Appendix E

Traffic and Transport Technical Note Addendum: Additional Ancillary Sites

TECHNICAL MEMORANDUM
Traffic and Transport Technical Note Addendum: Additional Ancillary Sites

Date 30 November 2015

To Zoe Wood and Todd Brookes

From Sally Manahan

Subject Traffic and Transport Technical Note Addendum: Additional Ancillary Sites Assessment, M1 Pacific Motorway Upgrade: Tuggerah to Doyalson.

1 Introduction

In October 2014, Roads and Maritime Services (Roads and Maritime) determined to proceed with the replacement of the existing pavement and widening of around 12.3 km of the M1 Pacific Motorway from two lanes in each direction to three lanes in each direction between Wyong Road, Tuggerah, and Doyalson Link Road, Kiar (the Project).

The Review of Environmental Factors undertaken for the Project (the original Project REF) identified three ancillary sites that would be used to support the construction of the original Project (the Warren Road, McPherson road and Hue Hue Road ancillary sites). As part of the original Project REF, a Construction Traffic and Transport Technical Note (original Traffic Note) (SMEC, 2014) was prepared to assess the impacts of the original Project on the traffic and transport network during construction.

However, since determination of the original Project REF, a need for additional construction ancillary sites has been identified. Three additional sites are being proposed for use. These sites are labelled W8, W9 and E5 on Figure 1 and a brief description of the sites is provided in Table 1.

This memo is an addendum to the original Traffic Note and considers the potential traffic and transport impacts associated with the use of these additional sites.

Table 1 Proposed additional ancillary sites for construction

Site	Location	Access arrangements
W8	North-west of the Warnervale Interchange	Access to the site would be via the Warnervale Interchange (an all-movements interchange), then along Sparks Road, Hue Hue Road and Kiar Ridge Road (about four kilometres by road from the site to the interchange). The site would be about: ▪ 2.2 kilometres to the northern end of the project ▪ 10.4 kilometres to the southern end of the project It may be possible to establish a site entrance directly from the M1 Pacific Motorway however that arrangement has not been developed or assessed at this time.
W9	North-west of the Warnervale Interchange	Access to the site would be via the Warnervale Interchange (an all-movements interchange), then along Sparks Road and Hue Hue Road. The proposed entrance location would be at the southwest corner of the site on Hue Hue Road. The site would be about: ▪ 2.2 kilometres to the northern end of the project ▪ 10.8 kilometres to the southern end of the project

Site	Location	Access arrangements
E5	South-east of the Warnervale Interchange	Access to the site would be via the Warnervale Interchange (an all-movements interchange), then along Sparks Road and Jack Grant Avenue. The site would be about: ▪ 6.3 kilometres to the northern end of the project ▪ 11.8 kilometres to the southern end of the project The proposed entrance location would be at the northeast corner of the site on Jack Grant Avenue.

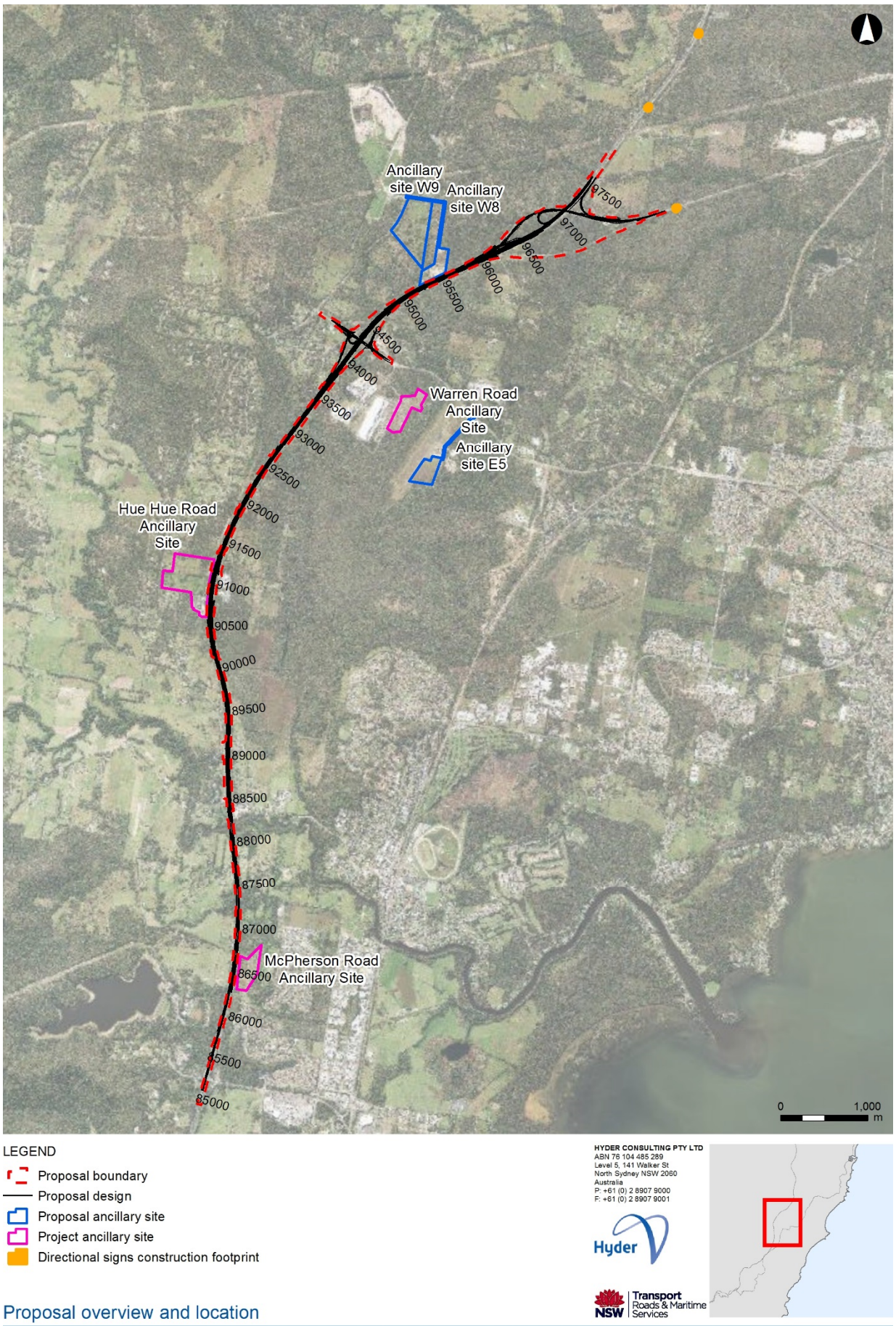

Figure 1 Potential Ancillary Site Locations

2 Addendum to the Traffic and Transport Impact Assessment

2.1 Construction Traffic Generation

The construction trip generation has been estimated and established in the Traffic Note and are adopted in this addendum.

One or more of the additional ancillary sites would be used during construction. For the purpose of this assessment, a conservative approach has been adopted by assuming that the peak hour traffic generation would occur at all three ancillary sites. This study has assumed worst case by assessing the peak construction period where the following traffic activities could occur simultaneously:

- Haulage and placement of road safety barriers
- Demolition of existing pavement
- Stabilisation of sub-grade
- Haulage and placement of earthworks and pavement materials.

The equivalent peak hour traffic generation is given in Table 2.

Table 2 Peak Hour Construction Traffic Generation[1]

Peak	Heavy vehicles	Light vehicles[2]	Total
Vehicles per day	417	152	569
Vehicle movements per hour	35	76	111

[1]Movements are one-way.

[2]Based on 16 management and supervisory personnel and 60 construction personnel per day. It is assumed that construction, management and supervisory personnel arrive at the site at a vehicle occupancy rate of one person per vehicle. Staff trips (76) would occur to the site prior to the general AM peak period and 76 trips would occur from the site in the general PM peak period

Source: REF, Appendix L, Construction Traffic and Transport Technical Note, Table 7, pg. 20 (SMEC, 2014).

2.2 Haulage Routes During Construction

As identified in the original Traffic Note, the origin of construction vehicles and the route they are likely to take cannot be confirmed so has not been assessed. However, it is anticipated that in addition to construction material haulage to and from the site from external sources, construction related traffic would generally travel on the existing M1 Pacific Motorway and connecting arterial roads with a small portion of trips on adjacent local roads for part of each trip.

Relevant haulage routes identified in the Traffic Note are listed in Table 3 in black text, with additional haulage routes required for the additional ancillary sites listed in **bold text**.

Table 3 Haulage Routes

Construction Activity	Route
Delivery of material from sources north and south of the proposed area Personnel commuting	M1 Pacific Motorway
Delivery from local suppliers east of the proposal area Personnel commuting	Wyong Road Sparks Road Hue Hue Road
Disposal of spoil/waste materials off site	M1 Pacific Motorway
Haulage of materials to and from work zone to ancillary facilities	M1 Pacific Motorway Sparks Road **Hue Hue Road (north of Sparks Road)** **Kiar Ridge Road**

3 Assessment Criteria and Methodology

3.1 Criteria

An analysis of the traffic and transport impacts have been undertaken with consideration given to the following factors:

- The capacity of the following intersections that would be impacted by the construction activities:
  - M1 Pacific Motorway / Sparks Road
  - Sparks Road / Hue Hue Road intersection
  - Hue Hue Road / Kiar Ridge Road intersection
  - Sparks Road / Jack Grant Avenue.
- Mid-block capacity and thresholds
- Capacity of site access intersections
- Access / egress point to and from the sites
- Carriageway restrictions.

3.2 Intersection Capacity

The "Level of Service" criteria set by Roads and Maritime are outlined in Table 4. In analysing intersection performance, a Level of Service "D" or better is generally acceptable.

Table 4 Level of Service Criteria for Intersections

Level of service	Average delay (seconds/ vehicle)	Traffic signals, roundabout	Give way and stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity, requires other control mode
F	More than 70	Roundabouts require other control mode	

Source: *Guide to Traffic Generating Developments (RMS, 2002)*

Roads and Maritime's guideline has recommended that with roundabout, stop and give way sign control intersections, the Level of Service value is determined by the critical movement with the highest delay per vehicle. With this type of intersection control, some movements suffer high levels of delay while other movements have minimal delay. Degree of saturation is defined as the ratio of demand (arrival) flow to capacity (also known as volume / capacity, v / c, ratio).

Average Vehicle Delay (AVD)

AVD is a measure of the operational performance of a road network or an intersection. AVD is determined globally over a road network or within a cordon during an assignment model run. The AVD exhibited on comparable network models, for analogous peak periods, forms the basis of comparing the operational performance of the road network.

AVD is used in the determination of an intersection's Level of Service. Generally, the total delay incurred by vehicles through an intersection, is averaged to give an indicative delay on any specific approach. Longer delays do occur but only the average over the peak hour period is reported.

3.3 Mid-block Capacity and Thresholds

Mid-block capacity and thresholds are based on the particular road links or intersections to ensure a satisfactory Level of Service of D, or better. These thresholds represent the 'Capacity' of specific road types. Traffic volumes observed on the road that are higher than the prescribed thresholds will be perceived by the community and road users as being over saturated.

While generally a single trafficable lane may carry up to 1,900 vehicles per hour, the capacity of each particular road type has been determined by considering a number of key factors noted in Austroads 'Roadway Capacity' manual including, but not limited to:

- Vehicle speed
- Volume of vehicles demanding to use the carriageway (linked to road classification)
- Potential for lane changing (higher vehicle volumes reduce the incidence of lane changing)
- Available lane widths and lateral clearances
- Surrounding land use characteristics (industrial, residential, retail, commercial, etc)
- Vertical carriageway alignment
- Horizontal carriageway alignment
- Carriageway condition
- Carriageway access (driveways, side street intersections, etc).

Subsequently, varying lane capacities apply to each classification and road type, adopted during the course of this assessment, as shown in Table 6.

Table 5 Level of Service Criteria for Mid-Blocks (for level terrain)

Level of service	Volume/Capacity Ratio	Description
A	0.15	Condition of free flow in which individual drivers are virtually 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.
B	0.16 - 0.27	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 a little less than with a level of service A
C	0.28 - 0.43	Also in the zone of stable flow, but most drivers are restricted to some extent in their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeable at this level
D	0.44 - 0.64	Close to 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.
E	0.65 - 1.0	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 minor4 disturbances within the traffic stream will cause breakdown.
F	-	

Source: Austroads Guide to traffic Engineering Practice – Part 02 – Roadway Capacity

Table 6 provides the typical one way mid-block capacity assumed for the key roads in the study area.

Table 6 Typical One-way Mid-block Capacities for Key Roads in the Study Area

Road Type Conditions	Lane Capacity (vehicle per lane per hour)
Pacific Highway	1,400
Wyong Road	1,200
Sparks Road	1,200
Hue Hue Road	1,200
Jack Grant Avenue	1,200
Kiar Ridge Road	1,200

4 Impacts on Traffic

4.1 Impact on Access Intersections

4.1.1 Impact on Sparks Road and Hue Hue Road Intersection

The modelling assessment tested traffic capacity of the Sparks Road and Hue Hue Road intersection. The access intersection was assessed using SIDRA software modelling for assessing intersection capacity. The intersection performance was assessed against the criteria presented in Table 4 in Section 3.

Figure 2 below shows the intersection layout modelled for Sparks Road / Hue Hue Road intersection. It is noted that PM peak traffic has been modelled since construction personnel would be likely to leave the site during the general PM peak period and arrive at the site prior to the general AM peak period.

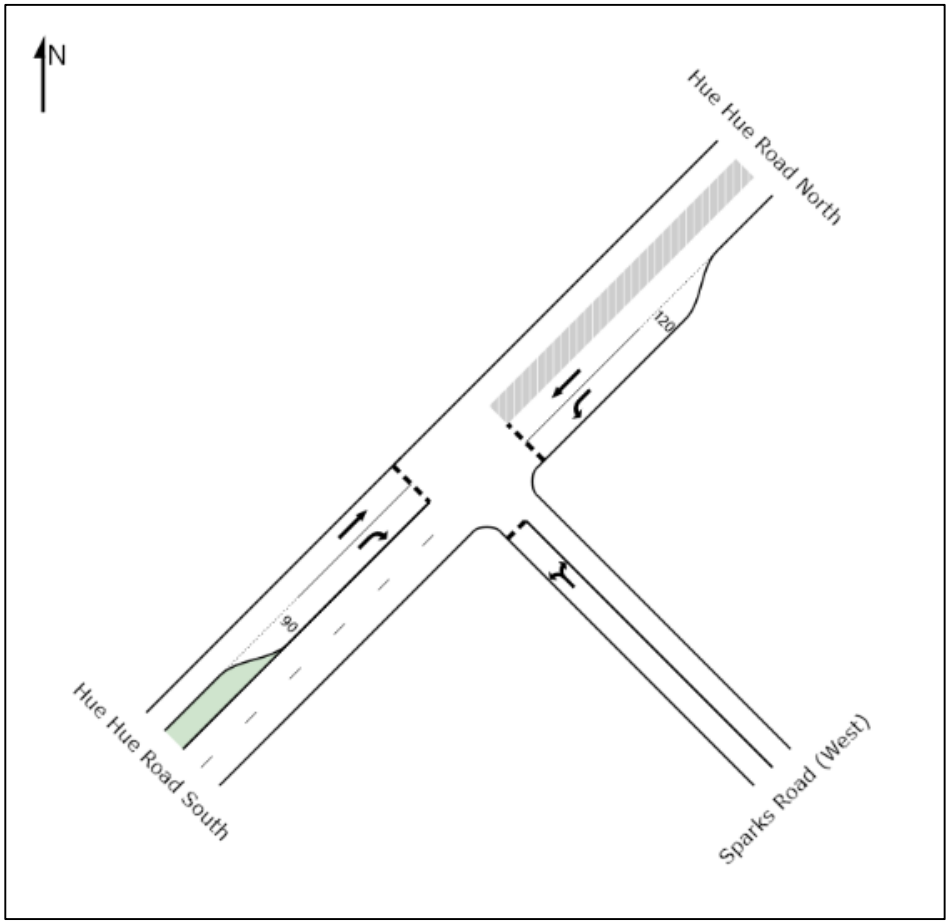

Figure 2 Intersection Layout on Sparks Road (West) and Hue Hue Road

Table 7 shows the Level of Service results from SIDRA at Sparks Road / Hue Hue Road intersection under existing conditions and with additional construction traffic as outlined in Section 2.

Table 7 Modelled Level of Service (Existing Conditions and with Construction Traffic) at the Sparks Road/Hue Hue Road Intersection

ID	Intersections	Intersection Control	Existing		With Construction Traffic	
			Avg. Delay (seconds)	LoS	Avg. Delay (seconds)	LoS
I-1	Sparks Road (West) / Hue Hue Road	Give Way/ Yield	11.9	A	16.1	B

Source: SIDRA, Model: F:\AA007114\D-Calculations\Ancillary Sites Addendum\SIDRA

4.1.2 Impact on Hue Hue Road and Kiar Ridge Road Intersection

Figure 3 shows the intersection layout modelled for Hue Hue Road / Kiar Ridge Road intersection.

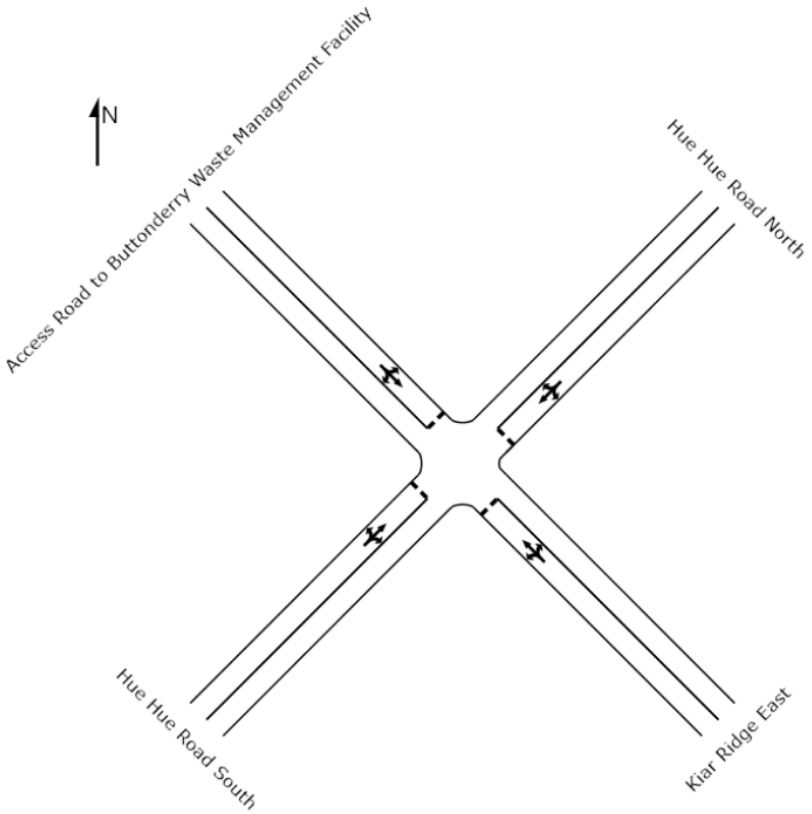

Figure 3 Intersection Layout on Hue Hue Road and Kiar Ridge Road*

Table 8 shows the Level of Service results from SIDRA at the Hue Hue Road / Kiar Ridge Road intersection under existing conditions and with additional construction traffic as outlined in Section 2.

Table 8 Modelled Level of Service (Existing Conditions and with Construction Traffic) at the Hue Hue Road / Kiar Ridge Road intersection

ID	Intersections	Intersection Control	Existing		With Construction Traffic	
			Avg. Delay (seconds)	LoS	Avg. Delay (seconds)	LoS
I-2	Hue Hue Road / Kiar Ridge Road	Give Way/ Yield	11.2	A	15.2	B

Source: SIDRA, Model: F:\AA007114\D-Calculations\Ancillary Sites Addendum\SIDRA

4.1.3 Impact on M1 Pacific Motorway / Sparks Road intersection

Figure 4 shows the intersection layout modelled for the M1 Pacific Motorway / Sparks Road intersection.

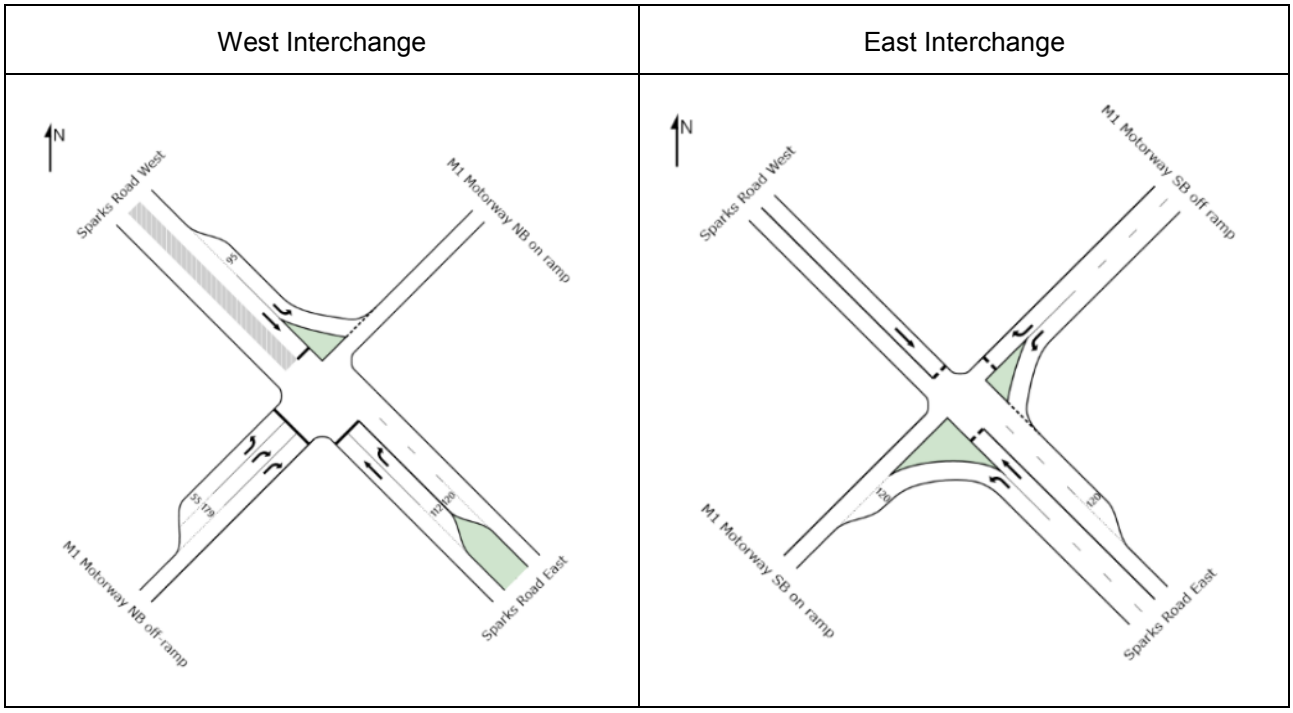

Figure 4 Intersection Layout on Sparks Road and M1 Motorway West and East Interchange

Table 9 shows the Level of Service results from SIDRA at the M1 Pacific Motorway / Sparks Road intersection under existing conditions and with additional construction traffic as outlined in Section 2.

Table 9 **Modelled Level of Service (Existing Conditions and with Construction Traffic) at the Sparks Road / M1 Pacific Motorway West and East Intersection**

ID	Intersections	Intersection Control	Existing		With Construction Traffic	
			Avg. Delay (seconds)	LoS	Avg. Delay (seconds)	LoS
I-3a	M1 Pacific Motorway West intersection / Sparks Road	Signals	16.2	B	17.2	B
I-3b	M1 Pacific Motorway East Interchange / Sparks Road	Give Way/ Yield	25,2	B	30.7	C

Source: SIDRA, Model: F:\AA007114\D-Calculations\Ancillary Sites Addendum\SIDRA

4.1.4 Impact on Sparks Road / Jack Grant Avenue intersection

Figure 5 shows the intersection layout modelled for the Sparks Road / Jack Grant Avenue intersection.

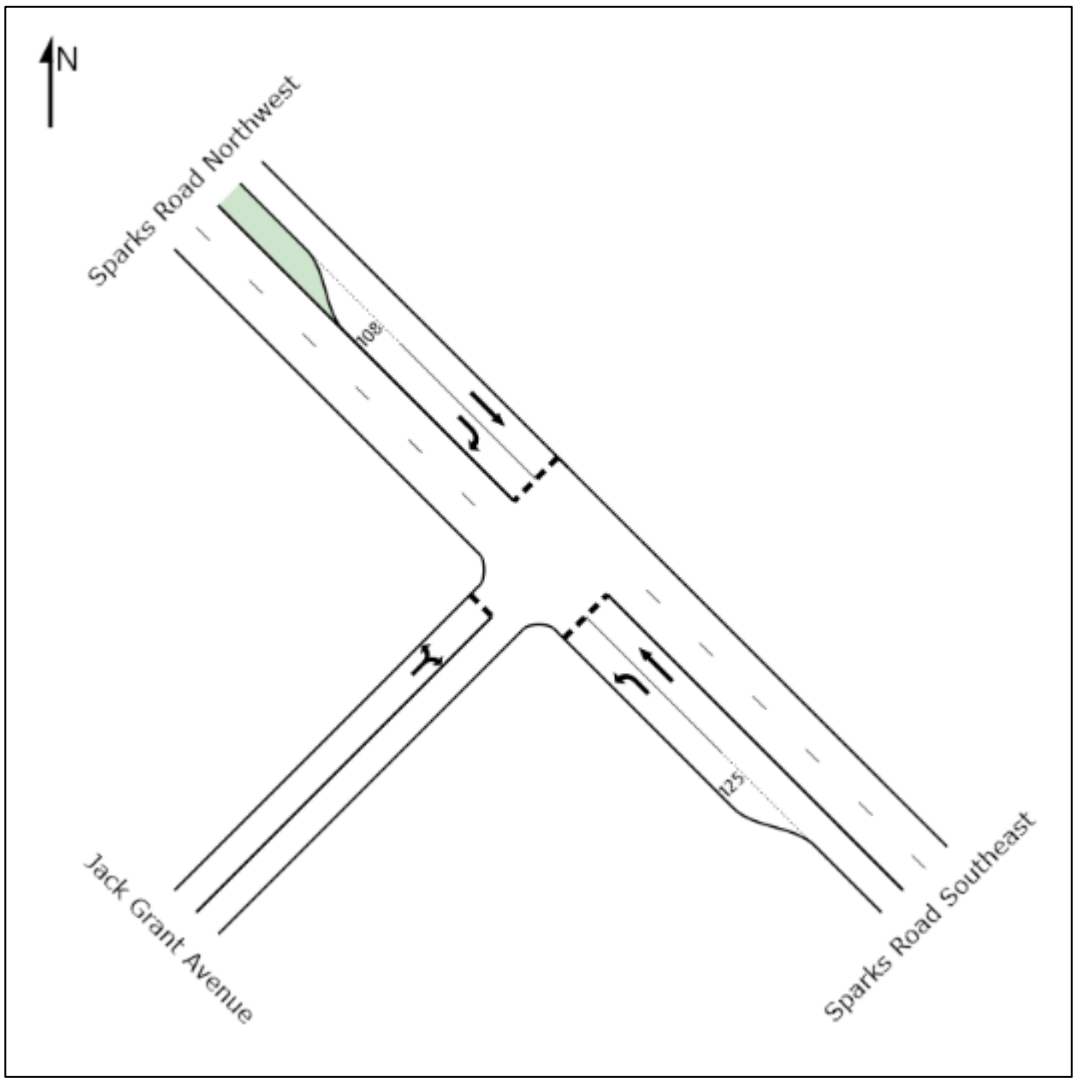

Figure 5 **Intersection Layout on Sparks Road and Jack Grant Avenue intersection**

Table 10 shows the Level of Service results from SIDRA at the Sparks Road / Jack Grant Avenue intersection under existing conditions and with additional construction traffic as outlined in Section 2.

Table 10 Modelled Level of Service (Existing Conditions and with Construction Traffic) at the Sparks Road / Jack Grant Avenue intersection

ID	Intersections	Intersection Control	Existing		With Construction Traffic	
			Avg. Delay (seconds)	LoS	Avg. Delay (seconds)	LoS
I-4	Sparks Road / Jack Grant Avenue	Give Way/ Yield	20.4	B	275.3	F

Source: SIDRA, Model: F:\AA007114\D-Calculations\Ancillary Sites Addendum\SIDRA

The SIDRA model predicts Level of Service 'A' at both the Sparks Road / Hue Hue Road intersection and the Hue Hue Road / Kiar Ridge Road intersection ; and a Level of Service 'B' at both the M1 Pacific Motorway / Sparks Road interchange and Sparks Road / Jack Grant Avenue intersection for the existing situation (without the construction traffic). . The SIDRA model predicts a slight increase to average vehicle delays and decrease in Level of Service from 'A' to 'B' at both Sparks Road / Hue Hue Road intersection and the Hue Hue Road / Kiar Ridge Road intersection with construction traffic during the PM peak (i.e. worst case scenario).

At the M1 Pacific Motorway West / Sparks Road interchange, a Level of Service "B" is maintained even with construction traffic while the M1 Pacific Motorway East / Sparks Road interchange experiences a slight increase in average vehicle delay and decrease of Level of Service from "B" to "C". These results indicate that the construction traffic would have a minor impact to traffic operation at these intersections.

At the Sparks Road / Jack Grant Avenue priority intersection the Level of Service of the intersection is predicted to deteriorate to Level of Service "F" (from Level of Service "B"). This is due to the heavy through volume in the westbound direction on Sparks Road inhibiting the right turn movement from Sparks Road to Jack Grant Avenue. The average vehicle delay for the right turning vehicles results in the decrease of Level of Service for that movement. The right turning vehicles are associated with construction traffic accessing the ancillary site along Jack Grant Avenue. It should be noted that for priority intersections, the Level of Service of the worst movement is reported. However, the Level of Service of the through movement on Sparks Road is maintained at Level of Service "A". To address this, traffic control devices such as temporary traffic signals may be installed and operated only during peak periods when construction traffic is anticipated to be high.

4.2 Impact on Traffic (Mid-block Analysis)

An assessment of the impacts on the local road network was undertaken for the Traffic Note and has been updated to include the additional intersections that will be impacted as a result of the additional ancillary sites. The assessment is summarised in Table 11.

Table 11 Construction Traffic Impacts – Mid Block

Road	Assessment parameter	No upgrade	During construction[5]
Pacific Motorway, north of Doyalson Link Road interchange*	Hourly traffic flow[1,2]	3,090	3,201
	Percentage change from no upgrade	0%	3.4%
	Heavy vehicle proportion	11.2%	11.9%
	Level of service[4]	A	A

Road	Assessment parameter	No upgrade	During construction[5]
Pacific Motorway, at service station*	Hourly traffic flow[1,2]	4,373	4,484
	Percentage change from no upgrade	0%	2.5%
	Heavy vehicle proportion	8.2%	8.8%
	Level of service[4]	C	C
Pacific Motorway, south of Wyong Road interchange*	Hourly traffic flow[1,2]	4,954	5,065
	Percentage change from no upgrade	0%	2.2%
	Heavy vehicle proportion	7.9%	8.4%
	Level of service[4]	D	D
Wyong Road, east of Wyong Road interchange*	Hourly traffic flow[1,2]	2,332	2,443
	Percentage change from no upgrade	0%	4.8%
	Heavy vehicle proportion	4.5%	5.7%
	Level of service[4]	A	A
Wyong Road, west of Wyong Road interchange*	Hourly traffic flow[1,2]	508	619
	Percentage change from no upgrade	0%	21.9%
	Heavy vehicle proportion	3.4%	8.4%
	Level of service[4]	A	A
Sparks Road, east of Sparks Road interchange*	Hourly traffic flow[1,2]	1,807	1,918
	Percentage change from no upgrade	0%	6.1%
	Heavy vehicle proportion	5.7%	7.2%
	Level of service[4]	C	C
Sparks Road, west of Sparks Road interchange*	Hourly traffic flow[1,2]	600	711
	Percentage change from no upgrade	0%	18.5%
	Heavy vehicle proportion	6.2%	10.2%
	Level of service[4]	A	A
Hue Hue Road, north of Sparks Road	Hourly traffic flow[1,3]	295	406
	Percentage change from no upgrade	0%	37.6%
	Heavy vehicle proportion	6.4%	13.3%
	Level of service[4]	A	A
Access road to Buttonderry Waste Management Facility, west of Hue Hue Road	Hourly traffic flow[1,3]	15	15
	Percentage change from no upgrade	0%	0%
	Heavy vehicle proportion	66.7%	66.7%
	Level of service[4]	A	A
Kiar Ridge Road, east of Hue Hue Road	Hourly traffic flow[1,3]	0	111
	Percentage change from no upgrade	0%	100%
	Heavy vehicle proportion	0%	31.5%
	Level of service[4]	A	A

Road	Assessment parameter	No upgrade	During construction[5]
Jack Grant Avenue, south of Sparks Road	Hourly traffic flow[1,3]	10	152
	Percentage change from no upgrade	0%	152%
	Heavy vehicle proportion	0%	46%
	Level of service[4]	A	A

Notes:
1. Traffic volumes are for both directions.
2. Hourly traffic volumes are based on the PM peak period, since construction personnel would be likely to leave the site during the general PM peak period and arrive at the site prior to the general AM peak period.
3. Level of Service is based on *Highway Capacity Manual*, volume / capacity ratios. The lane capacity for the national freeway assumes 1,400 vehicles per lane per hour and the lane capacity for Wyong Road and Sparks Road assumes 1,200 vehicles per lane per hour.
4. The hourly volume is estimated from ADT as 10%
5. The additional construction traffic volumes assume 35 heavy vehicles and 76 light vehicles per hour. In the absence of definite compound and ancillary locations and origins of materials and equipment, this assessment assumes all construction vehicles would travel on the all the key roads assessed

* Source: M1 Pacific Motorway, Tuggerah to Doyalson, Construction Traffic and Transport Technical Note (SMEC, 2014)

Traffic volumes would increase on the following roads during construction:

- Wyong Road, west of Wyong Road interchange (increase of 21.9 per cent)
- Sparks Road, west of Sparks Road interchange (increase of 18.5 per cent)
- Hue Hue Road, north of Sparks Road (increase of 37.6 per cent)
- Kiar Ridge Road, east of Hue Hue Road (increase of 100 per cent).

Table 11 indicates that despite the increase in traffic volumes, the level of service for all key roads assessed remain unchanged from existing and would not be altered due to the estimated additional construction traffic.

Although the proportion of heavy vehicles would increase noticeably for some of the key roads, the increase is be temporary and would be managed during construction. It is noted that Wyong Road and Sparks Road are designated B-double routes.

4.3 Access and Egress

Access and egress to the ancillary sites would be from the local road network as outlined in Table 1. The ancillary site entrances would be designed in accordance with relevant road safety standards and guidelines and Roads and Maritime requirements.

If large vehicles are required to deliver materials, such as low loaders equipment and machinery, this would be specifically addressed in the Traffic Management Plan (TMP) to be developed for the Project.

4.4 Construction Site Parking

As identified above and in the original Traffic Note, is anticipated that up to 76 management, supervisory and construction personnel would require car parking spaces within or nearby ancillary sites. To limit the impact of the Project on existing parking facilities, a temporary parking area would be provided for use by construction staff at the main construction compound. Accordingly, the additional construction vehicles associated with the Project are not expected to impact the capacity of existing parking facilities in the area.

4.5 Impacts on Public Transport

As identified in the original Traffic Note, the impact on existing passenger and school bus routes during construction would be negligible. Minor travel time increases may be experienced due to reduced speed limits. In the case that bus stops require temporary relocation during construction a suitable location would be identified by the contractor in consultation with bus operators.

4.6 Impacts on Local Roads and Properties

Construction traffic could cause short delays to people entering/exiting properties however access to properties would be maintained throughout the construction phase .As stated in the original Traffic Note, the Roads used by heavy vehicles during construction may experience additional wear as a result of the additional use. Dilapidation surveys of roads around the proposal area would be undertaken prior to their use for construction as well as after construction is complete. Any damage resulting from construction (not normal wear and tear) would be repaired unless alternative arrangements are made with the relevant road authority.

4.7 Impacts on Pedestrians and Cyclists

The potential impacts of construction on pedestrians and cyclists on the M1 Pacific Motorway and Sparks Road have been noted and assessed in the original Traffic Note.

On the roads impacted by construction traffic due to the additional ancillary sites, there are minimal (if any) pedestrian and cyclist facilities, and very low numbers of pedestrians and cyclists. As outlined in the original Traffic Note, cyclist groups would be consulted prior to the commencement of construction and advised to use alternative sections of the M1 Pacific Motorway or alternative routes during the construction period. Appropriate signage and way finding provisions would be implemented for cyclist detours.

4.8 Impacts on Emergency Services

The potential impacts on emergency services from construction of the project were assessed in the original Traffic Note. The additional ancillary sites would not significantly alter the expected impacts to these services. As outlined in the original Traffic Note and the original Project REF, a detailed traffic management plan (TMP) would be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The original Project REF indicated that the TMP would make provision for emergency services vehicles to pass through construction zones. Detailed design has found that such access arrangements are not feasible due to logistical and safety considerations. However, the detailed design process has resulted in provision of a minimum 1.8 m wide shoulder (up to 2.3 m wide wherever possible) along the alignment which would provide access for emergency service vehicles during the construction period. As identified in the original Project REF, the TMP would detail processes to update the local emergency services on the staging and progress of works that would affect their movement.

4.9 Impacts on traffic safety

The potential impacts on safety from construction of the project were assessed in the original Traffic Note. The additional ancillary sites would not significantly alter the potential impacts. As outlined in the original Traffic Note and the original Project REF, a detailed TMP would be prepared outlining the control measures to be implemented during construction to address safety risks and mitigate impacts on safety.

4.10 Incident Management

The potential impacts on incident management from construction of the project were assessed in the original Traffic Note. The additional ancillary sites would not significantly alter the expected impacts in relation to incident management. As outlined in the original Traffic Note and the original Project REF, the contractor would consult with Roads and Maritime Traffic Commanders, Traffic Emergency Patrols (TEP) and the Transport Management Centre (TMC) to plan the construction to allow for appropriate incident response plans to be implemented.

5 Mitigation Measures

Traffic and transport mitigation measures were outlined in the Project REF and the subsequent Submissions Report. These measures are included below in Table 12 with additional measures shown in **bold red text** with altered or deleted measures outlined in ~~strike through~~ text.

Table 12 Traffic and transport mitigation measures

Impact	Environmental Safeguard	Responsibility	Timing
Impacts on traffic during construction	Prepare and implement a detailed traffic management plan (TMP) as part of the Construction Environmental Management Plan (CEMP). The TMP is to include appropriate guidelines and procedures required to ensure the continuous, safe and efficient movement of construction and non-construction traffic in and around the project area. The TMP would be submitted in stages to reflect the progress of the work and would detail: • Signage requirements. • Lane possession and approval process during periods of online construction • Measures to minimise disruption and inconvenience to road users during the construction period. • Traffic control devices such as temporary signals.	Construction contractor	Construction
Impacts on traffic during construction (continued)	• A local and regional communications strategy. • Measures to provide adequate warning, information and guidance for road users during the construction period. • Appropriate construction speed limits to be implemented in consultation with Roads and Maritime to facilitate safety of road users and construction personnel. • Specific traffic management plans to address night works safety for motorists and for construction personnel. • Temporary accesses, ancillary site entrances and exits and other traffic management measures to be designed in accordance with relevant road safety and Roads and Maritime requirements. • Temporary accesses, ancillary site entrances and exits and other traffic management measures that do not impact upon the safety of the users of the existing road network. • Safe pedestrian access for the public along Sparks Road during construction. • Temporary parking for use by construction staff at a construction compound. • Access to all properties including the motorway service centres to be maintained throughout the construction. • ~~Make provision for emergency services vehicles to pass through construction zones and u~~Update the local emergency services on the staging and progress of works that would affect their movement. • **Key safety issues that may arise due to heavy vehicle maneuvers at major and minor road intersections.**	Construction contractor Construction contractor	Construction Construction

Impact	Environmental Safeguard	Responsibility	Timing
Damage to roads from construction traffic	• Dilapidation surveys of roads around the proposal area should be undertaken prior to their use for construction and after construction is complete. • Any damage to roads as a result of the construction traffic should be repaired.	Construction contractor	Construction
Impacts to cyclists during construction	• Cyclist groups would be consulted prior to the commencement of construction and advised to use alternative sections of the M1 Pacific Motorway or alternative routes during the construction period. • Appropriate signage and way finding provisions would be implemented for cyclist detours.	Construction contractor	Construction
Provision of incident management during construction	The contractor would consult with Roads and Maritime Traffic Commanders, Traffic Emergency Patrols (TEP) and the Transport Management Centre (TMC) to plan the construction to allow for appropriate incident response plans to be implemented.	Construction contractor	Construction

6 Summary and conclusions

This Traffic and Transport Technical Note Addendum has been prepared to identify and assess potential traffic and transport impacts associated with three additional ancillary sites proposed to be used during construction of the Project. The assessment has found that use of the additional ancillary sites would not have a significant adverse traffic impact on the surrounding road network. In summary:

- The mid-block analysis found that the Level of Service for all mid-blocks assessed would be unchanged from the existing Level of Service
- The intersection analysis indicates the use of the additional ancillary sites would:
    - Not impact the Level of Service at the M1 Pacific Motorway / Sparks Road intersection
    - Reduce the Level of Service, but stay within acceptable levels, at three key intersections (the Sparks Road / Hue Hue Road, Hue Hue Road / Kiar Ridge Road and M1 Pacific Motorway / Sparks Road (East) intersections)
    - Reduce the Level of Service from B to F at the Sparks Road / Jack Grant Avenue intersection. The Level of Service F only relates to the right turn movement from Sparks Road into Jack Grant Avenue, due to the proposed right turn movement for construction vehicles to ancillary site E5 and the requirement for this traffic to give way to through westbound traffic. This poor Level of Service would primarily impact construction vehicles. Other movements at this intersection, including the dominant through movement would maintain an acceptable Level of Service. On this basis, the increase in traffic generated during peak periods on the surrounding road network during construction is unlikely to have a significant effect on the performance of the intersections.

Overall, the impact of the construction traffic associated with the additional ancillary sites is anticipated to be minor. As outlined in the original Traffic Note and original Project REF, a Traffic Management Plan (TMP) would be prepared as part of the CEMP. The TMP would address key safety issues that may arise due to heavy vehicle manoeuvres at major and minor road intersections as well as a range of other traffic management provisions relevant to use of the additional ancillary sites.