roads and public transport systems. The NSW and Australian governments have not commenced planning any road or transport upgrades beyond 2041.

Longer term airport operations will be reliant on the introduction of the South West Rail Link extension after 2031. Even with the 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.

It is recommended that more detailed planning is commenced to address this envisioned capacity shortfall such 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 and in the PM peak, the westbound direction on the M4 and M5, as well as both directions on the M7. 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 roads analysed.
- there is a high number of rear end crashes on The Northern Road.
- 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 314 peak hour vehicle movements which would occur during the AM 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 transport system with the exception of potential oversized vehicle movements for the earthworks. These movements may require temporary road closures or police escorts.

A CTMP would be developed in consultation with relevant stakeholders prior to the commencement of construction. The CTMP 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 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 Initial 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 a minimum of 8,400 and up to 10,000 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 initial airport development

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

- daily passenger and employee vehicle trip generation of 22,134 vehicles to the proposed airport and 24,857 vehicles from the airport;
- the peak passenger and employee vehicle demand to the proposed airport is between 7:00 and 8:00 am and is 2,406 vehicles per hour;
- the peak passenger and employee vehicle demand away from the proposed airport is between 6:00 and 7:00 pm and is 2,429 vehicles per hour;
- daily freight vehicle trip generation of 20,922 vehicles to the proposed airport and 20,936 vehicles from the airport;
- the freight AM peak (2 hour) vehicle demand is 3,966 to the proposed airport and 2,295 from the airport; and
- the freight PM peak (2 hour) vehicle demand is 1,905 to the proposed airport and 2,117 from the airport.

The introduction of the airport and the M12 has the following effects on the capacity of the major road network:

- a small increase in congestion at The Northern Road/M4 intersection;
- a small increase in congestion on Mamre Road; and
- overall, by 2031, the initial airport development would not generate the level of traffic required significantly to impact the operation of the surrounding road network.

The initial (Stage 1) airport operations would not have a significant impact on the capacity of the 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 BWSEA and SWGC, 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.

11.5 Operational assessment of the indicative longer term airport development

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

- daily passenger and employee road vehicle trip generation of 87,575 vehicles to the proposed airport and 102,785 vehicles from the airport, with 242 trains per day.
- the peak passenger and employee vehicle demand to the proposed airport is between 7 and 8 AM and is 13,122 vehicles per hour
- the peak passenger and employee vehicle demand away from the proposed airport is between 6 and 7 PM and is 17,382 vehicles per hour
- daily freight vehicle trip generation Is expected to be 85,077 vehicles to the proposed airport and 85,291 vehicles from the airport
- peak AM (2 hour) vehicle demand is 12,201 to the proposed airport and 7,914 from the airport.
- peak PM (2 hour) vehicle demand is 10,263 to the proposed airport and 10,753 from the airport.

The assessment of the impact of public transport is limited to the forecast reduction in traffic volumes as a consequence of the proposed rail line from Leppington to St Marys via WSA.

As demonstrated, the indicative long term operations 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 NSW and Australian governments have not commenced planning any road or transport upgrades beyond 2041.

The indicative longer term operations of the proposed airport would be reliant on the introduction of the South West Rail Link extension after 2031. Even with the South West Rail Link extension, the identified increases in demand vs capacity for 2063 show that detailed planning is required to preserve additional 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 capacity shortfall such that potential future upgrades are not constrained by encroachment from the surrounding development.

12. References

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Transport for NSW, *Bus 801 Route Map*

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

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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

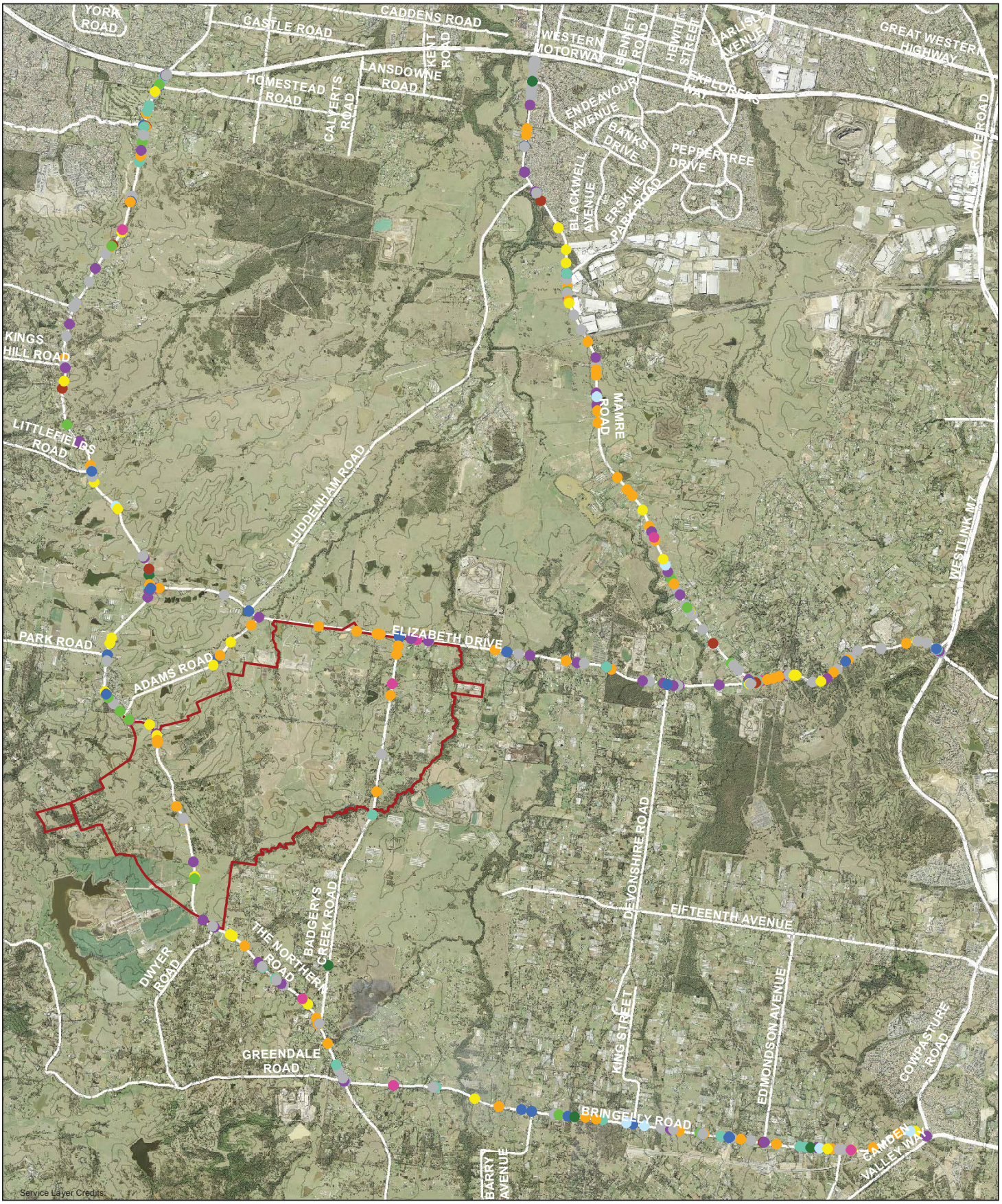
Job No	N1840
Client	RMS
Road	The Northern Rd - north of Bringelly Rd
Location	Bringelly
Site No.	16
Start Date	16-Jun-15
Description	Volume Summary
Direction	Combined

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
- Manoeuvring
- 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	21-24265
Revision	A
Date	10 Jul 2015

Location of crashes (5 years)

Figure 7

N:\AU\Sydney\Projects\21\24265\GIS\Maps\Deliverables\KBM.mxd [KBM: 33]

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: Created by: afoddy

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

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

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

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

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%	New Year	2	0.7%	Queen's BD	2	0.7%	Easter SH	8	2.6%
Tuesday	34	11.2%	Friday	54	17.8%	WEEKDAY	241	79.3%	Aust. Day	1	0.3%	Labour Day	2	0.7%	June/July SH	11	3.6%
Wednesday	46	15.1%	Saturday	28	9.2%	WEEKEND	63	20.7%	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						# Holiday Periods								
Monday	13	11.5%	Thursday	13	11.5%	Sunday	11	9.7%	New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	6	5.3%
Tuesday	26	23.0%	Friday	22	19.5%	WEEKDAY	86	76.1%	Aust. Day	0	0.0%	Labour Day	1	0.9%	June/July SH	4	3.5%
Wednesday	12	10.6%	Saturday	16	14.2%	WEEKEND	27	23.9%	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%

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

Self Reported Crash	0	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

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%

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%

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%

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

Day of the Week						# Holiday Periods								
Monday	26	16.6%	Thursday	40	25.5%	Sunday	13	8.3%	New Year	0	0.0%	Queen's BD	1	0.6%	Easter SH	3	1.9%
Tuesday	18	11.5%	Friday	17	10.8%	WEEKDAY	130	82.8%	Aust. Day	1	0.6%	Labour Day	0	0.0%	June/July SH	6	3.8%
Wednesday	29	18.5%	Saturday	14	8.9%	WEEKEND	27	17.2%	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			~ School Travel Time Involvement	
	0	0.0%		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%

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			~ School Travel Time Involvement		
		0	0.0%		8	33.3%

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%

Day of the Week						# Holiday Periods		
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%

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	0	0.0%	~ School Travel Time Involvement	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	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	208	208
04:00	71	378	449
05:00	436	541	976
06:00	780	792	1,572
07:00	1,246	760	2,006
08:00	1,064	756	1,820
09:00	975	736	1,711
10:00	697	658	1,354
11:00	625	631	1,257
12:00	577	593	1,171
13:00	595	700	1,295
14:00	796	736	1,532
15:00	913	865	1,778
16:00	1,285	818	2,103
17:00	1,046	683	1,730
18:00	762	518	1,280
19:00	390	419	809
20:00	128	162	290
21:00	40	124	164
22:00	-	35	35
23:00	-	-	-
Total	**12,425**	**11,113**	**23,539**

Table 2 2031 passenger trip generation from the airport

Hr comm.	Domestic air arrivals	International air arrivals	Hourly total
00:00	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	-	-
04:00	16	16	31
05:00	121	204	325
06:00	419	757	1,175
07:00	855	1,453	2,308
08:00	1,122	1,885	3,007
09:00	1,243	2,144	3,387
10:00	854	1,691	2,545
11:00	745	1,480	2,225
12:00	578	1,206	1,783
13:00	577	1,163	1,740
14:00	637	1,237	1,874
15:00	758	1,404	2,162
16:00	1,009	1,747	2,756
17:00	1,123	1,958	3,081
18:00	1,180	2,075	3,254
19:00	693	1,497	2,190
20:00	350	887	1,237
21:00	146	538	685
22:00	0	187	188
23:00	-	11	11
Total	**12,425**	**23,539**	**35,964**

Table 3 Passenger trip generation to the airport

Hr Comm.	Kiss'n'fly	Park'n'fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	-	-	-	-	-	-	-
01:00	-	-	-	-	-	-	-
02:00	-	-	-	-	-	-	-
03:00	83	62	42	10	10	-	208
04:00	173	138	90	22	26	-	449
05:00	347	315	195	49	71	-	976
06:00	675	448	276	69	104	-	1,572
07:00	890	558	336	84	138	-	2,006
08:00	940	440	267	67	106	-	1,820
09:00	964	374	227	57	90	-	1,711
10:00	764	295	181	45	70	-	1,354
11:00	692	282	173	43	66	-	1,257
12:00	608	281	173	43	65	-	1,171
13:00	648	323	200	50	73	-	1,295
14:00	729	401	246	61	94	-	1,532
15:00	842	468	287	72	109	-	1,778
16:00	991	556	335	84	138	-	2,103
17:00	918	406	245	61	100	-	1,730
18:00	809	235	141	35	58	-	1,280
19:00	548	130	80	20	31	-	809
20:00	266	12	7	2	3	-	290
21:00	164	-	-	-	-	-	164
22:00	35	-	-	-	-	-	35
23:00	-	-	-	-	-	-	-
Total	**12,085**	**5,727**	**3,499**	**875**	**1,353**	**-**	**23,539**

Table 4 Passenger trip generation from the airport

Hr Comm.	Kiss 'n' fly	Park 'n' fly	Taxi	Shuttle	Bus	Train	Hourly total
00:00	-	-	-	-	-	-	-
01:00	-	-	-	-	-	-	-
02:00	-	-	-	-	-	-	-
03:00	-	-	-	-	-	-	-
04:00	16	-	-	-	-	-	16
05:00	204	-	-	-	-	-	204
06:00	402	177	110	27	40	-	757
07:00	825	314	191	48	76	-	1,453
08:00	929	478	288	72	118	-	1,885
09:00	1,026	559	339	85	135	-	2,144
10:00	841	425	260	65	100	-	1,691
11:00	746	367	225	56	86	-	1,480
12:00	634	286	176	44	66	-	1,206
13:00	611	276	169	42	64	-	1,163
14:00	669	284	174	44	66	-	1,237
15:00	751	327	199	50	78	-	1,404
16:00	931	408	249	62	97	-	1,747
17:00	971	493	298	75	120	-	1,958
18:00	966	555	336	84	134	-	2,075
19:00	734	382	234	59	89	-	1,497
20:00	426	231	143	36	51	-	887
21:00	259	139	89	22	29	-	538
22:00	135	26	17	4	4	-	187
23:00	11	-	-	-	-	-	11
Total	**12,085**	**5,727**	**3,499**	**875**	**1,353**	**-**	**23,539**

Table 5 Total hourly passenger traffic generation to the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	87	28	1	1	116
04:00	194	63	3	2	261
05:00	446	151	6	5	608
06:00	785	303	9	16	1,113
07:00	1,054	431	10	16	1,512
08:00	1,017	453	8	12	1,490
09:00	991	459	7	11	1,467
10:00	771	351	6	5	1,133
11:00	704	316	5	4	1,030
12:00	636	275	5	7	924
13:00	686	290	6	8	990
14:00	806	334	8	9	1,156
15:00	934	387	9	10	1,340
16:00	1,130	475	10	9	1,625
17:00	983	444	8	7	1,441
18:00	791	389	4	4	1,188
19:00	502	249	2	2	755
20:00	210	117	0	0	328
21:00	119	65	-	-	184
22:00	23	12	-	-	35
23:00	-	-	-	-	-
Total	**12,868**	**5,592**	**109**	**127**	**18,696**

Table 6 Total hourly passenger traffic generation from the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Hourly total
00:00	-	-	-	-	-
01:00	-	-	-	-	-
02:00	-	-	-	-	-
03:00	-	28	-	-	28
04:00	14	63	-	-	77
05:00	165	151	-	-	317
06:00	430	303	3	12	749
07:00	852	431	6	12	1,301
08:00	1,029	453	9	13	1,503
09:00	1,153	459	11	14	1,636
10:00	902	351	8	7	1,269
11:00	795	316	7	6	1,124
12:00	656	275	5	7	944
13:00	637	290	5	7	939
14:00	692	334	5	7	1,039
15:00	786	387	6	8	1,187
16:00	992	475	8	6	1,481
17:00	1,064	444	9	8	1,525
18:00	1,095	389	11	9	1,504
19:00	782	249	7	6	1,044
20:00	449	117	4	3	574
21:00	263	65	3	2	333
22:00	103	12	1	0	116
23:00	7	-	-	-	7
Total	**12,868**	**5,592**	**109**	**127**	**18,696**

Table 7 Shift profiles

Worker type	Start	Finish	Percent of total employees	No of employees
Airfield overnight	21:00	05:00	2	220
Airfield day	05:00	13:00	3	123
Airfield afternoon	13:00	21:00	3	123
Terminal support morning	06:00	13:00	10	616
Terminal support afternoon	13:00	20:00	10	739
Terminal supplementary morning	06:00	11:00	14	862
Terminal supplementary morning	15:00	17:00	14	739
Office early start	07:00	17:00	21	1,293
Office later start	09:00	19:00	21	1,416
			Total	**6,158**

Table 8 Hourly arrival and departure volumes

Hr comm.	Arrival	Departure	Hourly total
00:00	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	-	-
04:00	61	110	171
05:00	369	110	479
06:00	1,386	-	1,386
07:00	1,078	-	1,078
08:00	708	-	708
09:00	708	-	708
10:00	-	431	431
11:00	-	431	431
12:00	431	369	800
13:00	431	369	800
14:00	370	-	370
15:00	370	647	1,016
16:00	-	647	647
17:00	-	708	708
18:00	-	1,078	1,078
19:00	-	739	739
20:00	110	431	541
21:00	110	61	171
22:00	-	-	-
23:00	-	-	-
Total	**6,132**	**6,132**	**12,263**

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	61	-	-	-	61
05:00	369	-	-	-	369
06:00	1,067	180	139	-	1,386
07:00	830	140	108	-	1,078
08:00	545	92	71	-	708
09:00	545	92	71	-	708
10:00	-	-	-	-	-
11:00	-	-	-	-	-
12:00	332	56	43	-	431
13:00	332	56	43	-	431
14:00	285	48	37	-	370
15:00	285	48	37	-	370
16:00	-	-	-	-	-
17:00	-	-	-	-	-
18:00	-	-	-	-	-
19:00	-	-	-	-	-
20:00	110	-	-	-	110
21:00	110	-	-	-	110
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**4,871**	**713**	**548**	**-**	**6,132**

Table 10 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	110	-	-	-	110
05:00	110	-	-	-	110
06:00	-	-	-	-	-
07:00	-	-	-	-	-
08:00	-	-	-	-	-
09:00	-	-	-	-	-
10:00	332	56	43	-	431
11:00	332	56	43	-	431
12:00	284	48	37	-	369
13:00	284	48	37	-	369
14:00	-	-	-	-	-
15:00	498	84	65	-	647
16:00	498	84	65	-	647
17:00	545	92	71	-	708
18:00	830	140	108	-	1,078
19:00	569	96	74	-	739
20:00	431	-	-	-	431
21:00	61	-	-	-	61
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**4,885**	**705**	**542**	**-**	**6,132**

Table 11 Employee traffic generation to the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	0
02:00	-	-	-	0
03:00	-	-	-	-
04:00	62	-	-	62
05:00	370	-	-	370
06:00	1,067	9	-	1,076
07:00	830	7	-	837
08:00	545	5	-	550
09:00	545	5	-	550
10:00	-	-	-	-
11:00	-	-	-	-
12:00	332	3	-	335
13:00	332	3	-	335
14:00	285	2	-	287
15:00	285	2	-	287
16:00	-	-	-	-
17:00	-	-	-	-
18:00	-	-	-	-
19:00	-	-	-	-
20:00	123	-	-	123
21:00	123	-	-	123
22:00	-	-	-	-
23:00	-	-	-	-
Total	**4,898**	**37**	**-**	**4,935**

Table 12 Employee traffic generation from the airport

Hr Comm.	Cars	Bus	Train	Hourly total
00:00	-	-	-	-
01:00	-	-	-	0
02:00	-	-	-	0
03:00	-	-	-	-
04:00	123	-	-	123
05:00	123	-	-	123
06:00	-	-	-	-
07:00	-	-	-	-
08:00	-	-	-	-
09:00	-	-	-	-
10:00	332	3	-	335
11:00	332	3	-	335
12:00	285	2	-	287
13:00	285	2	-	287
14:00	-	-	-	-
15:00	498	4	-	502
16:00	498	4	-	502
17:00	545	5	-	550
18:00	830	7	-	837
19:00	569	5	-	574
20:00	431	-	-	431
21:00	62	-	-	62
22:00	-	-	-	-
23:00	-	-	-	-
Total	**4,912**	**36**	**-**	**4,948**

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	39%	18%	11%	3%	20%	3%	7%	0%
No. trips	24,170	11,453	6,998	1,750	12,195	1,771	4,060	-

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	37%	19%	11%	3%	22%	4%	5%	0%
No. trips	1,715	872	527	132	1,037	175	214	-

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	37%	16%	10%	2%	21%	4%	10%	0%
No. trips	1,775	790	478	119	1,037	175	462	-

Table 16 Airport traffic generation to airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	-	-	-	-	-	-
01:00	-	-	-	-	-	-
02:00	-	-	-	-	-	-
03:00	87	28	1	-	116	-
04:00	270	63	3	-	337	-
05:00	907	151	6	-	1,065	-
06:00	2,119	218	9	28	2,374	-
07:00	2,092	276	10	28	2,406	-
08:00	1,698	216	8	27	1,951	-
09:00	1,672	184	7	30	1,893	-
10:00	771	144	6	13	934	-
11:00	704	137	5	11	858	-
12:00	1,051	137	5	16	1,209	-
13:00	1,101	156	6	16	1,279	-
14:00	1,162	196	8	15	1,380	-
15:00	1,289	228	9	16	1,542	-
16:00	1,130	276	10	13	1,429	-
17:00	983	201	8	16	1,207	-
18:00	791	117	4	18	930	-
19:00	502	63	2	12	579	-
20:00	348	6	0	7	361	-
21:00	256	-	-	4	260	-
22:00	23	-	-	1	24	-
23:00	-	-	-	-	-	-
Total	**18,957**	**2,796**	**109**	**272**	**22,134**	**-**

Table 17 Airport traffic generation from airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	-	-	-	-	-	-
01:00	-	-	-	-	-	-
02:00	-	-	-	-	-	-
03:00	-	-	-	1	1	-
04:00	152	-	-	2	153	-
05:00	303	-	-	5	308	-
06:00	516	85	3	18	623	-
07:00	1,007	154	6	18	1,185	-
08:00	1,265	236	9	13	1,523	-
09:00	1,427	275	11	12	1,725	-
10:00	1,525	207	8	8	1,748	-
11:00	1,389	179	7	8	1,583	-
12:00	1,150	139	5	11	1,306	-
13:00	1,126	134	5	12	1,277	-
14:00	830	138	5	9	983	-
15:00	1,568	160	6	16	1,750	-
16:00	1,814	200	8	15	2,036	-
17:00	1,989	243	9	13	2,254	-
18:00	2,406	273	11	13	2,702	-
19:00	1,678	185	7	8	1,879	-
20:00	1,099	111	4	0	1,214	-
21:00	405	65	3	-	474	-
22:00	115	12	1	-	127	-
23:00	7	-	-	-	7	-
Total	**21,771**	**2,796**	**109**	**181**	**24,857**	**-**

Appendix D – Longer 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	-	1,142	1,142
01:00	63	2,013	2,076
02:00	309	1,405	1,715
03:00	660	2,106	2,766
04:00	1,320	3,899	5,219
05:00	2,408	4,166	6,574
06:00	2,808	5,708	8,517
07:00	2,964	5,118	8,082
08:00	2,965	4,826	7,790
09:00	2,965	5,142	8,107
10:00	2,965	4,812	7,777
11:00	2,965	4,763	7,727
12:00	2,965	4,763	7,727
13:00	2,965	4,763	7,727
14:00	2,965	4,850	7,814
15:00	2,965	6,161	9,126
16:00	2,965	5,167	8,132
17:00	2,965	4,739	7,703
18:00	2,845	3,611	6,456
19:00	1,897	2,090	3,987
20:00	1,109	1,473	2,582
21:00	559	768	1,327
22:00	287	491	779
23:00	125	727	852
Total	**47,002**	**84,703**	**131,705**

Table 2 Passenger trip generation from the airport

Hr comm.	Domestic air arrivals	International air arrivals	Hourly total
00:00	5	177	182
01:00	10	244	253
02:00	65	881	945
03:00	304	1,676	1,980
04:00	656	2,188	2,844
05:00	1,303	1,788	3,091
06:00	2,188	2,703	4,890
07:00	2,954	4,305	7,258
08:00	2,965	5,293	8,257
09:00	2,965	6,105	9,070
10:00	2,965	5,224	8,189
11:00	2,965	4,776	7,740
12:00	2,965	4,763	7,727
13:00	2,965	4,763	7,727
14:00	2,965	4,763	7,727
15:00	2,965	4,763	7,727
16:00	2,965	4,785	7,750
17:00	2,965	5,305	8,270
18:00	2,947	6,105	9,052
19:00	2,753	5,201	7,954
20:00	2,145	4,201	6,346
21:00	1,084	2,557	3,641
22:00	543	1,251	1,794
23:00	273	675	947
Total	**46,873**	**84,491**	**131,364**

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	297	205	228	57	148	205	639
01:00	561	369	409	102	266	369	1,146
02:00	564	283	308	77	200	283	867
03:00	976	442	477	119	310	442	1,349
04:00	1,758	855	922	231	599	855	2,607
05:00	1,983	1,140	1,217	304	791	1,140	3,452
06:00	2,789	1,418	1,522	380	989	1,418	4,309
07:00	3,090	1,239	1,323	331	860	1,239	3,753
08:00	3,098	1,166	1,242	311	807	1,166	3,526
09:00	3,414	1,166	1,242	311	807	1,166	3,526
10:00	3,084	1,166	1,242	311	807	1,166	3,526
11:00	3,035	1,166	1,242	311	807	1,166	3,526
12:00	3,035	1,166	1,242	311	807	1,166	3,526
13:00	3,035	1,166	1,242	311	807	1,166	3,526
14:00	3,057	1,182	1,259	315	819	1,182	3,575
15:00	3,398	1,418	1,522	380	989	1,418	4,309
16:00	3,140	1,239	1,323	331	860	1,239	3,753
17:00	3,075	1,151	1,225	306	796	1,151	3,478
18:00	2,990	867	912	228	593	867	2,599
19:00	2,141	463	484	121	315	463	1,383
20:00	1,638	237	248	62	161	237	707
21:00	866	116	121	30	78	116	345
22:00	452	81	86	22	56	81	245
23:00	364	119	131	33	85	119	368
Total	**51,841**	**19,822**	**21,168**	**5,292**	**13,759**	**19,822**	**60,042**

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	182	-	-	-	-	-	-
01:00	161	22	25	6	16	22	70
02:00	442	122	136	34	88	122	381
03:00	868	273	299	75	194	273	840
04:00	1,048	441	481	120	313	441	1,355
05:00	1,564	380	403	101	262	380	1,146
06:00	2,041	711	752	188	489	711	2,139
07:00	2,708	1,132	1,204	301	782	1,132	3,418
08:00	3,386	1,210	1,290	323	839	1,210	3,662
09:00	3,297	1,429	1,534	383	997	1,429	4,343
10:00	3,356	1,200	1,280	320	832	1,200	3,632
11:00	3,048	1,166	1,242	311	807	1,166	3,526
12:00	3,035	1,166	1,242	311	807	1,166	3,526
13:00	3,035	1,166	1,242	311	807	1,166	3,526
14:00	3,035	1,166	1,242	311	807	1,166	3,526
15:00	3,035	1,166	1,242	311	807	1,166	3,526
16:00	3,057	1,166	1,242	311	807	1,166	3,526
17:00	3,398	1,210	1,290	323	839	1,210	3,662
18:00	3,280	1,429	1,534	383	997	1,429	4,343
19:00	3,122	1,200	1,280	320	832	1,200	3,632
20:00	2,228	1,021	1,092	273	710	1,021	3,097
21:00	1,435	547	586	146	381	547	1,660
22:00	731	264	282	71	183	264	800
23:00	352	147	158	40	103	147	448
Total	**51,841**	**19,738**	**21,077**	**5,269**	**13,700**	**19,738**	**59,785**

Table 5 Traffic generation to the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Train	Hourly total
00:00	301	152	7	10	1	471
01:00	564	276	13	18	2	872
02:00	545	220	10	13	1	789
03:00	936	348	15	21	2	1,321
04:00	1,728	674	29	40	4	2,475
05:00	2,130	919	38	53	6	3,145
06:00	2,871	1,132	48	230	25	4,306
07:00	3,020	1,000	41	185	20	4,266
08:00	2,989	946	39	138	15	4,126
09:00	3,200	946	39	138	15	4,337
10:00	2,979	946	39	54	6	4,024
11:00	2,947	946	39	54	6	3,991
12:00	2,947	946	39	105	11	4,048
13:00	2,947	946	39	105	11	4,048
14:00	2,969	957	39	98	11	4,075
15:00	3,315	1,132	48	110	12	4,616
16:00	3,053	1,000	41	57	6	4,158
17:00	2,966	934	38	53	6	3,997
18:00	2,756	720	28	40	4	3,549
19:00	1,907	389	15	21	2	2,334
20:00	1,372	198	8	11	1	1,590
21:00	717	97	4	5	1	824
22:00	384	66	3	4	0	457
23:00	321	91	4	6	1	422
Total	**49,861**	**15,981**	**662**	**1,567**	**171**	**68,242**

Table 6 Traffic generation from the airport

Hr comm.	Car	Taxi	Mini bus	Bus	Train	Hourly total
00:00	122	-	-	-	-	122
01:00	121	17	1	1	0	139
02:00	371	91	4	6	1	473
03:00	758	209	9	13	1	990
04:00	1,013	341	15	21	2	1,392
05:00	1,414	311	13	17	2	1,756
06:00	1,978	584	23	197	22	2,805
07:00	2,709	920	38	180	20	3,866
08:00	3,202	978	40	140	15	4,376
09:00	3,253	1,140	48	150	16	4,608
10:00	3,178	971	40	55	6	4,250
11:00	2,955	946	39	54	6	3,999
12:00	2,947	946	39	105	11	4,048
13:00	2,947	946	39	105	11	4,048
14:00	2,947	946	39	98	11	4,040
15:00	2,947	946	39	98	11	4,040
16:00	2,962	946	39	54	6	4,006
17:00	3,211	978	40	56	6	4,291
18:00	3,237	1,140	48	66	7	4,499
19:00	2,970	971	40	55	6	4,042
20:00	2,217	821	34	47	5	3,125
21:00	1,343	437	18	25	3	1,826
22:00	676	211	9	12	1	910
23:00	337	117	5	7	1	467
Total	**49,813**	**15,913**	**659**	**1,563**	**171**	**68,118**

Table 7 Hourly arrival and departure volumes

Hr comm.	Arrival	Departure	Hourly total
00:00	-	-	-
01:00	-	-	-
02:00	-	-	-
03:00	-	-	-
04:00	476	952	1,428
05:00	2,856	952	3,808
06:00	10,710	-	10,710
07:00	8,330	-	8,330
08:00	5,474	-	5,474
09:00	5,474	-	5,474
10:00	-	3,332	3,332
11:00	-	3,332	3,332
12:00	3,332	2,856	6,188
13:00	3,332	2,856	6,188
14:00	2,856	-	2,856
15:00	2,856	4,998	7,854
16:00	-	4,998	4,998
17:00	-	5,474	5,474
18:00	-	8,330	8,330
19:00	-	5,712	5,712
20:00	952	3,332	4,284
21:00	952	476	1,428
22:00	-	-	-
23:00	-	-	-
Total	**47,599**	**47,599**	**95,199**

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	476	-	-	-	476
05:00	2,856	-	-	-	2,856
06:00	3,213	1,392	2,463	3,641	10,710
07:00	2,499	1,083	1,916	2,832	8,330
08:00	1,642	712	1,259	1,861	5,474
09:00	1,642	712	1,259	1,861	5,474
10:00	-	-	-	-	-
11:00	-	-	-	-	-
12:00	1,000	433	766	1,133	3,332
13:00	1,000	433	766	1,133	3,332
14:00	857	371	657	971	2,856
15:00	857	371	657	971	2,856
16:00	-	-	-	-	-
17:00	-	-	-	-	-
18:00	-	-	-	-	-
19:00	-	-	-	-	-
20:00	952	-	-	-	952
21:00	952	-	-	-	952
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**17,945**	**5,507**	**9,744**	**14,404**	**47,599**

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	952	-	-	-	952
05:00	952	-	-	-	952
06:00	-	-	-	-	-
07:00	-	-	-	-	-
08:00	-	-	-	-	-
09:00	-	-	-	-	-
10:00	1,000	433	766	1,133	3,332
11:00	1,000	433	766	1,133	3,332
12:00	857	371	657	971	2,856
13:00	857	371	657	971	2,856
14:00	-	-	-	-	-
15:00	1,499	650	1,150	1,699	4,998
16:00	1,499	650	1,150	1,699	4,998
17:00	1,642	712	1,259	1,861	5,474
18:00	2,499	1,083	1,916	2,832	8,330
19:00	1,714	743	1,314	1,942	5,712
20:00	3,332	-	-	-	3,332
21:00	476	-	-	-	476
22:00	-	-	-	-	-
23:00	-	-	-	-	-
Total	**18,278**	**5,445**	**9,634**	**14,242**	**47,599**

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	476	-	-	476
05:00	2,856	-	-	2,856
06:00	3,213	164	18	3,395
07:00	2,499	128	14	2,641
08:00	1,642	84	9	1,735
09:00	1,642	84	9	1,735
10:00	-	-	-	-
11:00	-	-	-	-
12:00	1,000	51	6	1,056
13:00	1,000	51	6	1,056
14:00	857	44	5	905
15:00	857	44	5	905
16:00	-	-	-	-
17:00	-	-	-	-
18:00	-	-	-	-
19:00	-	-	-	-
20:00	952	-	-	952
21:00	952	-	-	952
22:00	-	-	-	-
23:00	-	-	-	-
Total	**17,945**	**650**	**72**	**18,667**

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	952	-	-	952
05:00	952	-	-	952
06:00	-	-	-	-
07:00	-	-	-	-
08:00	-	-	-	-
09:00	-	-	-	-
10:00	1,000	51	6	1,056
11:00	1,000	51	6	1,056
12:00	857	44	5	905
13:00	857	44	5	905
14:00	-	-	-	-
15:00	1,499	77	8	1,585
16:00	1,499	77	8	1,585
17:00	1,642	84	9	1,735
18:00	2,499	128	14	2,641
19:00	1,714	88	10	1,811
20:00	3,332	-	-	3,332
21:00	476	-	-	476
22:00	-	-	-	-
23:00	-	-	-	-
Total	**18,278**	**642**	**71**	**18,992**

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	29%	11%	12%	3%	10%	3%	13%	19%
No. of trips	103,683	39,560	42,245	10,561	36,223	10,953	46,728	68,043

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	31%	13%	13%	3%	13%	6%	9%	13%

share								
No. of trips	5,798	2,371	2,526	632	2,499	1,083	1,642	2,371

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	22%	8%	9%	2%	9%	4%	19%	28%
No trips	6,269	2,296	2,446	611	2,499	1,083	5,421	7,960

Table 15 Airport traffic generation to airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	301	152	7	-	460	-
01:00	564	276	13	2	855	0
02:00	545	220	10	12	786	1
03:00	936	348	15	26	1,324	1
04:00	2,204	674	29	42	2,949	2
05:00	4,986	919	38	35	5,978	2
06:00	6,084	1,132	48	394	7,657	22
07:00	5,519	1,000	41	360	6,920	20
08:00	4,631	946	39	280	5,895	15
09:00	4,842	946	39	301	6,127	16
10:00	2,979	946	39	111	4,075	12
11:00	2,947	946	39	108	4,039	11
12:00	3,946	946	39	210	5,141	16
13:00	3,946	946	39	210	5,141	16
14:00	3,826	957	39	195	5,018	11
15:00	4,172	1,132	48	195	5,547	19
16:00	3,053	1,000	41	108	4,202	14
17:00	2,966	934	38	112	4,050	15
18:00	2,756	720	28	133	3,638	21
19:00	1,907	389	15	111	2,422	16
20:00	2,324	198	8	95	2,625	5
21:00	1,669	97	4	51	1,821	3
22:00	384	66	3	24	477	1
23:00	321	91	4	14	430	1
Total	**67,806**	**15,981**	**662**	**3,126**	**87,575**	**242**

Table 16 Airport traffic generation from airport

Hr comm.	Car	Taxis	Mini bus	Bus	Road vehicles	Trains
00:00	122	-	-	10	132	1
01:00	138	17	1	18	173	2
02:00	462	91	4	13	570	1
03:00	966	209	9	21	1,205	2
04:00	2,306	341	15	40	2,702	4
05:00	2,676	311	13	53	3,053	6
06:00	2,563	584	23	230	3,401	25
07:00	3,629	920	38	185	4,772	20
08:00	4,180	978	40	138	5,337	15
09:00	4,393	1,140	48	138	5,719	15
10:00	5,148	971	40	105	6,264	11
11:00	4,901	946	39	105	5,990	11
12:00	4,749	946	39	149	5,883	16
13:00	4,749	946	39	149	5,883	16
14:00	3,892	946	39	98	4,975	11
15:00	5,392	946	39	186	6,563	20
16:00	5,407	946	39	134	6,525	15
17:00	5,831	978	40	137	6,986	15
18:00	6,876	1,140	48	167	8,232	18
19:00	5,655	971	40	109	6,774	12
20:00	6,370	821	34	11	7,236	1
21:00	2,256	437	18	5	2,717	1
22:00	887	211	9	4	1,111	0
23:00	455	117	5	6	582	1
Total	**84,004**	**15,913**	**659**	**2,209**	**102,785**	**242**

GHD

133 Castlereagh St Sydney NSW 2000

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T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

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Document Status

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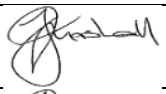
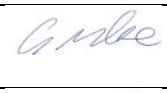
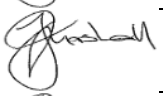
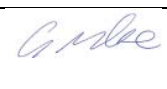
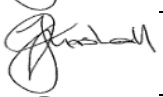
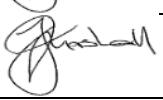
A	S Payne K McNatty G McCabe	G McCabe		G Marshall		20.07.2015
B	S Payne K McNatty G McCabe	G McCabe		G Marshall		25.08.2015
C	S Payne K McNatty G McCabe	G McCabe		G Marshall		03.09.2015
0	S Payne K McNatty G McCabe	G McCabe		G Marshall		06.10.2015

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