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CONSULTING ENGINEERS

Traffic Impact Assessment Report

Heritage Minerals – Mt Morgan Mine
Priority Living Area (PLA)
Mt Morgan

Prepared For: Heritage Minerals

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Traffic Impact Assessment Report

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CONTENTS

INTRODUCTION	1
1.1. PROJECT BACKGROUND	1
1.2. SCOPE AND STUDY AREA	1
STUDY AREA.....	1
EXISTING CONDITIONS WITHIN PLA.....	3
2.1. SURROUNDING ROAD NETWORK DETAILS	3
PROJECT TRANSPORT ROUTE.....	3
ROAD LINKS	3
INTERSECTIONS.....	4
PROPOSED DEVELOPMENT DETAILS.....	7
3.1. OPERATIONAL DETAILS	7
3.2. PROPOSED ACCESS AND PARKING	8
INTERNAL SITE FACILITIES.....	8
DEVELOPMENT TRAFFIC.....	8
4.1. TRAFFIC GENERATION	8
IMPACT ASSESSMENT AND MITIGATION	11
5.1. WITHOUT DEVELOPMENT TRAFFIC VOLUMES.....	11
ROAD LINK VOLUMES.....	11
INTERSECTION VOLUMES	12
5.2. INTERSECTION IMPACT ASSESSMENT AND MITIGATION.....	12
5.3. ROAD LINK ASSESSMENT AND MITIGATION	16
5.4. PAVEMENT IMPACT ASSESSMENT AND MITIGATION	17
CONCLUSIONS AND RECOMMENDATIONS	19
6.1. SUMMARY OF IMPACTS AND MITIGATION MEASURES PROPOSED.....	19
TRAFFIC IMPACTS.....	19
PAVEMENT IMPACTS.....	19
RECOMMENDATIONS	19
APPENDIX A.....	A
APPENDIX B.....	A
APPENDIX C.....	A
APPENDIX D.....	B

Traffic Impact Assessment Report

INTRODUCTION

1.1. PROJECT BACKGROUND

Heritage Minerals are finalising their feasibility study for retreating retrieving the Mount Morgan Mine tailings to recover gold and copper. Last year, they completed the purchase of the Mount Morgan mining leases from Norton Goldfields.

As part of the permitting process, an amendment application has been submitted to Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) to amend the Priority Living Area (PLA) Permit (RPI17-001) obtained by Carbine/Norton under the Regional Interests Development Act (RIDA).

1.2. SCOPE AND STUDY AREA

McMurtrie Consulting Engineers (MCE) have been commissioned by Heritage Minerals to undertake a Traffic Impact Assessment (TIA) for the proposed new use.

This TIA was carried out to determine the level of potential impacts of the Project on the existing road pavement and intersections within the Mt Morgan PLA.

The outcomes of the assessment will be used to inform discussion regarding the project with Rockhampton Regional Council (RRC) and Department of Transport and Main Roads (TMR), with the assessment methodology adopted for the TIA summarised via the key tasks listed below:

- Broadly identify the existing transport infrastructure which is of relevance to the Project;
- Estimate traffic generation associated with the proposed road haulage operation and the distribution of this haulage traffic on the identified road network;
- Assess the potential impact of the proposed road haulage operations on the surrounding transport infrastructure, in particular the pavements of the surrounding road network; and
- Identify potential mitigation and management strategies to be implemented during the proposed road haulage operations to offset the potential impact of the Project (if required).

STUDY AREA

As previously identified, the proposed assessment will be limited to the Mt Morgan PLA. The Mt Morgan PLA is shown in **Figure 1** below.

Heritage Minerals won't be hauling pyrite or any other mineral products that will trigger a requirement for a Road Use Notification under the Mineral Resources Act so their obligations under the RIDA only relate to the Mount Morgan PLA.

Also note that product extraction and cartage at this point only represents some 4,000TPa or 3 trucks per week so at that volume over a year it is entirely insignificant.

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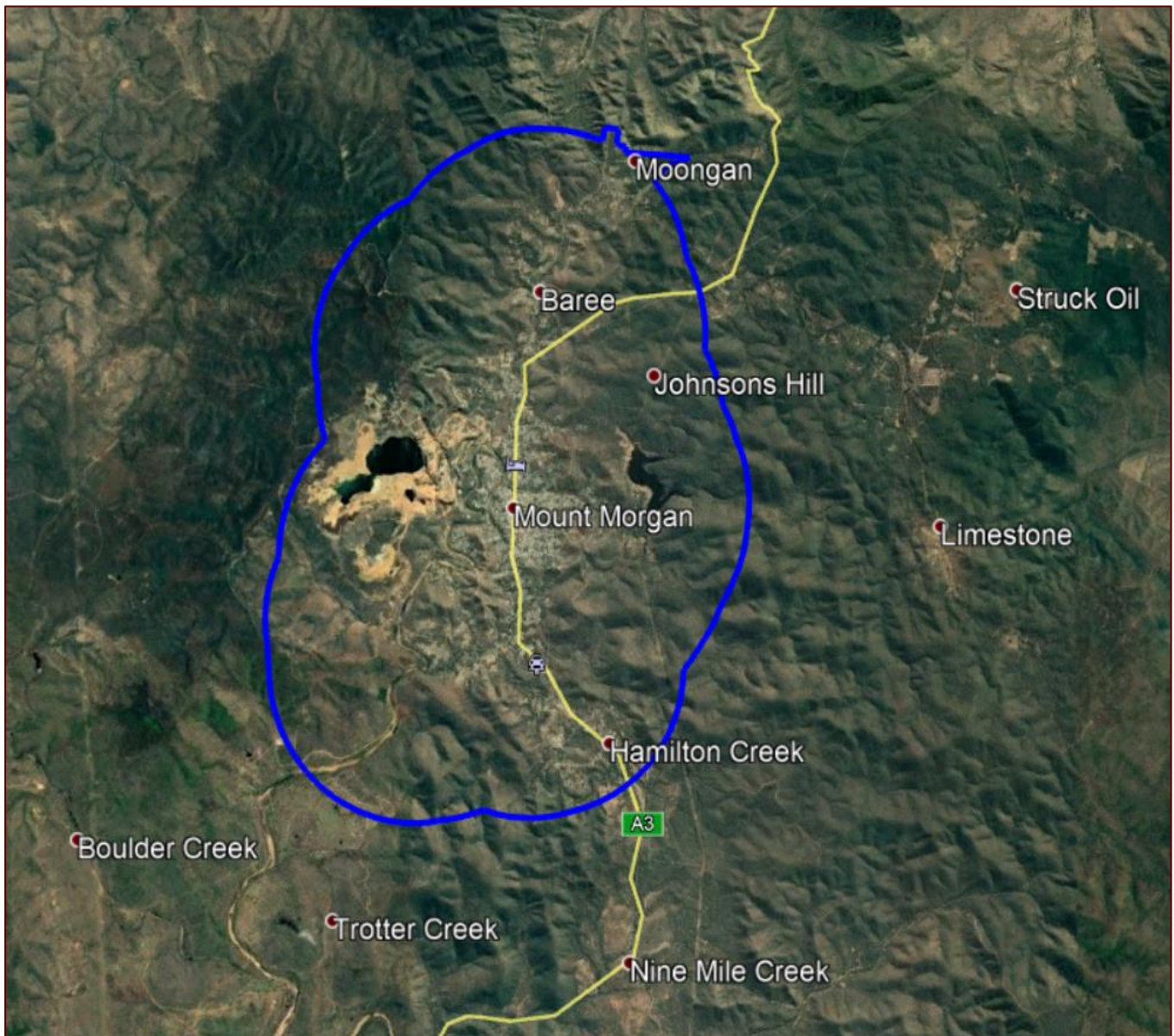


Figure 1 Study Area – Mt Morgan PLA

EXISTING CONDITIONS WITHIN PLA

2.1. SURROUNDING ROAD NETWORK DETAILS

PROJECT TRANSPORT ROUTE

Based on operational data provided by the proponent and the requirement to only consider the PLA the impacted road infrastructure includes the following road links and intersections:

- Gordon Lane;
- Razorback Road (Creek Street) within PLA.
- Burnett Highway within PLA;
- Gordon Lane intersection with Burnett Highway;
- Razorback Road (Creek Street) intersection with Burnett Highway;

ROAD LINKS

Gordon Lane

Gordon Lane is typical of a 50kph narrow, local access street that generally experiences little to no traffic growth. In fact, a comparison of traffic counts taken by TMR in 1989 and counts taken by RRC in 2016 show zero or negative growth. That is, the 2016 counts show 12 hour volumes on Gordon Lane of 428 vpd and the 1989 traffic volumes show 12 hour counts of 468 vpd. Pavement impacts associated with increased ESA's will however exceed the 5% threshold.



Figure 2 Typical Section of Gordon Lane

Razorback Road (Creek Street) within PLA

The subject section of Razorback Road between the PLA boundary and the Burnett Highway in Mount Morgan provides an alternate route that traverses the Mt Morgan Range.

Razorback Road carries in excess of 2000 vpd with approximately 11.2% heavy vehicles (see **Appendix A**).

The majority of Razorback Road has a signed speed limit of 70km/hr. The existing alignment of Razorback Road incorporates sweeping horizontal curves that traverse sloping terrain with vertical grades up to 18.5% on the section referred to as the 'jump up'. Razorback Road generally has a 6m – 7m carriageway with line-marking to the centerline.

The section from the 'jump up' to the Burnett highway consists of a road in a semi-urban and urban environment as it progresses through the eastern side of Mount Morgan until the intersection with the Burnett Highway.



Figure 3 - View of “JUMP UP” Section

Burnett Highway within PLA

The Burnett Highway with the PLA is represented by a low volume rural highway at either end with an urban section traversing the township of Mt Morgan. It is expected that a large proportion of workers will come from the township itself thus minimizing traffic impacts.

The most heavily impacted section is the link from Gordon Lane to Creek Street/Razorback Road which averages a seal width of 8.4m and includes one horizontal curve that shows curve/shoulder widening applied. Development vehicles only represent a small fraction of the overall daily to heavy vehicle movements. The existing speed limit is 60 – 80kph. There appears to be no immediate safety issues with this link in terms of width and geometry.

INTERSECTIONS

Gordon Lane intersection with Burnett Highway

The existing intersection of Gordon Lane with Burnett Highway is in the form of a BAR/AUL and the speed limit is 60kph.

Intersection visibility comfortably exceeds minimum SISD for 60kph speed limit (151m for 70kph design speed) in both directions as shown in the following **Figures**.

074-20-21

**Figure 4 – SISD for 70kph****Figure 5 – Gordon St/Burnett Hwy Sight Distance Looking Left**

074-20-21



Figure 6 – Gordon St/Burnett Hwy Sight Distance Looking Right

Razorback Road (Creek Street) intersection with Burnett Highway

The existing intersection of Razorback Road (Creek Street) Burnett Highway is in the form of a BAR/AUL and the speed limit is 80kph.

As shown in **Figure 7** there is an existing visibility deficiency looking left (or north) from Creek Street/Razorback Road due to the horizontal curve of the Burnett Hwy. The speed limit for vehicles approaching from this direction is 80kph.

Looking right at this point (refer **Figure 8**) visibility is good with a nearby power pole creating only a minor obstruction. SISD for this direction exceeds the 181m requirement for an 80kph design speed and is therefore appropriate.

The speed limit for southbound traffic on the Burnett Hwy is 80kph in this area and as mentioned available sight distance is less than that required for a 90kph design speed. An onsite check has shown that SISD for a 70kph design speed (150m grade corrected) can be achieved for this direction and it is therefore recommended that DTMR reduce the speed limit from the northern approach to 60kph in lieu of the existing 80kph regardless of the haulage task to ensure adequate SISD is provided for all traffic using the highway.



Figure 7 – Razorback Road looking left



Figure 8 – Razorback Road looking right

PROPOSED DEVELOPMENT DETAILS

3.1. OPERATIONAL DETAILS

Based on information provided by the proponent Heritage Minerals it is understood that the proposed development will have a Construction Phase lasting 9 months presumably in 2022, followed by an Operational Phase from 2022 to 2027.

074-20-21

3.2. PROPOSED ACCESS AND PARKING

INTERNAL SITE FACILITIES

It is noted that no details were provided regarding the proposed haulage vehicle movements internal to the mine site, and as such no assessment has been undertaken regarding the expected vehicle paths within the sites.

DEVELOPMENT TRAFFIC

4.1. TRAFFIC GENERATION

As previously identified, the development will be split into construction and operational phases.

Proposed traffic volumes per phase will be as follows:

1. Construction Phase for a period of 9 months from 2022
 - Up to 40 truck movements per day and 250 light vehicle movements per day as per **Figures 9 and 10**

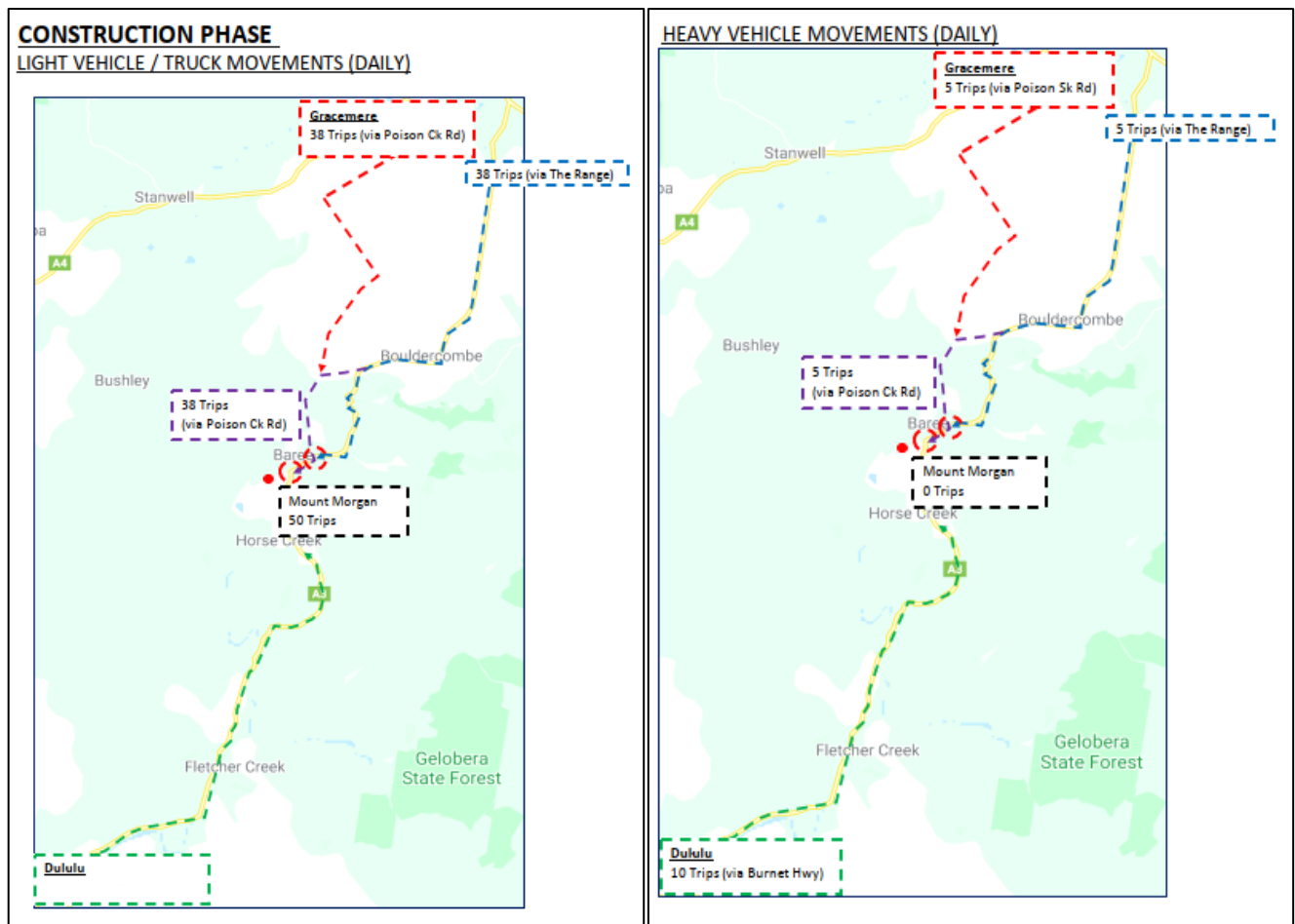


Figure 9 - Network Assignment

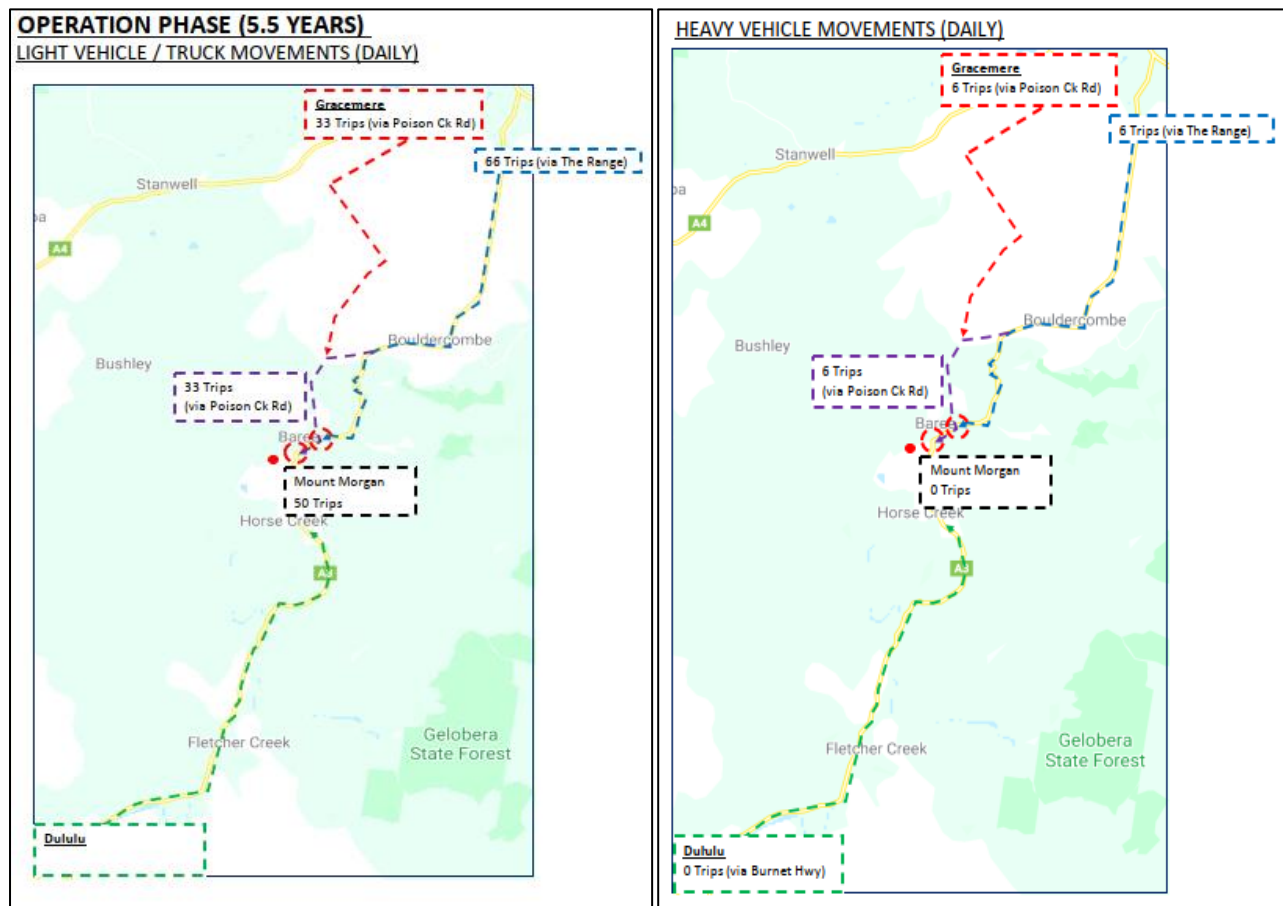
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Figure 10 - Impacted Intersection Daily Rates

2. Operational Phase for a period of 5.5 years from 2022 to 2027 with a total of 80 employees
 - 24 truck movements per day for reagents and supplies and 230 light vehicle movements per day as per **Figures 11 and 12.**
 - Noting that product outbound will only be 2 trucks per week bulka bags of copper concentrate or less than 4,000TPa which will have negligible impact on traffic and pavements over a year.

074-20-21



074-20-21



Figure 12 - Impacted Intersection Daily Rates

IMPACT ASSESSMENT AND MITIGATION

Based on the information provided above, and as previously determined, the critical elements of the surrounding road network in terms of the potential impact of the proposed haulage operations are as follows:

- The identified road link of Burnett Highway and Razorback Road forming the proposed transport route; and
- The critical intersections of Gordon Lane and Razorback Road with the Burnett Highway
- Gordon Lane

Further assessment of the impact of the proposed haulage operations on these road network elements including capacity and safety is provided in the following sections.

5.1. WITHOUT DEVELOPMENT TRAFFIC VOLUMES

ROAD LINK VOLUMES

Existing road link volumes are as per **Table 1** below noting that historical growth rates are low to negative so a conservative 1% growth rate has been adopted. Refer **Appendix A** for traffic data.

074-20-21

Table 1 - Road Link Daily Traffic Volumes

Description	AADT Segment		Base Data Year	Base Year (2021) AADT				10 Yr. GR %	Background AADT (2022)			
	Start (km)	End (km)		Gaz	% HV	A-Gaz	% HV		Gaz		A-Gaz	
									Total	HV	Total	HV
Burnett Highway – 41F												
Start to Gordon Lane	0.000	2.533	2019	1891	6.98%	1936	4.29%	1.00%	1910	133	1955	84
Gordon Lane to Razorback	2.533	5.000	2019	1257	5.49%	1235	10.85%	1.00%	1270	70	1247	135
Burnett Highway – 41E												
Showgrounds Road to End	101.344	102.775	2019	1123	9.44%	1134	8.91%	1.00%	1134	107	1145	102
End PLA to Showgrounds Road	102.775	98.500	2019	463	11.23%	450	7.33%	1.00%	468	53	455	33
Razorback Road (Creek Street)												
Burnett Hwy to end of PLA (approx. 3kms)			2021	1034	11.20%	1034	11.20%	1.00%	1044	117	1044	117

INTERSECTION VOLUMES

No up to date intersection counts were available from RRC nor TMR, as such new counts were collected with the details included in **Appendix A**.

5.2. INTERSECTION IMPACT ASSESSMENT AND MITIGATION

The following **Figures** have been derived from the background intersection counts and the proposed development traffic as outlined in **Section 4** above. Again, noting a conservative growth rate of 1%.

Burnett Highway / Gordon Lane Intersection

- The existing intersection provides a BAR and AUL treatment with a 60kph speed limit.

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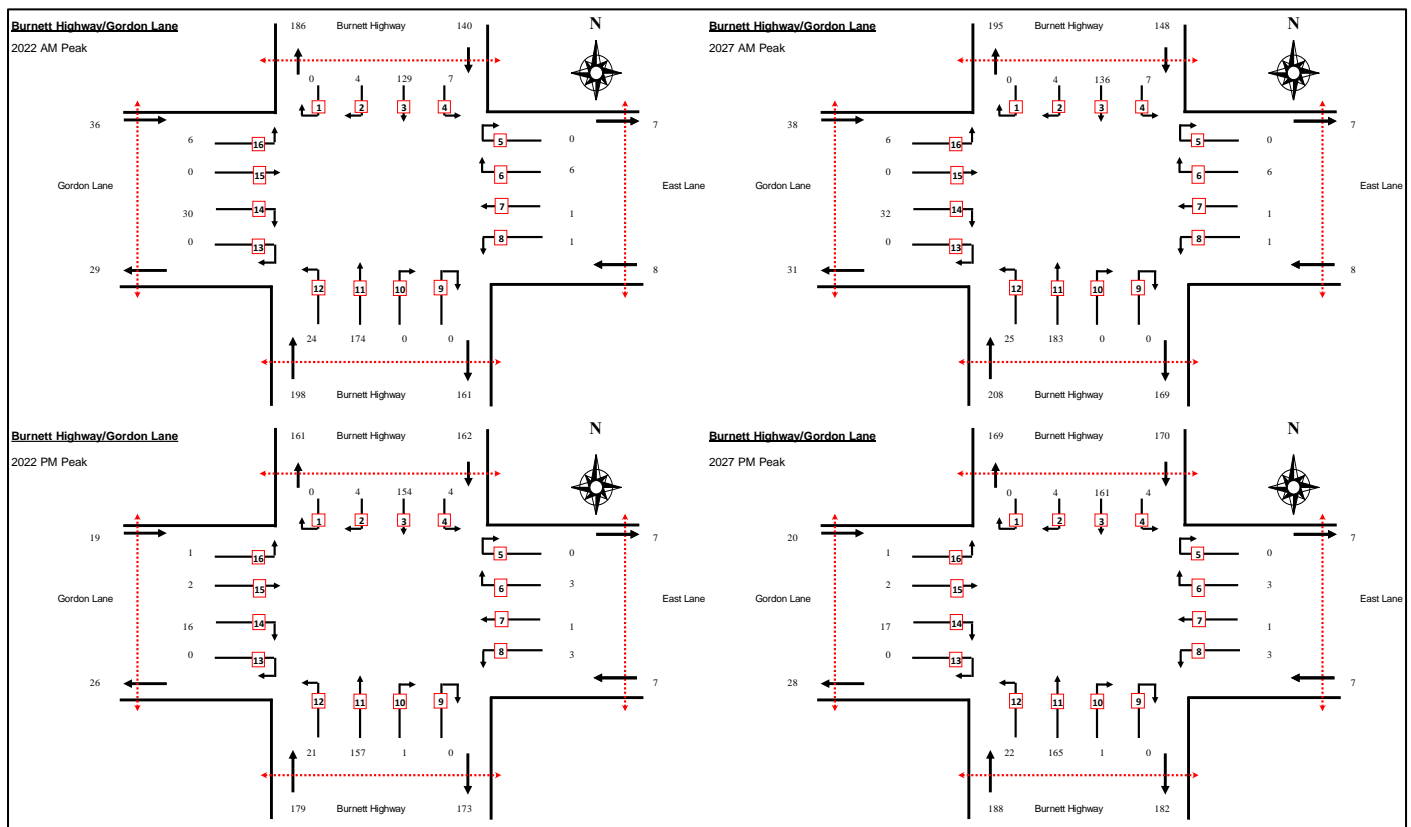


Figure 13 - Gordon Lane Peaks 2022 and 2027 without Development

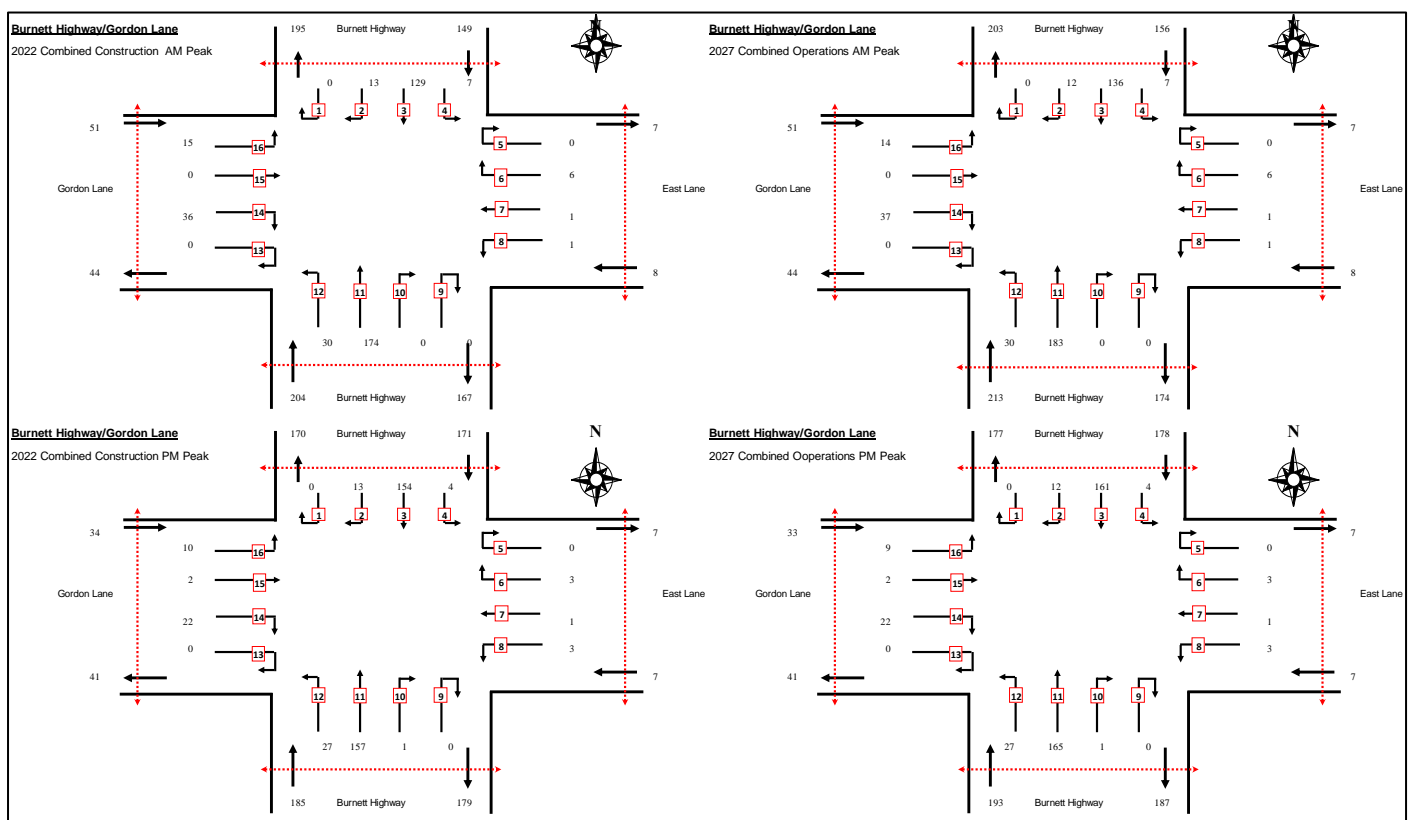


Figure 14 - Gordon Lane Peaks 2022 and 2027 with Development

Analysis of these scenarios have been undertaken using SIDRA 9.0 with the results as outlined in **Appendix B**. In summary the intersection performs satisfactorily for all scenarios and no upgrades are triggered as a result of development traffic.

074-20-21

Swept path assessment has also been undertaken as per **Appendix C** and no additional widening is required as per **Figure 15** below.

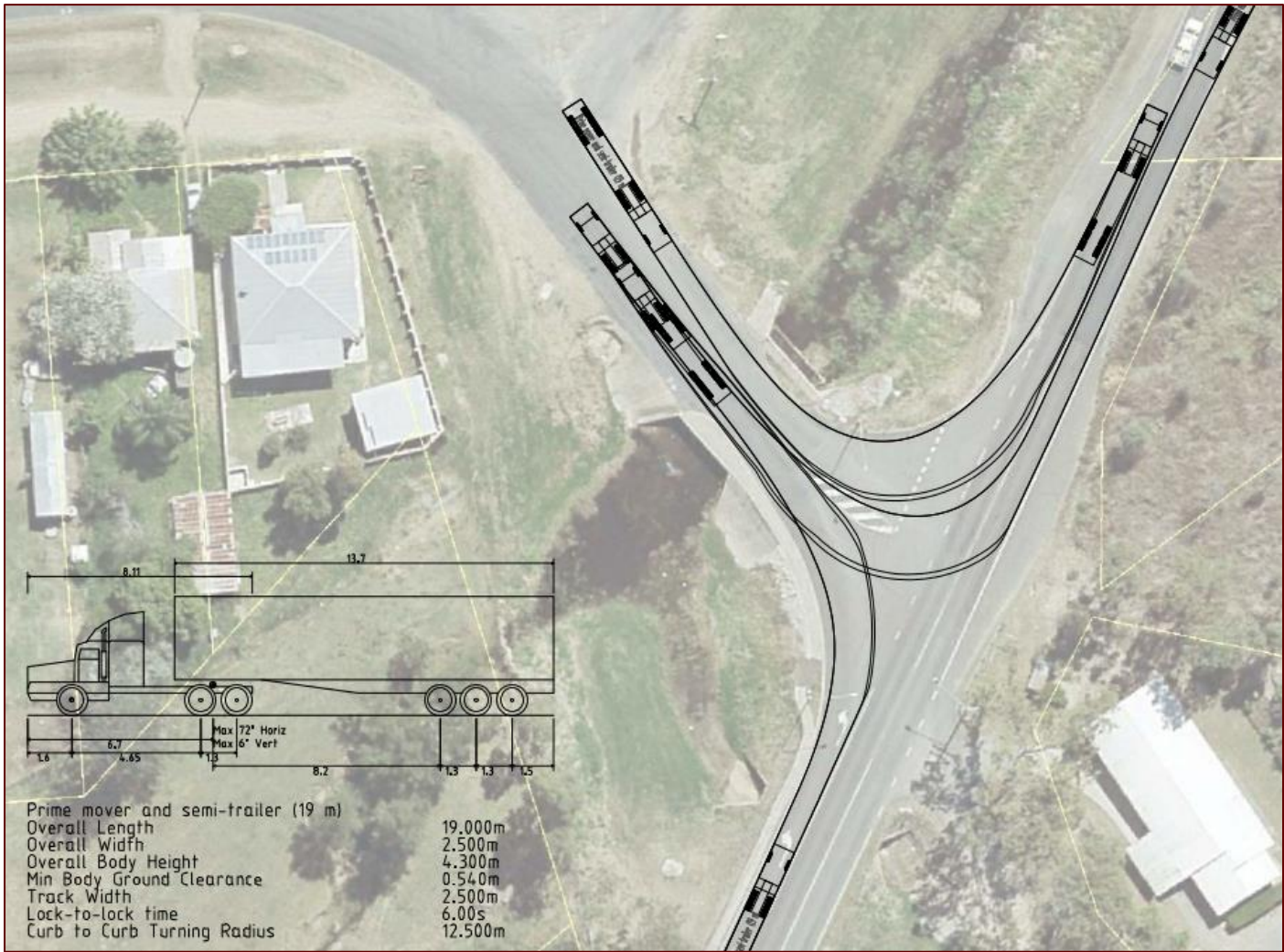
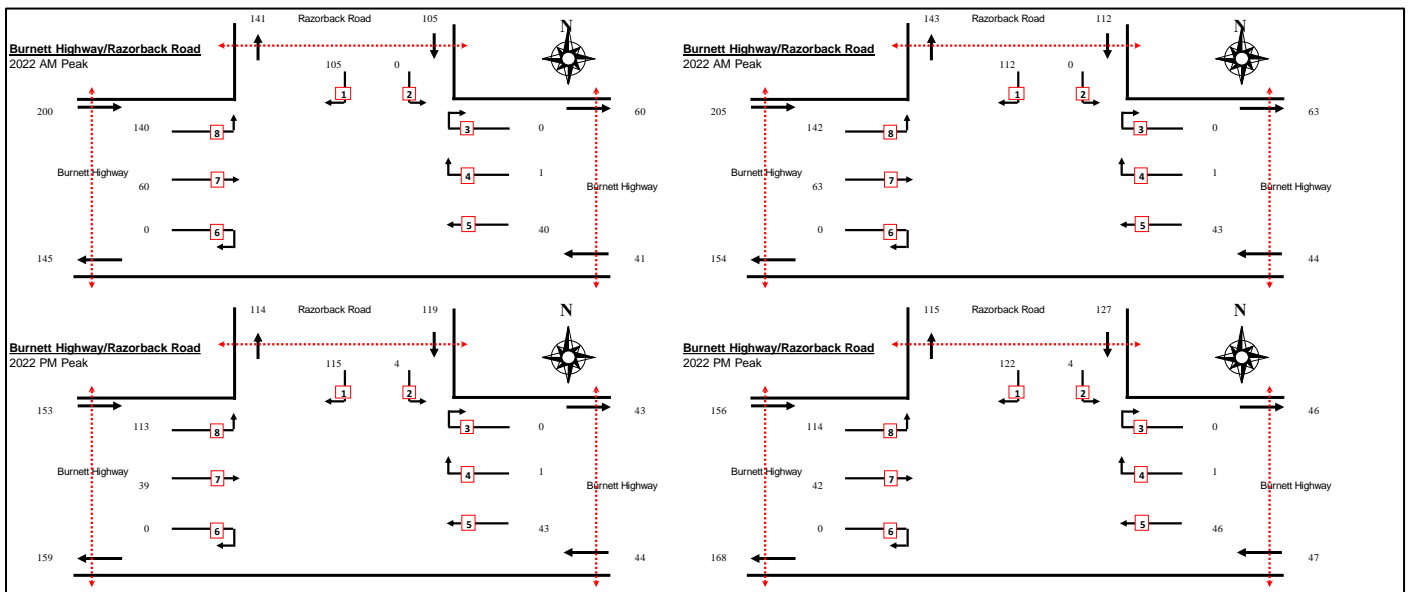
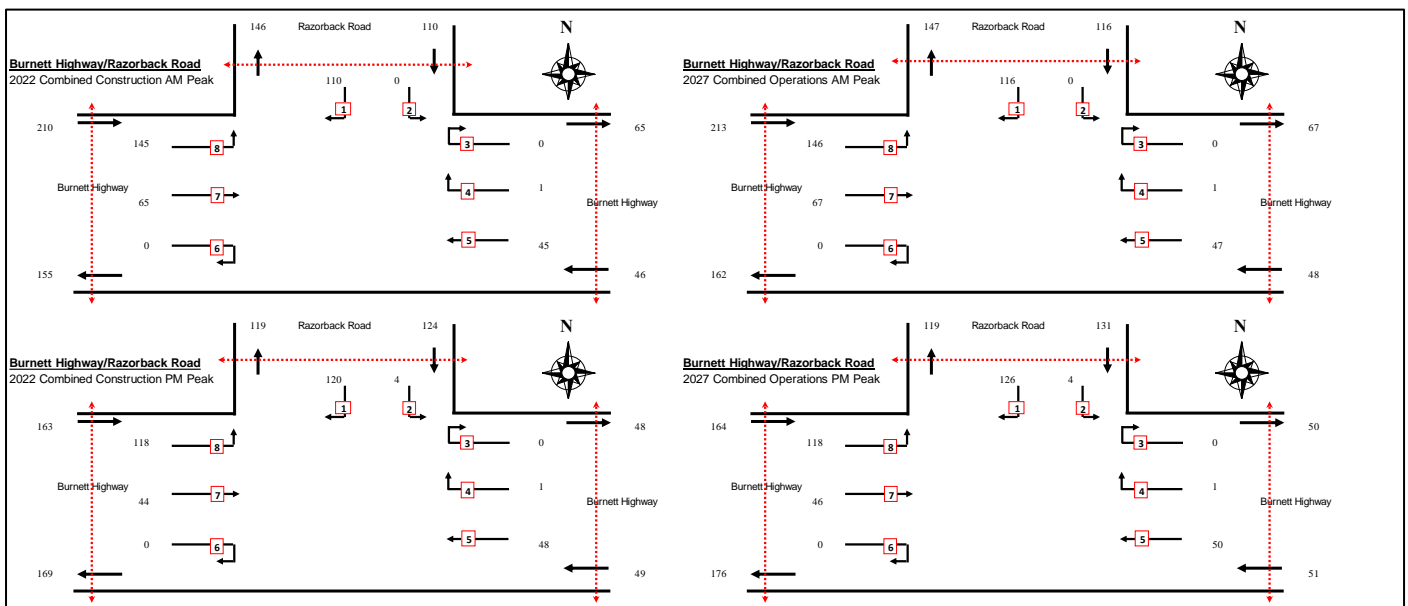


Figure 15 - Swept Path Widening Requirements for Gordon Lane/Burnett Highway

074-20-21

Burnett Highway / Razorback Road (Creek Street) Intersection

- The existing intersection provides a BAR and AUL treatment with a 80kph speed limit.

**Figure 16 - Razorback Road Peaks 2022 and 2027 without Development****Figure 17 - Razorback Road Peaks 2022 and 2027 with Development**

Analysis of these scenarios have been undertaken using SIDRA 9.0 with the results as outlined in **Appendix B**. In summary the intersection performs satisfactorily for all scenarios and no upgrades are triggered as a result of development traffic.

Swept path assessment has also been undertaken as per **Appendix C** and no additional widening is required as per **Figure 18** below

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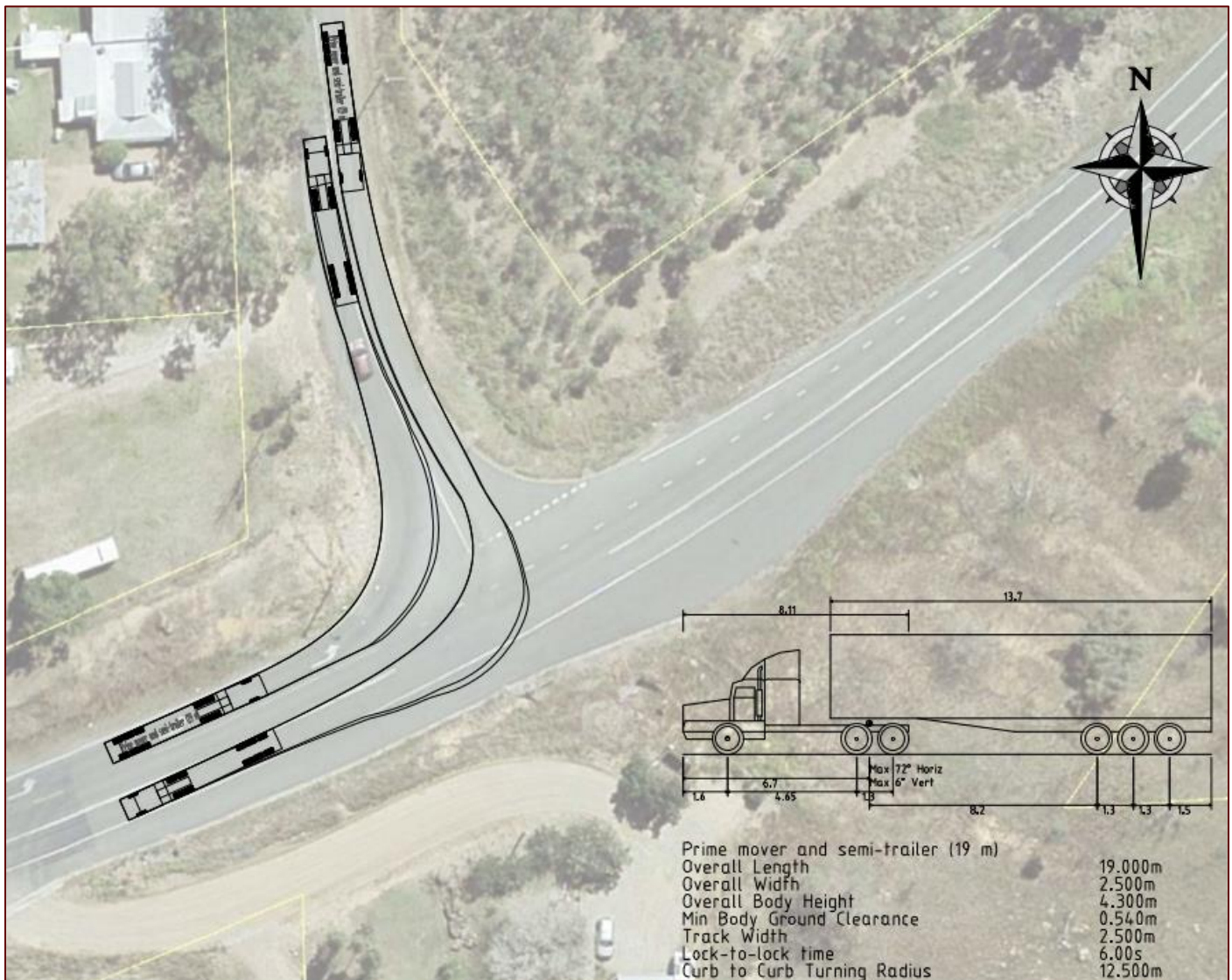


Figure 18 - Swept Path Widening Requirements for Razorback Road/Burnett Highway

5.3. ROAD LINK ASSESSMENT AND MITIGATION

Gordon Lane

Given the increased traffic volumes on Gordon Lane exceed the 5% impact trigger in terms of AADT and ESA's it is recommended that the road should be asphalt sealed and upgraded (widened) to an 8m wide sealed pavement.

Burnett Highway

Additional development traffic movements equate to increases of more than 5% in terms of ESA's on the Burnett Highway, which can be considered significant in terms of pavements, however, the increase is marginal in the context of the capacity of the link and does not exceed the 5% trigger in terms of traffic volumes.

It is however noted that the percentage of traffic volume increase identified for these road sections is predominantly due to the low background traffic volumes.

Based on the low background and relatively low development traffic volumes identified it is anticipated that the existing configuration of the Burnett link will be adequate to accommodate the resultant "post development" volumes and that sufficient "capacity" is available on the surrounding road network to cater for the additional trips generated by the proposed development construction and operations.

074-20-21

Razorback Road

Similarly, to Burnett Highway only a relatively short section of Razorback Road is impacted and development traffic is relatively low and still well within the capacity of the road section. Development volumes do not exceed the 5% trigger for AADT on this link so any further analysis would appear unwarranted.

5.4. PAVEMENT IMPACT ASSESSMENT AND MITIGATION

The assessment of potential pavement impacts of the project involves a comparison of the pavement loading ESAs associated with the background traffic volumes on the relevant road links, to the ESAs estimated to be generated by the additional heavy vehicles associated with the proposed haulage operations.

The comparison of the background and development pavement loadings along the identified transport route has been undertaken, with a summary of the results provided in **Table 2**. Based on **Table 2** pavement impact contributions are triggered for the highlighted scenarios within the PLA.

Table 2 Pavement Loading Comparison

Description	AADT Segment		Base Data Year	Base Year (2021) AADT				10 Yr. GR %	Background AADT (2022)				Development ESAs		5% rule
	Start (km)	End (km)		Gaz	% HV	A-Gaz	% HV		Gaz		A-Gaz		Const 2022	Ops 2022	
									HV	ESA/year	HV	ESA/year	ESA/year	ESA/year	
Burnett Highway – 41F															
Start to Gordon Lane	0	2.533	2019	1891	6.98%	1936	4.29%	1.00%	133	145976	84	91854	11093	0	Const - 10 semi's per day inbound
Gordon Lane to Razorback	2.533	5	2019	1257	5.49%	1235	10.85%	1.00%	70	76321	135	148195	11093	17748	Const and Ops - 10 semi's per day inbound
Burnett Highway – 41E															
Showgrounds Road to End	101.344	102.775	2019	1123	9.44%	1134	8.91%	1.00%	107	117243	102	111745	11093	0	Const - 10 semi's per day inbound
End PLA to Showgrounds Road	102.775	98.5	2019	463	11.23%	450	7.33%	1.00%	53	57504	33	36480	11093	0	Const - 10 semi's per day inbound
Razorback Road (Creek Street)															
Burnett Hwy to end of PLA (3kms)			2021	1034	11.20%	1034	11.20%	1.00%	117	128036	117	128036	5546	8874	Ops - 5 semi's per day inbound

Notes:

- No calculations for Gordon Lane as 5% trigger assumed and road will be widened and strengthened in any case
- Assuming ESA/veh based on a semi trailer as 4.93 loaded and 0.51 unloaded noting unloaded direction doesn't trigger under any scenario
- For Construction ESA assuming inbound loaded and outbound unloaded and 300 days per year
- For Operations ESA assuming 50% trips loaded and 50% unloaded in either direction
- For Operations product outbound is only 4000TPa so is considered as insignificant

074-20-21

Pavement impact contribution calculations were undertaken using the TMR Fitzroy District spreadsheet method for Razorback Road (Road Roughness data provided previously by RRC), which is generally accepted as the standard methodology for local government-controlled roads and the Marginal Cost Method for the Burnett Highway (Marginal Costs provided by TMR). Noting that Gordon Lane has been excluded as it will require widening and reconstruction to cater for development traffic. Further details of the calculations undertaken are provided for reference in **Appendix D**, with the resultant pavement maintenance and rehabilitation contributions required to offset the impacts of the identified haulage scenarios of the Project **Table 3** below.

Table 3 Recommended Project Pavement Contributions

Haulage Scenario	Pavement Contribution
	\$
Construction – Burnett Highway (TMR)	\$10,273 once off
Operations Burnett Highway (TMR)	\$4,342 pa
Operations Razorback Road (RRC)	\$2,405 pa

CONCLUSIONS AND RECOMMENDATIONS

6.1. SUMMARY OF IMPACTS AND MITIGATION MEASURES PROPOSED

TRAFFIC IMPACTS

Based on the relatively low background traffic numbers and the relatively small increase in traffic numbers as a result of the Project, it is anticipated that the proposed development will have a minimal impact on the traffic operation of the identified mid-block sections with adequate capacity expected to be available on the road link to cater for the additional vehicles. Additionally, the impact of the proposed Project on the relevant intersections can also be deemed to be negligible.

The impact on Gordon Lane pavement and capacity is significant and it is expected that this link would be widened and strengthened appropriately i.e. be asphalt sealed and upgraded (widened) to an 8m wide sealed pavement.

PAVEMENT IMPACTS

An assessment of the expected pavement impacts to the relevant sections of Burnett Highway and Razorback Road was undertaken for the proposed Project.

This assessment identified that the additional heavy vehicle movements associated with the proposed Project are expected to lead to increases in pavement loadings on the identified road sections, with the inbound values above the recommended 5% impact trigger for the proposed haulage scenarios assessed.

As such pavement impact contribution calculations were undertaken using the standard TMR Fitzroy District spreadsheet methodology for Razorback Road and the Marginal Cost method for Burnett Highway, with the following contribution value calculated to be required to offset the identified pavement impacts of the proposed Project:

Table 4 Recommended Project Pavement Contributions

Haulage Scenario	Pavement Contribution
	\$
Construction – Burnett Highway (TMR)	\$10,273 once off
Operations Burnett Highway (TMR)	\$4,342 pa
Operations Razorback Road (RRC)	\$2,405 pa

RECOMMENDATIONS

In light of the information provided above, it can be considered that based on the provision of the payment of a suitable road maintenance contributions (based on the assessed haulage scenario) to offset the expected increased maintenance and rehabilitation requirements on the relevant sections of Razorback Road, Burnett Highway and the widening and strengthening of Gordon Lane as a result of the additional traffic generated by the Project, that the proposed Project will have a minor impact on the adjacent road network.

APPENDIX A

Raw Traffic Count Data (RRC) & TMR Census Database & New Intersection Counts

APPENDIX B

SIDRA Analysis

APPENDIX C

Swept Path Assessments

Pavement Impact Assessment Detail