

NSW Department of Planning and
Environment

**Hornsby Quarry Construction
Spoil Management Facility**

Independent Transport Assessment

Rev A | 26 November 2015

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

1.1 Background

Roads and Maritime Services (ROADS AND MARITIME) is seeking approval under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the use of Hornsby Quarry as a site for handling, management and beneficial reuse of spoil generated by the construction of NorthConnex.

Arup was engaged by the Department of Planning and Environment (DP&E) to inform their assessment of the Hornsby Quarry Road Construction Spoil Management Facility by providing independent traffic and transport advice relating to the adequacy of the documentation provided and the appropriateness of the mitigation measures proposed in the following documents:

- Hornsby Quarry Road Construction Spoil Management Project – Appendix C - Technical Working Paper: Traffic
- Hornsby Quarry Road Construction Spoil Management project - Submissions and Preferred Infrastructure Report

It is understood traffic and transport is one of the key environmental issues associated with the proposal.

1.2 Objectives

The objectives of this study are as follows:

- Review the traffic and transport assessment in the Environmental Impact Statement (EIS) and comment on the technical adequacy and completeness of the assessment. The review shall take into account relevant guidelines, requirements and legislation
- Review the appropriateness and effectiveness of management and mitigation measures recommended for the project, taking into account relevant guidelines, industry best practice and research or monitoring evidence

2 Existing Conditions

2.1 Site Location

The Hornsby Quarry site is located around 21 kilometres north-west of the Sydney Central Business District, in Old Mans Valley to the west of Hornsby town centre. The site covers about 35 hectares and is owned by Hornsby Shire Council (Council).



2.2 Existing Road Network

The study area under consideration for the project stretches from the Pacific Highway between Pennant Hills Road and Ku-ring-gai Chase Road in the north to the M1 Pacific Motorway / Pacific Highway interchange in the south as well as encompassing the M1 Motorway.

2.2.1 Pacific Highway

The Pacific Highway north of the Pacific Highway / Pennant Hills Road intersection is a divided carriageway which has a speed limit of 60 kilometres per hour. Within the study area, the Pacific Highway provides access to the suburbs of Hornsby, Normanhurst, Waitara Mount Colah and Mount Ku-ring-gai. Parking is available in the kerbside lane through a number of sections. South of High Street, the Pacific Highway is three lanes in either direction. To the north of William Street until the intersection with Bridge Road, the Pacific Highway is primarily a single carriageway with a speed limit of 50 kilometres per hour. The stretch of the Pacific Highway between George Street and Bridge Road is also referred to as Peats Ferry Road.

2.2.2 M1 Pacific Motorway

Within the study area, the M1 Pacific Motorway extends between Pennant Hills Road and Ku-ring-gai Chase Road under dual carriageway conditions with separation between the northbound and southbound directions of travel. The speed limit ranges between 80 to 100 kilometres per hour and the cross section consists of three lanes in either direction (six lanes in total).

2.2.3 George Street

George Street facilitates a sub-arterial function within the Hornsby town centre. The route is designed to remove traffic from the Hornsby town centre located to the west of Hornsby Station. The southern section provides a narrow median with pedestrian fencing prohibiting pedestrians crossing the road. The posted speed limit is 60 kilometres per hour and parking is not permitted on either side of the road.

2.2.4 Jersey Street North

Jersey Street North serves a sub-arterial road linking Hornsby town centre with Mount Colah. The posted speed limit is 60 kilometres per hour.

2.2.5 Bridge Road

Bridge Road is mainly a local road; however, between Pacific Highway and George Street, the road performs a sub-arterial role in linking George Street and Jersey Street North. Bridge Road has two trafficable lanes in either direction between George Street and the Pacific Highway. West of the Pacific Highway, the lane arrangement transitions to one lane in either direction with an additional lane of parking. There are approximately 12 car parking spaces on the eastern side of Bridge Road, south of Roper Lane. The posted speed limit is 60 kilometres per hour where Bridge Road is a sub-arterial, 50 kilometres per hour west of the Pacific Highway and drops to 30 kilometres per hour at the curve to access the quarry.

2.2.6 Ku-ring-gai Chase Road

Ku-ring-gai Chase Road is a sub-arterial road primarily consisting of a single carriageway with one lane in either direction. Ku-ring-gai Chase Road has access to the M1 Motorway through southern access ramps. The speed limit on Ku-ring-gai Chase Road is 60 kilometres per hour.

2.3 Existing Traffic Volumes

Hourly intersection count summary obtained by AECOM (2013, 2014 & 2015) for the AM and PM peak periods are presented in Table 1 below.

Table 1 Peak hour traffic volumes

Intersection/Peak	Light Vehicles	Heavy Vehicles	Total	HV % (Peak Hour)
M1 Pacific Motorway / Pacific Highway Interchange				
AM Peak	4,450	240	4,690	5%
PM Peak	4,970	120	5,090	2%
Pennant Hills Road / Pacific Highway				
AM Peak	2,950	200	3,150	6%
PM Peak	3,330	110	3,440	3%
Pacific Highway / College Crescent / Pretoria Parade				
AM Peak	2,617	161	2,778	6%
PM Peak	2,786	153	2,939	5%
Pacific Highway / Edgeworth David Avenue				
AM Peak	2,966	183	3,149	6%
PM Peak	3,407	90	3,497	3%
Pacific Highway / George Street				
AM Peak	2,958	187	3,145	6%
PM Peak	3,405	90	3,495	3%
Pacific Highway / Bridge Road				
AM Peak	1,906	62	1,968	3%
PM Peak	2,104	48	2,152	2%
Bridge Road / Jersey Street North				
AM Peak	2,004	48	2,052	2%
PM Peak	2,107	34	2,141	2%
Pacific Highway / Jersey Street North / Wattle Street				
AM Peak	1,658	64	1,722	4%
PM Peak	2,023	58	2,081	3%
Pacific Highway / Yirra Road				
AM Peak	2,215	66	2,281	3%
PM Peak	2,595	52	2,647	2%
Pacific Highway / Ku-ring-gai Chase Road				
AM Peak	497	24	521	5%
PM Peak	639	12	651	2%

(Source: Austraffic, 2013; Skyhigh 2014, Skyhigh 2015)

2.4 Road Network Performance

2.4.1 Traffic Crashes

AECOM reported that no fatal crashes have occurred within the past six years on the M1 Pacific Motorway and the Pacific Highway, but injury crashes have occurred on a slightly higher than average frequency when compared to the NSW average. However, there were no identified ‘blackspots’ nor noticeable areas of high crash activity which would impact the proposal.

2.4.2 Intersection Performance

The performance of intersections has been assessed in terms of Level of Service (LOS), which is based on the average delay per vehicle. LOS ranges from A = very good to F = unsatisfactory.

The majority of the intersections within the study area operate within the recommended guidelines for intersection operation (Level of Service D or better). The traffic signals are coordinated to provide priority along each corresponding corridor to reduce the average delays to the major through movements in the peak direction.

However to the south of the study area the intersection performance is approaching capacity with movements recording a poor level of service. This indicates that the M1 Pacific Motorway / Pacific Highway interchange and Pennant Hills Road / Pacific Highway is susceptible to decreases in performance with any increase in demand without improvements to intersection layouts, or where possible, further optimisation of the signal timings.

This is summarised in Table 2 below.

Table 2 Existing intersection performance

Intersection/Peak	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service
M1 Pacific Motorway / Pacific Highway interchange				
AM Peak	4,450	240	42.3	C
PM Peak	4,970	120	55.3	D
Pennant Hills Road / Pacific Highway				
AM Peak	2,950	200	58.1	E
PM Peak	3,330	110	50.1	D
Pacific Highway / College Crescent / Pretoria Parade				
AM Peak	2,617	161	52.9	D
PM Peak	2,786	153	49.6	D
Pacific Highway / Edgeworth David Avenue				
AM Peak	2,966	183	27.6	B
PM Peak	3,407	90	29.7	C

Intersection/Peak	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service
Pacific Highway / George Street				
AM Peak	2,691	165	37.4	C
PM Peak	3,186	82	49.1	D
Pacific Highway / Bridge Road				
AM Peak	1,906	62	26.4	B
PM Peak	2,104	48	32.3	C
Bridge Road / Jersey Street North				
AM Peak	2,004	48	33.7	C
PM Peak	2,107	34	28.7	C
Pacific Highway / Jersey Street North / Wattle Street				
AM Peak	1,658	64	14.8	B
PM Peak	2,023	58	30.1	C
Pacific Highway / Yirra Road				
AM Peak	2,215	66	31.6	C
PM Peak	2,595	52	44.8	D
Pacific Highway / Ku-ring-gai Chase Road				
AM Peak	497	24	3.2	A
PM Peak	639	12	4.8	A

2.5 Existing Public Transport Network

2.5.1 Rail services

Hornsby Station is located to the east of the Pacific Highway opposite Dural Lane. There are two other stations either side of Hornsby Station which are in the study area, Waitara and Asquith.

The North Shore, Northern and Central Coast and Newcastle lines stop at Hornsby Station. 30 services operate in the AM peak period and 28 services operate in the PM peak period on the Northern and North Shore lines. Station entry and exit barrier counts for Hornsby equate to 11,560 for both in and out over a 24 hour period, Waitara equates to 3,000 for both in and out over a 24 hour period, and Asquith equates to 1,460 for both in and out over a 24 hour period.

2.5.2 Bus Services

Four bus services run past the site and 10 bus services operate to Hornsby Station, ranging from every 10 minutes to once an hour.

Table 3 Existing bus services

Route	AM peak services (7:00 9:00)	Frequency	PM peak services (16:00 18:00)	Frequency
M60 Hornsby to Parramatta	6	10 mins	12	10 mins
575 Macquarie University to Hornsby	5	24 mins	5	24 mins
588 Hornsby to Normanhurst West	2	60 mins	5	24 mins
596 Hornsby to Hornsby Heights	7	17 mins	7	17 mins
598 Hornsby to Asquith	4	30 mins	4	30 mins
587 Hornsby to Westleigh	2	60 mins	4	30 mins
589 Hornsby to Sydney Adventist Hospital	2	60 mins	2	60 mins
595 Hornsby to Mt Colah	3	40 mins	4	30 mins
597 Hornsby to Berowra	2	60 mins	2	60 mins
594H City Express	2	60 mins	3	40 mins

(Source: HillsBus and Transdev, 2015)

2.6 Existing Active Transport Network

Walk only trips in the area represent 14 per cent of average weekday travel mode share in Hornsby. Cycle trips are not represented in the mode share data, although account for a proportion of the 'other' category which represents two per cent in the Hornsby LGA.

Pedestrian footpaths are provided along the sides of the roads, with regular crossings via signalised intersections as well as two pedestrian overpasses at Hornsby train station. There are no separated cyclist facilities within the Hornsby area and roads within the study area are generally not an inviting cycle route. The Pacific Highway, however, provides on-road cycle facilities, in the form of a widened road shoulder, between Galston Road and Ku-Ring-gai Chase Road.

The Hornsby Mountain Bike Trail is also located within the study area. It provides six kilometres of off-road trails which are accessed from Quarry Road.

3 Proposed Development

3.1 Scope of Works

The site would be used to receive up to 1.5 million cubic metres of excavated natural material and/or virgin excavated natural material from the approved NorthConnex construction sites. Only excavated natural material and/or virgin excavated natural material would be received and reused at the Hornsby Quarry site. Key features of the project include:

- Widening and sealing of the quarry access road (Bridge Road and track) to facilitate all weather access.
- Clearing and grubbing, and establishment of erosion and sediment controls.
- Establishment of a compound site, security fencing and signage around the construction area.
- Dewatering of the void (to be undertaken by Hornsby Council in accordance with its existing groundwater licence) to a suitable level that allows working within the void.
- Spoil haulage by truck from the NorthConnex construction sites to the Hornsby Quarry site over a period of approximately 28 months.
- Stockpiling of spoil within the Hornsby Quarry site using dozers.
- Transport of the spoil via the conveyor from the stockpiles to the rim of the quarry void, where the spoil would fall directly into the void.
- Spreading and grading of the spoil on the quarry floor.
- Site demobilisation and rehabilitation of the compound site, stockpile areas and the conveyor corridor.

The project is anticipated to commence in late 2015 and is expected to take around 33 months to complete.

3.2 Proposed Site Access and Haulage Routes

The routes between the NorthConnex spoil locations and Hornsby Quarry are different for the inbound and outbound trips to/from the quarry during peak times. Peak times have been defined as 7 am to 10 am during the AM peak hour and 3 pm to 6 pm for the PM peak hour on weekdays.

Access routes proposed to Hornsby Quarry from NorthConnex sites south of the M1 Pacific Motorway / Pennant Hills Road intersection:

- Into Hornsby Quarry: Pacific Highway from the intersection with Pennant Hills Road, then along George Street and onto Bridge Road.
- Out of Hornsby Quarry:
 - Non-peak hours: Bridge Road and south along George Street and the Pacific Highway onto Pennant Hills Road (southern route)
 - Peak hours:
 - (i) out through Bridge Road and north along Jersey Street North, the Pacific Highway, Yirra Road, Belmont Parade, Ku-ring-gai Chase Road to connect with the M1 Pacific Motorway (northern route)
 - (ii) out through Bridge Road and north along Jersey Street North, the Pacific Highway to Windybanks Interchange at Berowra
 - (iii) Bridge Road and south along George Street and the Pacific Highway onto Pennant Hills Road

Access routes proposed to Hornsby Quarry from NorthConnex sites north of the M1 Pacific Motorway / Pennant Hills Road intersection

- Into Hornsby Quarry (M1 Compound Scenario): From the Mt Colah M1 Pacific Motorway exit, a U-turn via Ku-ring-gai Chase Road interchange back onto the M1 Pacific Motorway to travel south, turn right and travel along Pacific Highway as per the southern haulage route
- Out of Hornsby Quarry (M1 Compound Scenario):
 - Non-peak hours: Bridge Road and south along George Street and the Pacific Highway onto Pennant Hills Road and back on the M1 Pacific Motorway.
 - Peak hours:
 - (i) out through Bridge Road and north along Jersey Street North, the Pacific Highway, Yirra Road, Belmont Parade, Ku-ring-gai Chase Road to connect with the M1 Pacific Motorway (northern route)
 - (ii) out through Bridge Road and north along Jersey Street North, the Pacific Highway to Windybanks Interchange at Berowra
 - (iii) Bridge Road and south along George Street and the Pacific Highway onto Pennant Hills Road

These routes are presented graphically in Figure 1 below.

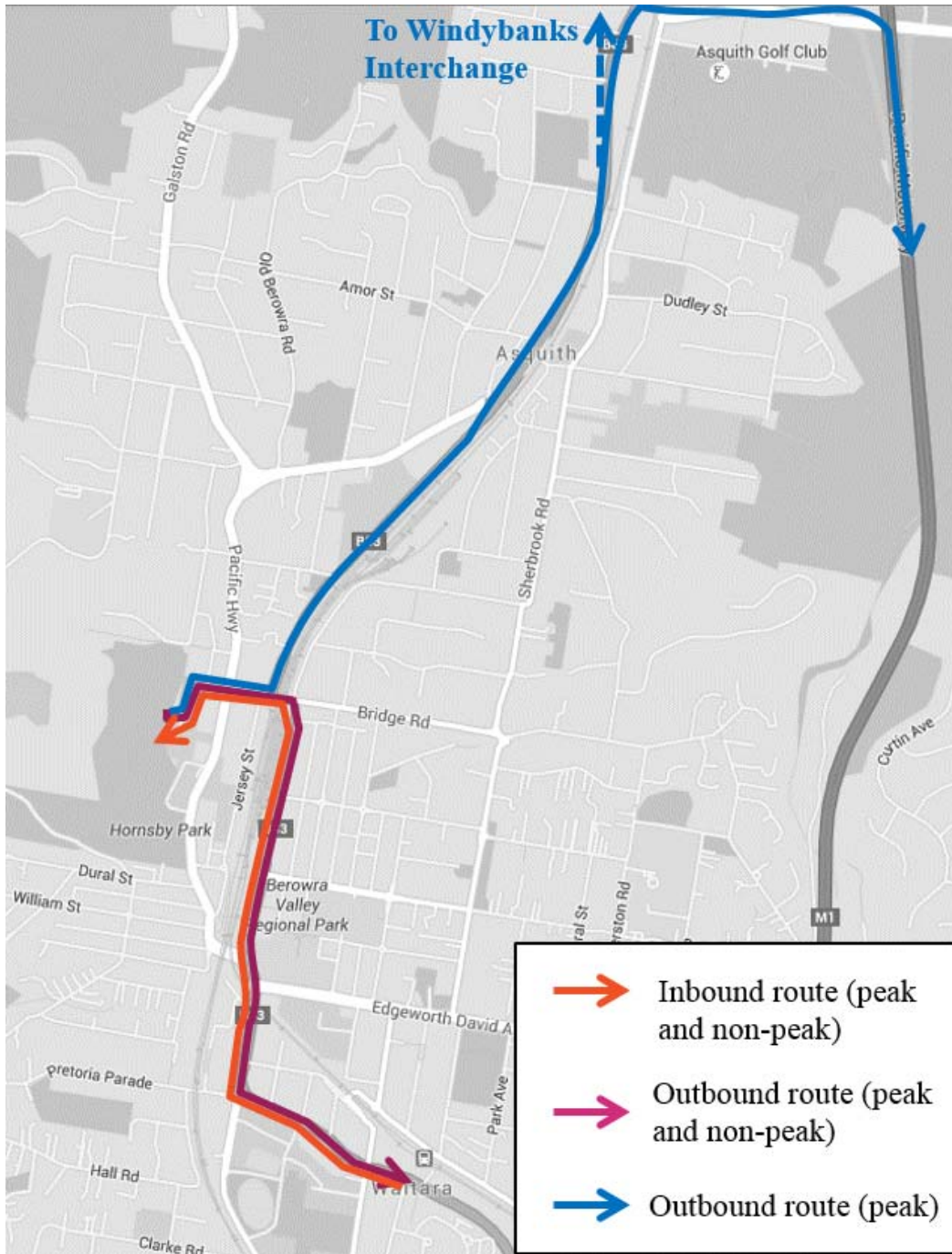


Figure 1 Proposed site access and haulage routes

3.3 Work Hours and Traffic

All works and haulage associated with spoil management at the Hornsby Quarry site would be confined to standard day time hours comprising:

- 7 am to 6 pm, Monday to Friday
- 8 am to 1 pm, Saturdays
- No work on Sundays or public holidays.

3.4 Traffic Flows

The maximum number of trucks accessing Hornsby Quarry in an hour is proposed to be 35. This equates to a maximum potential total of 385 trucks per weekday of operation. The program for spoil haulage is anticipated to run for 28 months.

The trip patterns of project site staff, whose shift is slated to commence at 6 am, will not impact on the peak period of traffic on the surrounding road network. Similarly, following completion of construction site activities at 6 pm, workers will leave the site after the PM peak period and are not anticipated to impact on the operation of the surrounding road network. Staff traffic generation is estimated to be approximately 20 light vehicles.

Table 4 Forecast vehicle movements

Phase	Daily heavy vehicles (and movements)	Daily light vehicles (and movements)
Preparatory works	10 (20)	10 (20)
Site establishment works	20 (40)	25 (50)
Establishment of conveyer	20 (40)	25 (50)
Spoil emplacement activities (haulage)	385 (770)	20 (40)
Site clean-up and demobilisation and	20 (40)	20 (40)

4 Assessment of Key Issues

4.1 Traffic Modelling Methodology

The approach AECOM adopted to undertake the traffic modelling and forecasting for the traffic and transport assessment involved:

- Use of existing traffic counts to characterise existing traffic conditions and road network performance.
- Application of a strategic Sydney transport model (Cube traffic modelling package) to determine anticipated future growth in traffic road network and the effects of tolling on road traffic demand.
- Use of strategic (Cube) and corridor (LinSig) traffic models to determine existing and future traffic conditions within the study area. The outputs from these models have been used to assess the operational performance of the intersections within the study area during the operation of construction.

Recommendation

This approach is considered adequate to assess the impacts of the proposal.

4.2 Traffic Distribution

Modelling undertaken by AECOM to assess the impacts of construction traffic on the local road network has focused on the access routes identified in the M1 compound scenario. This scenario provides for the distribution of 23 haulage vehicles which emanate from the M1 compound and travel northbound on the M1. Vehicles are proposed to utilise the M1 / Ku-ring-gai Chase Road interchange to undertake a u-turn before travelling southbound and accessing the Pacific Highway via the M1/ Pacific Highway interchange.

The remaining 12 haulage vehicles originate from sites located to the south of the Pennant Hills Road / Pacific Highway intersection and travel north to the intersection of Pennant Hills Road / Pacific Highway via Pennant Hills Road. To the north of this location, regardless of the access route scenario, the distribution of construction haulage vehicles and their routes to and from Hornsby Quarry during peak times are identical.

Recommendation

For the purposes of assessing localised road network impacts, this distribution is considered adequate.

4.3 Background Traffic Volumes and Patterns

The year 2016 has been used as the assessment year for impacts, which is representative of and aligns with the anticipated program of works for NorthConnex tunnelling and excavation activities.

Recommendation

This approach is considered adequate to assess the impacts of the proposal.

4.4 Intersection Performance

AECOM's analysis provides a comparison of intersection performance with and without project vehicles during the AM and PM peak periods. This is summarised in the table below, with poorly performing intersections highlighted in red.

Table 5 Future intersection performance

Intersection/ Peak	2016 – Without project				2016 – With project			
	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service
M1 Pacific Motorway / Pacific Highway Interchange								
AM Peak	4,520	262	35.2	C	4,520	262	35.2	C
PM Peak	5,009	144	68.2	E	5,009	144	71.4	F
M1 Pacific Motorway / Pacific Highway Interchange (M1 compound scenario)								
AM Peak	4,520	262	35.2	C	4,520	274	47.7	D
PM Peak	5,009	144	68.2	E	5,009	156	81.4	F
Pennant Hills Road / Pacific Highway								
AM Peak	2,940	195	76.3	F	2,940	230	76.8	F
PM Peak	3,367	116	45.9	D	3,367	151	45.9	D
Pennant Hills Road / Pacific Highway (M1 compound scenario)								
AM Peak	2,940	195	76.3	F	2,940	230	90.3	F
PM Peak	3,367	116	45.9	D	3,367	151	48.1	D
Pacific Highway / College Crescent / Pretoria Parade								
AM Peak	2,670	168	47.1	D	2,670	203	51.5	D
PM Peak	2,822	157	47.0	D	2,822	192	52.9	D
Pacific Highway / Edgeworth David Avenue								
AM Peak	3,042	200	32.2	C	3,042	235	32.2	C
PM Peak	3,462	97	30.8	C	3,462	132	30.9	C
Pacific Highway / George Street								
AM Peak	2,777	175	41.5	C	2,777	210	41.8	C
PM Peak	3,235	88	50.3	D	3,235	123	51.5	D
Pacific Highway / Bridge Road								
AM Peak	1,972	68	29.8	C	1,972	138	58.2	E
PM Peak	2,184	54	46.1	D	2,184	124	74.7	F

Intersection/ Peak	2016 – Without project				2016 – With project			
	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service	Light Vehicles	Heavy Vehicles	Average Delay	Level of Service
Bridge Road / Jersey Street North								
AM Peak	2,003	48	20.9	B	2,003	118	26.3	B
PM Peak	2,151	33	25.3	B	2,151	103	25.4	B
Pacific Highway / Jersey Street North / Wattle Street								
AM Peak	1,663	64	20.2	B	1,663	99	20.6	B
PM Peak	2,076	59	33.4	C	2,076	94	37.0	C
Pacific Highway / Yirra Road								
AM Peak	2,248	68	30.6	C	2,248	103	41.5	C
PM Peak	2,628	55	47.0	D	2,628	90	62.2	E
Pacific Highway / Ku-ring-gai Chase Road								
AM Peak	511	26	3.2	A	511	49	3.5	A
PM Peak	637	16	4.9	A	637	39	4.5	A

The traffic modelling indicates the following intersections will operate at or above capacity during the commuter peak hours throughout the project period:

- M1 Pacific Motorway / Pacific Highway Interchange
- Pennant Hills Road / Pacific Highway
- Pacific Highway / Bridge Road

As previously noted, the Pacific Motorway / Pacific Highway and Pennant Hills Road / Pacific Highway intersections already operate at or close to capacity, and are susceptible to decreases in performance with any increase in demand. In this context the deterioration in intersection performance is considered acceptable.

The greatest change in intersection performance is forecast to occur at the Pacific Highway / Bridge Road intersection. Currently the intersection operates satisfactorily in both peak hours, however with the project they are forecast to operate at Level of Service F. Average vehicle delays for cars travelling east along Bridge Road are expected to increase from 99 seconds to 145 seconds during the PM peak hour – an almost 50% increase.

It should be noted however that with the proposed closure of Roper Lane the primary users impacted will be those related to the quarry operations. The traffic modelling has not considered the closure of Roper Lane and therefore the intersection will likely operate at an improved level of service when compared to that indicated in the EIS.

The traffic impacts arising at the Pacific Highway / Yirra Road intersection are unclear from the documentation provided. It could be expected that the additional truck movements through this intersection would result queues in the right turn bay on the southern approach spilling back – impacting through traffic.



Figure 3 Bridge Road south of Roper Lane

Recommendation

- It is recommended detailed vehicle swept paths (undertaken in accordance with Austroads Standards) be provided as part of the traffic management plan for the project, at both the Yirra Road / Belmont Parade intersection and for Bridge Road south of Roper Road.
- Should the swept path analysis determine that the movement of spoil trucks is not feasible in the current environment, mitigation measures should be proposed. This may include localised road widening and/or the provision of on-site traffic controllers.

4.6 Parking

Parking for site personnel would be provided within the quarry site.

However to facilitate the movement of trucks on Bridge Road (west of Peats Ferry Road) it is likely that 30 on-street parking spaces will be temporarily removed. These spaces currently provide unrestricted, all day parking – with resident parking provided in off-street facilities in adjacent multi-dwelling developments.

Recommendation

Given the temporary nature of the works, and the spaces impacted are not subject to a resident parking scheme, the parking impacts are considered manageable.

4.7 Roper Lane Closure

The closure of Roper Lane at its connection to Bridge Road is proposed for safety reasons (to minimise interaction with local traffic) to manage haulage traffic along Bridge Road. Existing traffic utilising Roper Road to access Peats Ferry Road will need to use alternative routes rather than the signalised Bridge Road/Peats Ferry Road intersection.

The two closest intersections providing access to Peats Ferry Road are at Summers Avenue and Watson Avenue. These are both unsignalised intersection which provide for full turning movements. Traffic turning right into Peats Ferry Road must cross two lanes of oncoming traffic (60km/h speed limit). As illustrated in Figure 4, sight lines are partially obstructed for vehicles undertaking this movement. This provides for an unsafe environment. In the opposite direction, vehicles turning right into either of these streets would impact the flow of through traffic on Peats Ferry Road.



Figure 4 Peats Ferry Road / Watsons Avenue intersection

Image Source: Google Maps

The closest signalised intersection is at Galston Road, more than 1km north away from the intersection with Bridge Road. It is considered unlikely drivers would take this route as an alternative to the closer Summers Avenue and Watson Avenue.

Recommendation

To provide for safe movements for traffic impacted by the closure of Roper Road at Bridge Road, it is recommended traffic signals be provided at the Watsons Road / Peats Ferry Road intersection. With regards to this recommendation, the Roads and Maritime have noted that

“Preliminary discussions have started between Council and Roads and Maritime to identify a design solution for this intersection which would ensure the safety of road users and that would not result in a detrimental impact to the existing road network. Consultation would continue with the aim of identifying a safe, feasible design solution for potential implementation at the intersection in the future. Where such a design solution is identified and agreed, it is intended that intersection works would be carried as soon as possible to maximise road network benefits during the early stages of the project.”

4.8 Public Transport Impacts

Rail services in the project corridor and surrounding areas are not expected to be affected by the project

The applicant has noted that there will be some impacts to bus services arising from the proposed works – primarily due to increases in bus service travel times due to slower travel speeds and increased intersection delays.

The majority of bus services commence/terminate Hornsby train station, approximately 700m from the station. Analysis conducted by the applicant has considered the expected increase in travel time for the M60 bus route (the only metro bus route impacted by the works). This analysis undertaken has considered the AM and PM peak periods, between the intersections of Pacific Highway / George Street to Pacific Highway / Pennant Hills Road (a distance of approximately 2.1 km).

The table below indicates the increase in delay and impact on average speed for Route M60 as a result of construction vehicle traffic associated with the works. This indicates that delays will increase by between 4 seconds and 32 seconds, depending on the peak hour and direction.

Table 6 Increases in bus travel times arising from proposal

Peak / Direction	Overall Delay (sec)
<i>AM Peak</i>	
Southbound	17.5 sec (increase)
Northbound	31.7 sec (increase)
<i>PM Peak</i>	
Southbound	17.5 sec (increase)
Northbound	4.2 sec (increase)

Recommendation

In the context of the existing M60 bus route, with a total travel time of approximately 1 hour 20 minutes, a temporary increase in bus delays of between 4 seconds and 32 seconds is considered manageable.

4.9 Pedestrian Impacts

Pedestrian access along Bridge Road, south of Roper Lane, is proposed to be prohibited during the construction phase. It is unclear whether this is planned to be continued post construction during the project life as well.

Consideration must be given to pedestrian safety and accessibility within the vicinity of the site and pedestrians accessing the lower TAFE campus via Bridge Road.

Recommendation

It is recommended the applicant, in consultation with the TAFE, ensure provision is made for the safe pedestrian access to Buildings H and U on the lower level of the Hornsby TAFE Campus.

5 Recommendations and Mitigation Measures

5.1 Summary of Recommendations

A summary of the recommendations arising from this transport assessment are provided in Table 7 below.

Table 7 Summary of recommendations

Issue	Recommendation
Traffic Modelling Methodology	No additional documentation / analysis required.
Traffic Distribution	No additional documentation / analysis required.
Background Traffic Volumes and Patterns	No additional documentation / analysis required.
Intersection Performance	Further analysis should be conducted which considers the traffic impacts at the Pacific Highway / Yirra Road intersection. Should the analysis conclude that the queues in the right turn bay on the southern approach spill back to the through lane, lengthening of the right turn bay should be considered.
Vehicle Swept Paths	Detailed vehicle swept paths (undertaken in accordance with Austroads Standards) be provided as part of the traffic management plan for the project, at both the Yirra Road / Belmont Parade intersection and for Bridge Road south of Roper Road. Should the swept path analysis determine that the movement of spoil trucks is not feasible in the current environment, mitigation measures should be proposed. This may include localised road widening and/or the provision of on-site traffic controllers.
Parking	No additional documentation / analysis required.
Roper Lane Closure	To provide for safe movements for traffic impacted by the closure of Roper Road at Bridge Road, it is recommended traffic signals be provided at the Watsons Road / Peats Ferry Road intersection. It is noted preliminary discussions between Hornsby Shire Council and Roads and Maritime have commenced in relation to this measure
Public transport	No additional documentation / analysis required.
Pedestrians	The applicant, in consultation with the TAFE, ensure provision is made for the safe pedestrian access to Buildings H and U on the lower level of the Hornsby TAFE Campus.

5.2 Mitigation Measures

The following measures are recommended for consideration by the Department of Planning and Environment in their determination of the project application to mitigate the impacts of the proposal:

1. Traffic Management Plan

- Preparation of a detailed Traffic Management Plan (TMP), including the heavy vehicle movement monitoring plan, covering the life of the project, and updated upon any changes to the project.

2. Intersection Performance

- If required, extend the right turn bay on Pacific Highway (south approach) into Yirra Road to prevent lane overspill and blocking of northbound through traffic.

3. Vehicle Swept Paths

- If required, localised road widening and/or the provision of on-site traffic controllers on Bridge Road to enable the safe movement of spoil truck along designated routes.

4. Roper Lane Closure

- Provision of traffic signals at the Watsons Road / Peats Ferry Road intersection

5. TAFE Access

- Consultation with the Northern Sydney Institute and agreement on management arrangements to support the traffic requirements of the TAFE, such as the consolidated vehicle control point identified by AECOM for consideration, or through accommodating scheduled vehicle access times for the TAFE Campus through Bridge Road.
- In addition, a joint emergency vehicle access plan should be prepared for the lower campus during the project operating hours.

6. Pedestrians

- In consultation with the TAFE and nearby residents, provision should be made for the safe pedestrian access along Bridge Street and to Buildings H and U on the lower level of the Hornsby TAFE Campus.

7. Changes to haulage routes

- Adequate notification and consultation should be undertaken prior to any changes to proposed haulage routes being implemented.

6 Conclusions

Arup has prepared this independent transport assessment to provide advice to the Department of Planning and Environment to inform their assessment of the Hornsby Quarry Road Construction Spoil Management Facility proposal.

The study has considered key elements of the project, as well as the projected impacts on the transport network. An assessment of the traffic analysis undertaken has concluded that there are no issues with the proposal proceeding, pending the following items being addressed:

- Preparation of a detailed Traffic Management Plan (TMP), including the heavy vehicle movement monitoring plan, covering the life of the project.
- A review of the need to extend the right turn bay on Pacific Highway (south approach) into Yirra Road to prevent lane overspill and blocking of northbound through traffic.
- A review of the need to undertake localised road widening and/or the provision of on-site traffic controllers on Bridge Road to enable the safe movement of spoil truck along designated routes.
- Provision of traffic signals at the Watsons Road / Peats Ferry Road intersection during the closure of Roper Lane. It is noted preliminary discussions between Hornsby Shire Council and Roads and Maritime have commenced in relation to this measure.
- regarding installation of traffic signals at the Watson Avenue/Peats Ferry Road intersection
- Consultation with the Northern Sydney Institute and agreement on management arrangements to support the traffic requirements of the TAFE.
- Preparation of a joint emergency vehicle access plan for the lower TAFE campus during the project operating hours.
- Provision for safe pedestrian access along Bridge Street and to Buildings H and U on the lower level of the Hornsby TAFE Campus.
- Adequate notification and consultation undertaken prior to any changes to proposed haulage routes being implemented.