

9. Assessment of key issues

This section assesses the key issues as identified in the DGRs (refer Appendix B) which may be associated with the project. These issues include traffic and transport (operational and construction), noise and vibration (operational and construction), ecology, urban design and landscape, Aboriginal cultural heritage, construction surface water and soils, and non-Aboriginal heritage.

Director-General's Requirements	Where addressed
<i>An assessment of the key issues, with the following aspects addressed for each key issue (where relevant):</i>	
<ul style="list-style-type: none"> <i>Description of the existing environment.</i> 	<i>Chapter 9, Technical Papers</i>
<ul style="list-style-type: none"> <i>Assessment of potential impacts (direct and indirect) of the project for both construction and operation stages, in accordance with relevant policies and guidelines.</i> 	<i>Chapter 9, Technical Papers</i>
<ul style="list-style-type: none"> <i>Identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters), have been considered in the impact assessment and/or in developing management/mitigation measures.</i> 	<i>Chapter 4, Chapter 9, Technical Papers</i>
<ul style="list-style-type: none"> <i>Description of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor the impacts of the project.</i> 	<i>Chapter 9, Technical Papers</i>
<ul style="list-style-type: none"> <i>Any residual impacts</i> 	<i>Chapter 8, Chapter 9, Technical Papers</i>

9.1 Operational traffic and transport

An assessment of the transport and traffic impacts associated with the operation of the project has been undertaken and is presented below. This assessment constitutes a summary of *Technical Paper 1 – Transport and Traffic* (Volume 2).

Director-General's Requirements	Where addressed
<i>Operational Traffic and Transport Implications:</i>	
<ul style="list-style-type: none"> <i>The environmental assessment must include an assessment of the operational impacts of the project, including traffic levels on the M2 Motorway and the impacts on the surrounding road network, including any impacts on the Lane Cove Tunnel, the M7 Westlink Motorway, and the surrounding local and regional road network.</i> 	<i>Section 9.1.2, Technical Paper 1</i>
<ul style="list-style-type: none"> <i>The assessment must also consider operational implications for public transport (particularly with respect to bus routes, interchanges and connections with the rail network), impacts on cyclists and cycle access, and any impacts on pedestrian access and safety (for those ancillary works around the M2 corridor, as relevant).</i> 	<i>Sections 6.3.2, 9.1.2, Technical Paper 1</i>
<i>Project justification – demonstrate that the project will enhance the use of public transport, demonstrate that the project will not unduly induce traffic and exacerbate congestion in the medium to longer term within the adjoining subregions.</i>	<i>Chapter 3, Section 9.1</i>

9.1.1 Existing environment

Existing conditions

The M2 Motorway is a dual carriageway motorway with two lanes in each direction for the majority of its length, except for the section between Lane Cove Road and Beecroft Road where three lanes are provided for the westbound movements.

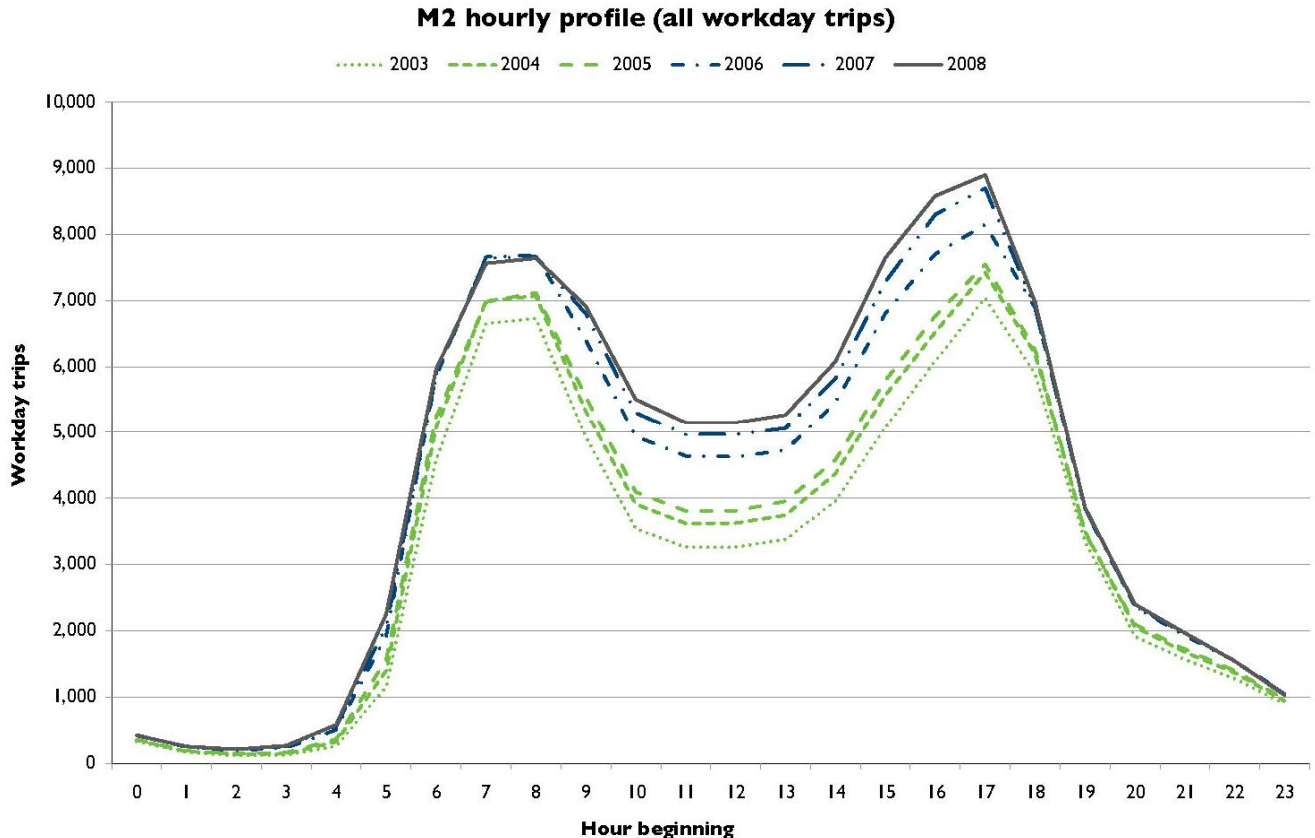
The M2 Motorway forms part of the Sydney Orbital network and is a vital link between Sydney's north-west and Sydney's lower north shore as well as the Sydney central business district. It also accommodates large volumes of heavy vehicles transporting freight between the M7 Motorway and Sydney Newcastle Freeway.

One of the features of the M2 Motorway is the dedicated bus lanes, located between Beecroft Road and Windsor Road. Median bus terminals allow buses to operate safely without interrupting the main flow of traffic, whilst providing convenient passageways for bus commuters via the overhead pedestrian walkways.

Existing M2 Motorway traffic volumes

In the past ten years, the Average Annual Daily Traffic (AADT) on the M2 Motorway has increased from approximately 60,000 to 95,000, with the greatest increase experienced upon commissioning of the M7 Motorway in December 2005 and the Lane Cove Tunnel in March 2007. Figure 14 shows the historical hourly traffic profile on the M2 Motorway at the toll plazas.

Figure 14 Hourly traffic profile of the M2 Motorway



Source: Transurban, 2010

Figure 14 indicates that since 2006, traffic flow during the AM peak period (7.00 am – 9.00 am) is constrained at just fewer than 8,000 vehicles, while traffic volumes during the inter-peak and PM peak period (5.00 pm – 7.00 pm) volumes are continuing to increase.

Along the M2 Motorway, traffic volumes vary between the interchanges. The busiest section, by direction, during both the AM and PM peak hours occurs between Beecroft Road and Herring Road. Considering daily traffic volumes, the busiest section is identified between Windsor Road and Pennant Hills Road. Table 16 and Table 17 show the AM and PM peak hour and daily traffic volumes at the various sections of M2 Motorway on a typical workday. Table 18 shows the total traffic flow for the same time periods.

Table 16 Eastbound M2 workday flows (2009)

From	To	AM Peak Hour	PM Peak Hour	Daily
Old Windsor Road	Windsor Road	2,250	2,250	30,300
Windsor Road	Pennant Hills Road	3,150	2,800	39,000
Pennant Hills Road	Beecroft Road	3,400	2,100	33,950
Beecroft Road	Christie Road	4,200	2,300	38,050
Christie Road	Lane Cove Road	3,550	2,100	34,450
Lane Cove Road	Delhi Road	2,750	1,450	25,450
Delhi Road	Epping Road	1,900	1,050	17,350

Table 17 Westbound M2 workday flows (2009)

From	To	AM Peak Hour	PM Peak Hour	Daily
Epping Road	Delhi Road	850	1,950	17,400
Delhi Road	Lane Cove Road	1,400	2,900	26,750
Lane Cove Road	Herring Road	1,950	3,750	35,550
Herring Road	Beecroft Road	2,150	4,500	39,650
Beecroft Road	Pennant Hills Road	2,000	4,100	36,800
Pennant Hills Road	Windsor Road	2,650	4,050	42,550
Windsor Road	Old Windsor Road	2,050	2,950	32,750

Table 18 Total M2 workday flows (2009)

From	To	AM Peak Hour	PM Peak Hour	Daily
Old Windsor Road	Windsor Road	4,300	5,200	63,050
Windsor Road	Pennant Hills Road	5,800	6,850	81,550
Pennant Hills Road	Beecroft Road	5,400	6,200	70,750
Beecroft Road	Christie Road	6,350	6,800	77,700
Christie Road	Lane Cove Road	5,500	5,850	70,000
Lane Cove Road	Delhi Road	4,150	4,350	52,200
Delhi Road	Epping Road	2,750	3,000	34,750

M2 operating performance

Level of Service (LoS) is defined as a qualitative measure describing operational conditions within a traffic stream. For motorways, where there is uninterrupted flow (no driveway accesses, traffic signals and the like), LoS is affected by traffic volume and merge arrangements.

A LoS definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and safety. By definition, there are six LoS, designated from A to F, with LoS A representing the best operating condition (free flow) and LoS F the worst (flow break-down).

The following is a description of each LoS¹:

- LoS A: is a condition of free flow in which drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and manoeuvre within the traffic stream is extremely high.
- LoS B: is in the zone of stable flow where most drivers still have reasonable freedom to select their desired speed and manoeuvre within the traffic stream.
- LoS C: is 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.
- LoS D: is close to the limit of stable flow where all drivers are severely restricted in their freedom to select desired speed and to manoeuvre within the traffic stream. Small increases in traffic flow would cause operational problems.
- LoS E: Traffic volumes are at, or close to, capacity. There is virtually no freedom to select desired speed and manoeuvre within the traffic stream. Minor disturbances within the traffic stream would cause breakdowns in operation.
- LoS F: Forced Flow. The amount of traffic approaching a point exceeds that which can pass it. Flow breakdowns occur and queuing and delays occur.

All LoS calculations in this report are based on the procedures in the US Transport and Research Board 2000 Highway and Capacity Manual.

Table 19 lists theoretical hourly lane capacity by road type for LoS E. These theoretical capacities represent ideal conditions. In practice, higher traffic throughputs can be observed and local conditions such as narrow lanes, inadequate shoulders, parking and property access can also reduce these capacities.

¹ AustRoads (2009), "Guide to Traffic Management Part 3: Traffic Studies and Analysis", Sydney

Table 19 Theoretical mid-block lane capacities

Description	Hourly capacity (single lane) passenger car units
Motorway	2,000
Ramps	1,650
Motorway to Motorway Ramp	1,650
Major Arterial	1,800
Arterial	1,650
Sub-arterial	1,500
Collector	1,000
CBD Street	900
Residential Street	550

Comparing the existing traffic volumes identified in the previous section with the hourly theoretical capacities identified in Table 19, Table 20 and Table 21 provides a summary of the LoS for each section of the M2 Motorway.

Table 20 M2 Motorway eastbound hourly capacity and observed level of service

To	From	Capacity (veh/hr)	AM Peak Hour ¹	LoS AM ²	PM Peak Hour ¹	LoS PM ²
Old Windsor Road	Windsor Road	4,000	2,250	C+	2,250	B+
Windsor Road	Pennant Hills Road	4,000	3,150	D+	2,800	B+
Pennant Hills Road	Beecroft Road	4,000	3,400	D+	2,100	B+
Beecroft Road	Christie Road	4,000	4,200	F+	2,300	B+
Christie Road	Lane Cove Road	4,000	3,550	D	2,100	C
Lane Cove Road	Delhi Road	4,000	2,750	C	1,450	B
Delhi Road	Epping Road	4,000	1,900	B	1,050	A

Note: 1 – average hourly 7.00-9.00am; 2 – average hourly 5.00-7.00pm.

2 – Level of Service has been calculated using the AustRoad guidelines based on observed travel speeds.

LoS marked with + refer to HCM freeway ramp merge analysis.

3 – Westbound section between Lane Cove Road and Beecroft Road has three (narrow 3.1m) lanes hence increased capacity over the other 2 lanes segments.

Table 21 M2 Motorway westbound hourly capacity and observed level of service

To	From	Capacity (veh/hr)	AM Peak Hour ¹	LoS AM ²	PM Peak Hour ¹	LoS PM ²
Epping Road	Delhi Road	4,000	850	A	1,950	C
Delhi Road	Lane Cove Road	4,000	1,400	B+	2,900	C+
Lane Cove Road	Herring Road ³	5,200	1,950	B+	3,750	C+
Herring Road	Beecroft Road ³	5,200	2,150	B+	4,500	D+
Beecroft Road	Pennant Hills Road	4,000	2,000	B	4,100	E
Pennant Hills Road	Windsor Road	4,000	2,650	C+	4,050	D+
Windsor Road	Old Windsor Road	4,000	2,050	B	2,950	C

Note: 1 – average hourly 7.00-9.00am; 2 – average hourly 5.00-7.00pm.

2 – Level of Service has been calculated using the AustRoad guidelines based on observed travel speeds.

LoS marked with + refer to HCM freeway ramp merge analysis.

3 – Westbound section between Lane Cove Road and Beecroft Road has three (narrow 3.1m) lanes hence increased capacity over the other 2 lanes segments.

Traffic from ramps entering motorways can cause congestion and delays as well as incidents and, in the case of the M2 Motorway, this is observed in the eastbound direction during the morning peak where traffic enters from Windsor Road, Pennant Hills Road and Beecroft Road. Similarly in the westbound direction in the afternoon peak traffic entering from Herring Road and Pennant Hills Road can cause disruption.

Table 20 shows that, during the AM peak hour, eastbound movements beyond Pennant Hills Road is near capacity with the section between Beecroft Road and Christie Road operating with peak traffic volumes above theoretical capacity. Queues regularly form back from this location and combine with queues back from the Windsor Road, eastbound merge, as far back as the M7 Motorway. The poor traffic conditions observed back to the M7 Motorway are due to demand exceeding capacity in these downstream sections rather than demand exceeding capacity in the section between the M7 Motorway and Windsor Road.

In the PM peak hour, the westbound movement, beyond Herring Road, operates at near capacity with the section between Beecroft Road and Pennant Hills Road operating at a LoS E (Table 21). Although a third traffic lane was recently designated by utilising the former emergency lane, the subsequent lane width reduction, reduced speed limits lack of road shoulder has reduced the throughput capacities.

M2 heavy vehicles

In addition to the overall increase in traffic volumes, the proportion of heavy vehicles along the M2 Motorway has also risen. The annual proportion of heavy vehicle volumes along the M2 Motorway are summarised in Table 22. In 2005, prior to the opening of the M7 Motorway, heavy vehicles accounted for 5.9 percent (at toll locations) of the total traffic volumes on the M2 Motorway. Since the opening of the M7 Motorway, the proportion of heavy vehicles on the M2 Motorway has risen to above seven percent.

Table 22 M2 Motorway heavy vehicle proportions 2003 -2009

Year	Proportion of heavy vehicles (percent)
2003	4.2
2004	5.4
2005	5.9
2006	7.3
2007	7.7
2008	7.7
2009	7.2

Completion of M7 also resulted in doubling of heavy vehicle volumes on Pennant Hills Road ramps, as shown in Figure 15. Prior to M7, workday average heavy vehicle volumes were 2,000 vehicles, whereas after completion of M7 they increased to over 4,000 vehicles.

The M7 Motorway provides an efficient link for freight movements in the western Sydney region. In particular, the M7 Motorway has provided a key link for freight transport between Hume Highway and F3 Freeway via the M2 Motorway.

Public transport

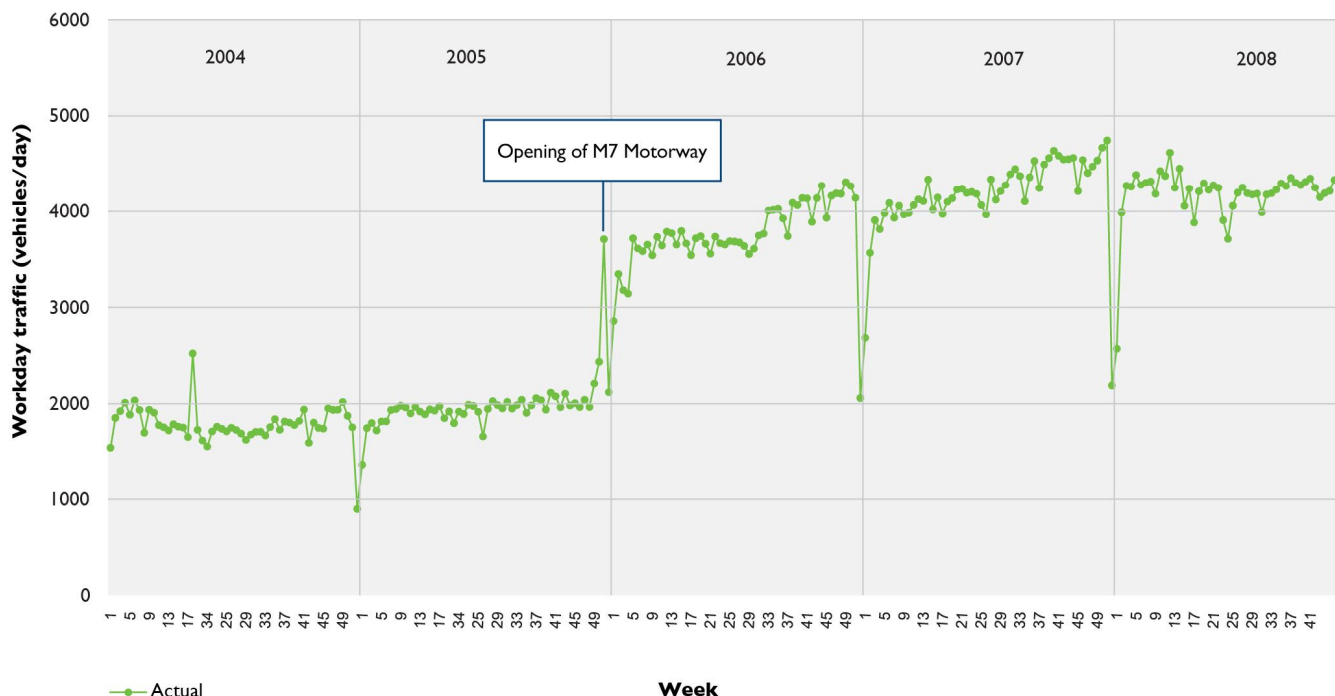
Both bus and rail infrastructure is located in the vicinity of the M2 Motorway. These include a number of rail stations in the M2 Motorway catchment serving the Epping to Chatswood Rail Line (ECRL) and the Northern Line as well as the numerous bus routes operating along the M2 Motorway to serve Sydney's north west regions.

The M2 Motorway forms part of the strategic bus corridor network; with routes from Castle Hill – City via Macquarie, Macquarie – City, Macquarie – Burwood, Parramatta – City via Macquarie using the M2 Motorway. The strategic bus corridors are shown in Figure 16. Numerous bus routes operate along the M2 Motorway to serve Sydney's north west regions. Combined, these bus routes carry over 17,000 passengers each weekday². With increased development planned in the north west regions, it is likely that the demand for public transport within the region would increase in the future.

² Hillsbus, communications 2008. Assuming a bus-operating-day of 15 hours leads to peak flows of a bus every 4 minutes each with approximately 40 passengers.

Figure 15 Heavy vehicle volumes 2004 – 2008

Hills M2 – Workday trucks at Pennant Hills toll plaza – 2004-2008



Source: Transurban, 2010

Buses using the M2 Motorway serve Sydney's north west, with routes to Sydney CBD and North Sydney and to a lesser extent Lane Cove, Epping and Macquarie Park. The M2 Motorway is also used by Busways' Route 750. Eastbound bus services on the M2 Motorway can be grouped according to their Motorway exit point, as follows:

M2 Motorway express routes – Routes 610, 610X, 612, 613, 613X, 614, 614X, 615, 615X, 616, 616X, 617X, 618, 620, 620X, 622, 642, 642X, 650X, 652X and 653 travel directly through and exit at the eastern end of the M2 Motorway and are known as the M2 Express Routes. A total of 230 eastbound services operate along these routes each weekday.

Christie Road off-ramp and Herring Road on-ramp routes – Routes 619, 621, and 651 exit via Christie Road Off Ramp and terminate at Macquarie Centre and Macquarie Park, or travel through to the Sydney central business district. These routes use the Herring Road on-ramp in the westbound direction. A total of 57 eastbound services operate along these routes each weekday.

Beecroft Road bus ramp routes – Routes 611 and 740 exit via the Beecroft Road bus only ramp and travel to Epping Station, Macquarie University and terminate at Macquarie Centre. A total of 23 eastbound services operate along these routes each weekday.

Legend:

- Major centre
- 1 Penrith to Blacktown (North)
- 2 Penrith to Blacktown (South)
- 3 Blacktown to Castle Hill
- 4 Blacktown to Parramatta
- 5 Castle Hill to Hornsby
- 6 Castle Hill to City (via Macquarie)
- 7 Hornsby to Macquarie
- 8 Hornsby to Chatswood
- 9A Parramatta to City (via Macquarie)
- 9B Parramatta to City (via Ryde)
- 10 Parramatta to Bankstown
- 11 Parramatta to Liverpool (T-way)
- 12 Parramatta to Burwood
- 13 Macquarie to City (via Chatswood)
- 14 Chatswood to Dee Why/Brookvale
- 15 Mona Vale to City
- 16 Brookvale to City (via Roseville)
- 17 Bondi Junction to City
- 18 Randwick to City
- 19 Maroubra to City
- 20 Miranda to City
- 21 Miranda to Heathcote
- 22 Miranda to Bankstown
- 23 Miranda to Hurstville
- 24 Hurstville to Bankstown
- 25 Hurstville to City (via Newtown)
- 26 Hurstville to Burwood
- 27 Bankstown to Burwood
- 28 Bondi Junction to Burwood
- 29 Bondi Junction to Hurstville
- 30 Liverpool to Campbelltown
- 31 Campbelltown to Camden
- 32 Liverpool to Bankstown
- 33 Bankstown to Wetherill Park
- 34 Bankstown to Burwood
- 35 Mona Vale to Macquarie
- 36 Burwood to City
- 37 Burwood to Chatswood
- 38 Burwood to Macquarie
- 39 Parramatta to Castle Hill
- 40 Parramatta to Rouse Hill
- 41 Parramatta to Wetherill Park

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Current bus facilities on the M2 Motorway include:

- Bus only lanes, in each direction, along the median between Windsor Road and Beecroft Road.
- Bus only east facing entry / exit ramp at the Windsor Road interchange.
- Bus only east facing entry / exit ramp at the Pennant Hills Road interchange.
- Bus only west facing flyover at Beecroft Road.
- Median bus stop near Barclay Road, North Rocks.
- Median bus stop near Oakes Road, West Pennant Hills.
- Kerbside bus stops near Gooden Reserve, Model Farms.
- Kerbside bus stops near Cropley Drive, Baulkham Hills.

Bus service level and reliability are dependent on traffic conditions on the M2 Motorway and the surrounding local road network. The dedicated bus lanes along the M2 Motorway allow a congestion free journey with reliable travel times along the M2 Motorway, between Windsor Road and Beecroft Road. However, buses that continue beyond Beecroft Road to the CBD encounter recurrent congestion, particularly in the section between Beecroft Road and Christie Road where peak traffic volumes are the greatest. In the westbound direction during the PM peak period, lengthy queuing can be experienced by buses until they reach the dedicated bus lanes.

Along the adjacent rail network, the largest passenger flows occur at the following locations:

- Epping Railway Station – where passengers can connect to the Northern Line services and Newcastle and Central Coast Line services that stop at Epping Station.
- Chatswood Station – where passengers can connect with North Shore Line services.

The Epping to Chatswood Rail Line was commissioned on 26 February 2009 and connects two stations listed above to provide rail connections to the growing North Ryde/Macquarie area. At the end of the fare free period (June, 2009), patronage along the line was approximately 12,000 passengers per day.

Epping rail station is also serviced by CityRail's Northern Railway Line as well as various Government and private bus routes. Table 23 shows the various bus routes providing connections to the Northern Rail Line in the vicinity of the M2 Motorway.

Table 23 Bus routes with connections to the Northern Rail Line

Service	Origin	Via	Station	Operator	No. of services (arriving before 9.00am)
546	Parramatta	Oatlands, North Rocks, Carlingford	Epping	Sydney Buses	6
548	Parramatta	North Rocks, Carlingford	Epping	Sydney Buses	6
549	Parramatta	Carlingford	Epping	Sydney Buses	5
553	North Rocks	North Rocks, Carlingford	Beecroft	Sydney Buses	1
611*	Blacktown	Seven Hills, M2 Motorway	Epping (continues to Macquarie Centre)	Hillsbus	5
625	Parramatta Interchange	North Rocks, Carlingford	Pennant Hills	Hillsbus	5
626	Dural	Cherrybrook	Pennant Hills	Hillsbus	6
630	Blacktown	Seven Hills, Baulkham Hills, Carlingford	Epping (continues to Macquarie Centre)	Hillsbus	4
632	Castle Hill	Cherrybrook	Pennant Hills (continues to Hornsby and also services Thornleigh, Normanhurst, Waitara stations)	Hillsbus	8
633	Castle Hill	West Pennant Hills	Pennant Hills	Hillsbus	6
635	Castle Hill	West Pennant Hills	Beecroft	Hillsbus	4
637	Glenorie	Galston, Round Corner	Pennant Hills	Hillsbus	1
638	Berrilee	Arcadia, Galston, Round Corner	Pennant Hills	Hillsbus	2
639	Kenthurst	Round Corner	Pennant Hills	Hillsbus	1
651	Castle Hill	West Pennant Hills	Beecroft (continues to Macquarie Centre and CBD)	Hillsbus	5
740*	Plumpton	Quakers Hill, Stanhope Gardens, Glenwood, M2 Motorway	Epping (continues to Macquarie Centre)	Busways	5

*Denotes services that would be rerouted as a result of the M2 Upgrade project.

In addition to the services listed in Table 23, the bus services operating along the M2 Motorway are illustrated in Figure 17.

Passenger counts of bus services 740 and 611, which access the Beecroft Road bus ramps at the M2 Motorway, indicate low patronage with approximately 70 passengers departing and boarding these services daily. In addition to these passengers, there are approximately 40 students that utilise these services (DT&I, pers comm., 2010).

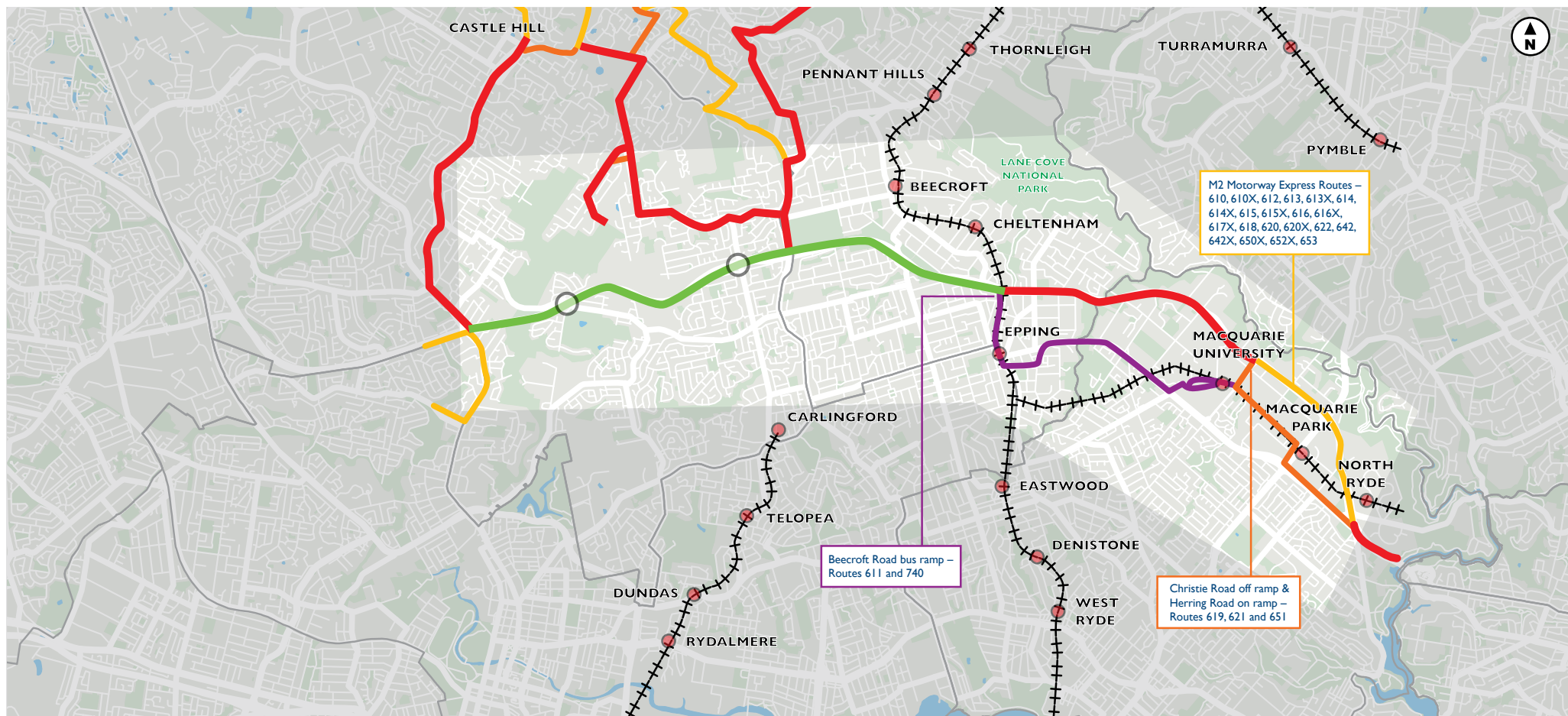
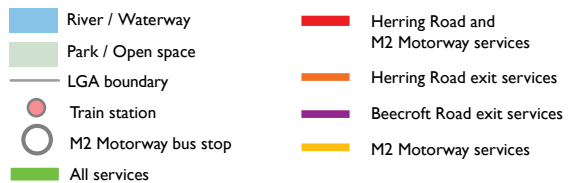


Figure 17 – M2 Motorway bus services and surrounding rail network

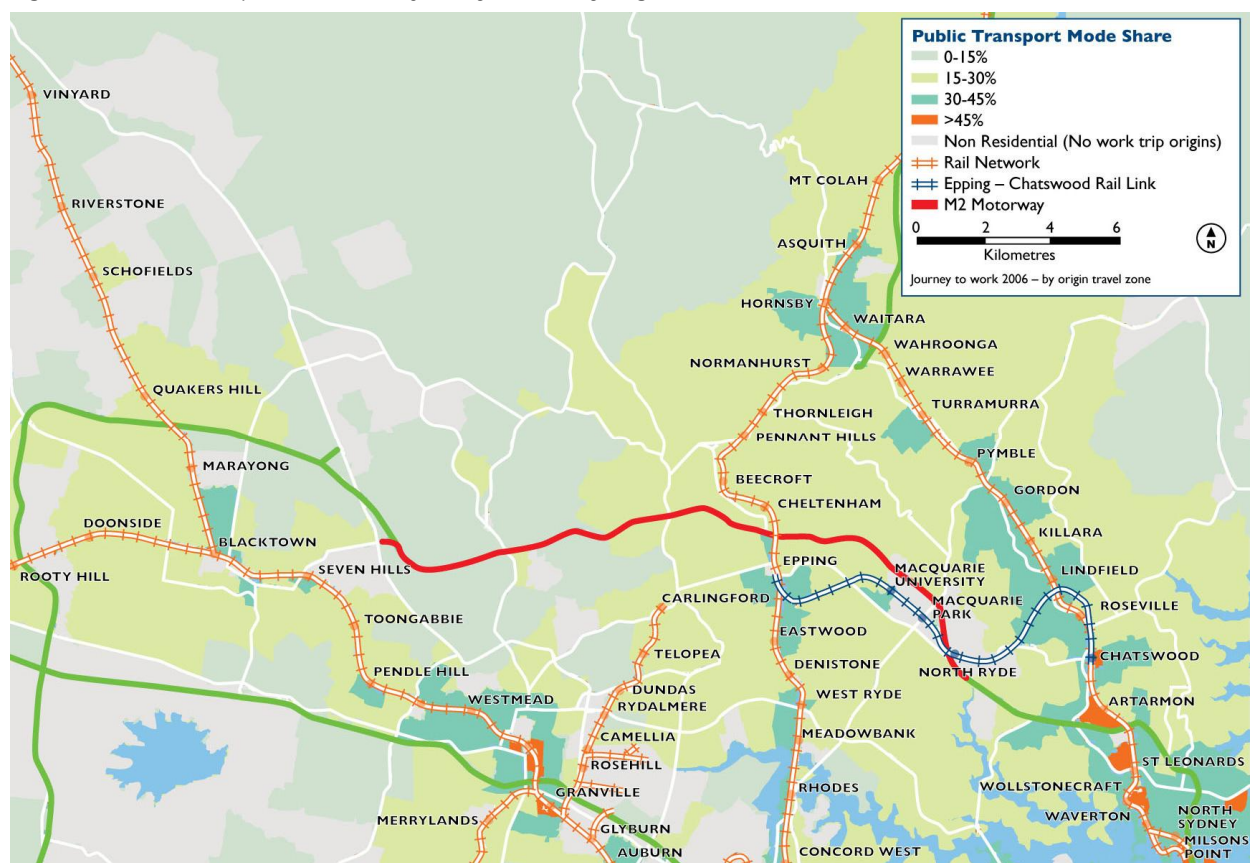


Transport mode share

Existing proportion of Journey to Work (JTW) public transport trips originating in the vicinity of the M2 Motorway is between 0 to 30 percent of total trips. As shown in Figure 18, the public transport mode share west of Pennant Hills Road is 0-15 percent, whereas east of Pennant Hills Road it increases to 15-30 percent and corresponds to the alignment of the rail network.

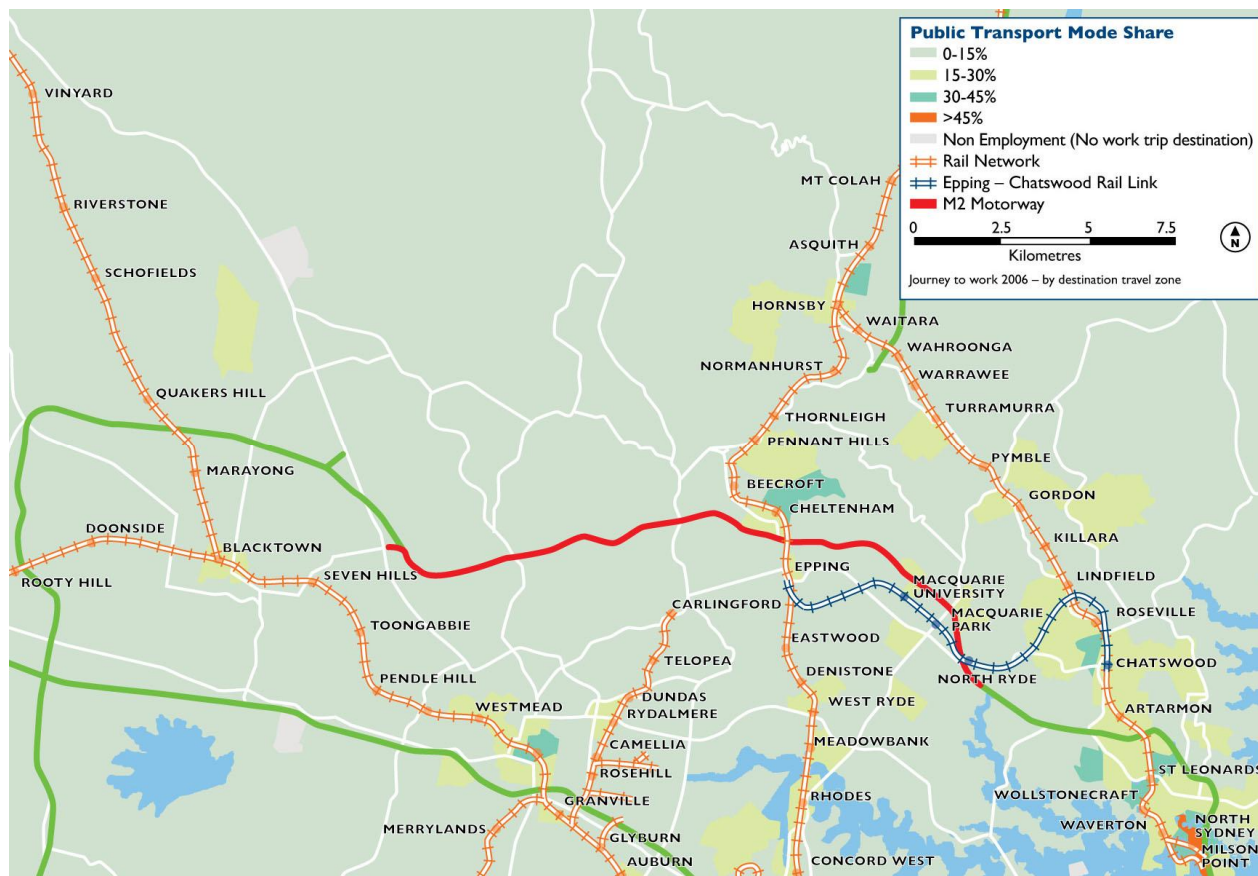
With limited rail infrastructure along the M2 Motorway corridor, bus services are often the primary public transport alternative for most people within surrounding areas. As illustrated in Figure 39, the 2006 Census data indicate that Blacktown and Baulkham Hills LGAs having a higher proportion of people travelling to work by car at 67 percent and 70 percent respectively compared to 58 percent for the Sydney region. Comparatively, the public transport mode share for trips with destinations in the vicinity of the M2 Motorway is low, as shown in Figure 19.

Figure 18 Public transport mode share journey to work by origin



Source: ABS 2006

Figure 19 Public transport mode share journey to work by destination



Source: ABS 2006

The NSW Government has set relatively high mode share targets for public transport to Sydney CBD of 75 percent by 2016 and for Macquarie Park of 40 percent by 2031. The associated initiatives being implemented to achieve these targets, such as restricting parking availability, would continue to drive growth in public transport usage.

Local road network

For urban and suburban arterial roads with interrupted flow (due to signalised intersections, driveways and the like), LoS is defined in terms of average travel speed of all through vehicles and is strongly influenced by the spacing of traffic signals and average intersection delay. The following is a description of each LoS (AustRoads (1988), "Guide to Traffic Engineering Practice, Part 2 - Road Capacity", Sydney):

- LoS A: Generally free flow conditions with operating speeds about 90% of free flow travel speeds. Vehicles are unimpeded in manoeuvring in the traffic stream and stopped delay at intersections is minimal.
- LoS B: Relatively unimpeded operation with average travel speed about 70% of the free flow speed. Manoeuvring in the traffic stream is only slightly restricted and stopped delays are low.
- LoS C: Stable operating conditions but with manoeuvring becoming more restricted and motorist experiencing appreciable tension in driving, longer queues and/or adverse signal coordination may contribute to lower average travel speeds of about 50% of the free flow speed.

- LoS D: Conditions border on a range which small increases in flow can significantly intersection delay and reduce travel speed. Travel speeds are about 40% of the free flow speed.
- LoS E: Conditions are characterised by significant intersection delays and travel speeds of 33% of free flow speed or lower. Contributing factors may be: adverse signal progression closely spaced signals and saturated intersection conditions.
- LoS F: Traffic flow at this level is very low speed – below 25% to 33% of the free flow speed. Signalised intersections would be over-saturated with extensive queuing.

To describe the performance of the surrounding local road network in the vicinity of the proposed M2 Upgrade project, four screen lines adjacent to the M2 Motorway have been defined as shown in Figure 20.

Table 24 summarises the AM and PM peak hour flows and LoS of the screenline points based on the procedures in the US Transport and Research Board 2000 Highway and Capacity Manual.

The analysis identifies several locations where the citybound movement operates at LoS F during the AM peak, including Norwest Boulevard east (1A), Old Windsor Road (1E), James Ruse Road (2D), Church Street (2E), Epping Road (3C) and Pennant Hills Road (4C) and Ryde Road (4F) along screenline 4. At these locations heavy congestion is experienced together with slower travel times.

During the PM peak, the outbound direction is the dominant movement. Relative to the inbound movement during the AM peak, improvements in congestion levels and LoS are indicated during the PM peak. However, heavy congestion is identified at Epping Road west of Vimiera Road (3C), with a LoS F.

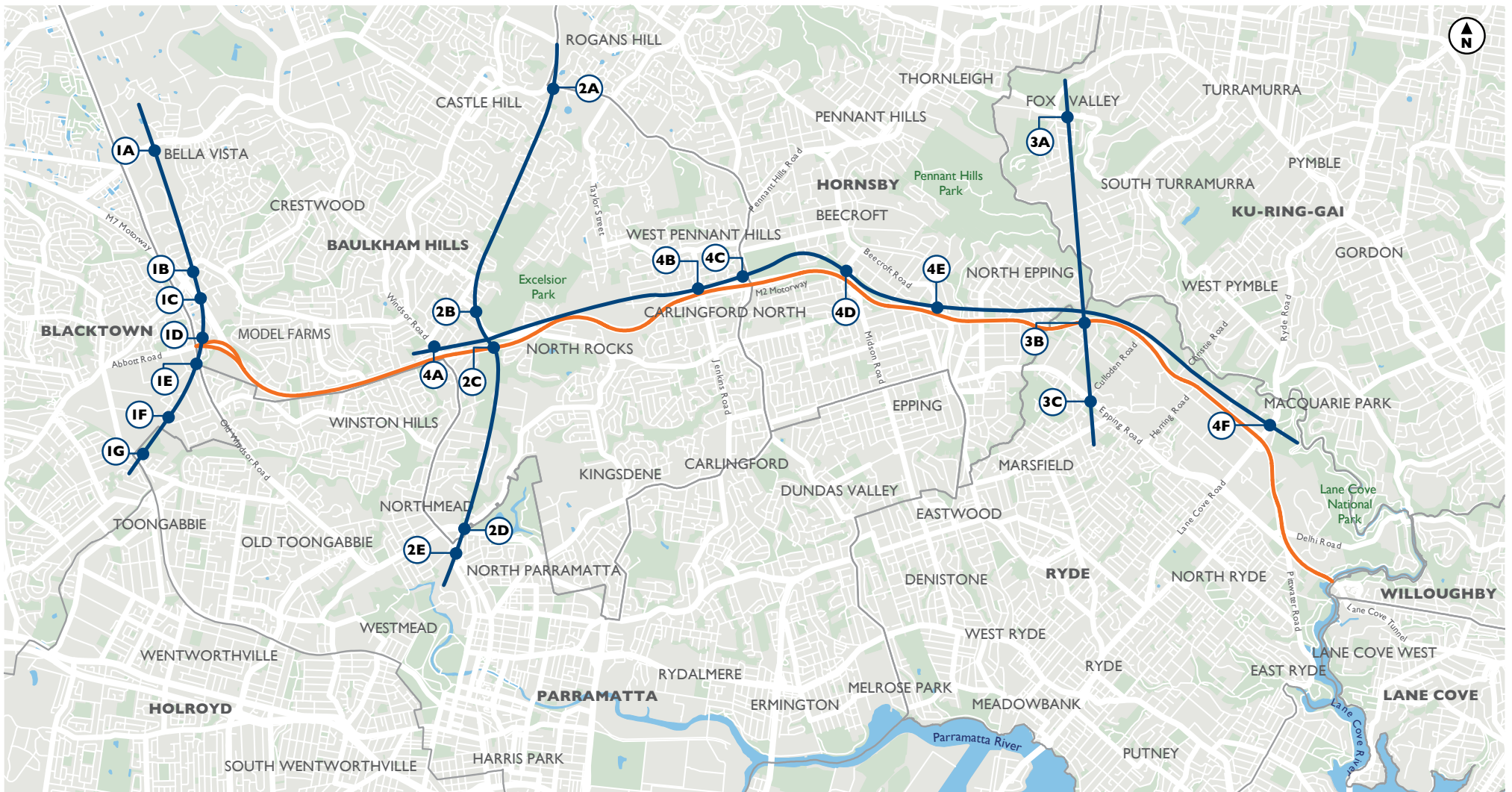


Figure 20 – Location of screen lines

- M2 Motorway
- Screen lines
- River / Waterway
- Park / Open space
- LGA boundary



Source: Transurban, 2010