



Premise

CENTREX METALS LIMITED

ARDMORE PHOSPHATE PROJECT DIAMANTINA DEVELOPMENTAL ROAD

TRAFFIC IMPACT ASSESSMENT

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ENGINEERING



ENVIRONMENT



AGRICULTURE



WATER

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1 INTRODUCTION

Premise was engaged by Centrex Metals Limited (Centrex) to undertake a Traffic Impact Assessment for the proposed Ardmore Phosphate Project in accordance with the “Guide to Traffic Impact Assessment” (Department of Transport and Main Roads, September 2017).

1.1 Background

This Traffic Impact Assessment is based on full scale mining operations. Prior to full scale operations commencing, a trial mining operation will occur with haulage of no more 50,000 tonnes.

This version of the Traffic Impact Assessment is provided to inform the Environmental Authority Application for the trial mining operation. It excludes the Pavement Impact Assessment which is currently subject to negotiation with the Department of Transport and Main Roads.

1.2 Scope and Study Area

Ardmore Phosphate Project is located approximately 128km south of Mt Isa and 27km west of Dajarra. Concentrate produced by the project will be transported via Diamantina Developmental Road and Cloncurry Dajarra Road through Dajarra to Duchess for transfer to rail. The impact assessment area for this report is the proposed haulage route as shown by Figure 1-1.

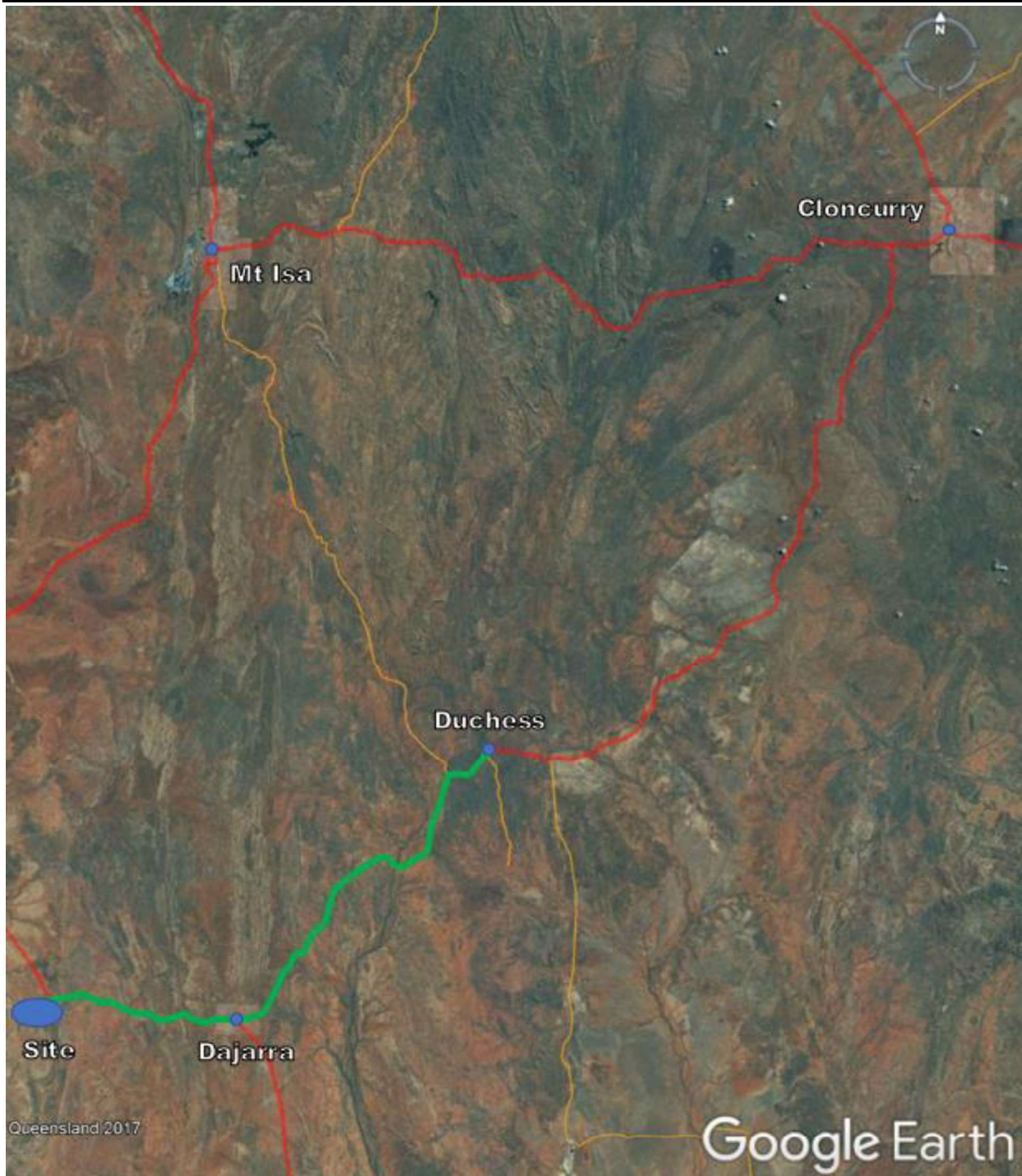


Figure 1-1 Study area

The Project is expected to commence operations in 2021 which is adopted as the opening year. The nominal life of the mine is 10 years. Therefore, the design year for site access will be 2031.

1.3 Pre-lodgment Advice

No formal Pre-Lodgement Advice from the Department of Transport and Main Roads (TMR) has been reviewed by Premise. It is understood that TMR requires a Traffic Impact Assessment in accordance with the “Guide to Traffic Impact Assessment”.

Cloncurry Shire Council (CSC) has advised by email that it requires a Traffic Impact Assessment including:

- Mine development and haulage profile;
- Pavement impact assessment;
- Traffic operation assessment;
- Safety review; and
- Environmental and other considerations.

The CSC requirements listed above are consistent with a Road Impact Assessment in accordance with the “Guidelines for Assessment of Road Impacts of Development” (Queensland Government Department of Main Roads, March 2006). On 3 July 2017, the “Guidelines for Assessment of Road Impacts of Development” (GARID) were superseded by the “Guide to Traffic Impact Assessment” (GTIA). Therefore, this report is prepared in accordance with the GTIA.

2 EXISTING CONDITIONS

2.1 Land Use and Zoning

The mining lease is located within the rural zones of both the Cloncurry and Boulia Shire planning schemes.

2.2 Surrounding Road Network Details

The surrounding road network is shown by Figure 2-1. Maps of multi-combination vehicle routes and zones available from the TMR website (<https://www.tmr.qld.gov.au/business-industry/Heavy-vehicles/Multi-combination-vehicles/Maps>) indicate that operation of multi-combination vehicles including type 2 road trains is not restricted in the study area. The subject site fronts Diamantina Developmental Road. Diamantina Developmental Road is referred to as either north or south relative to Cloncurry Dajarra Road. The haulage route also includes Cloncurry Dajarra Road.

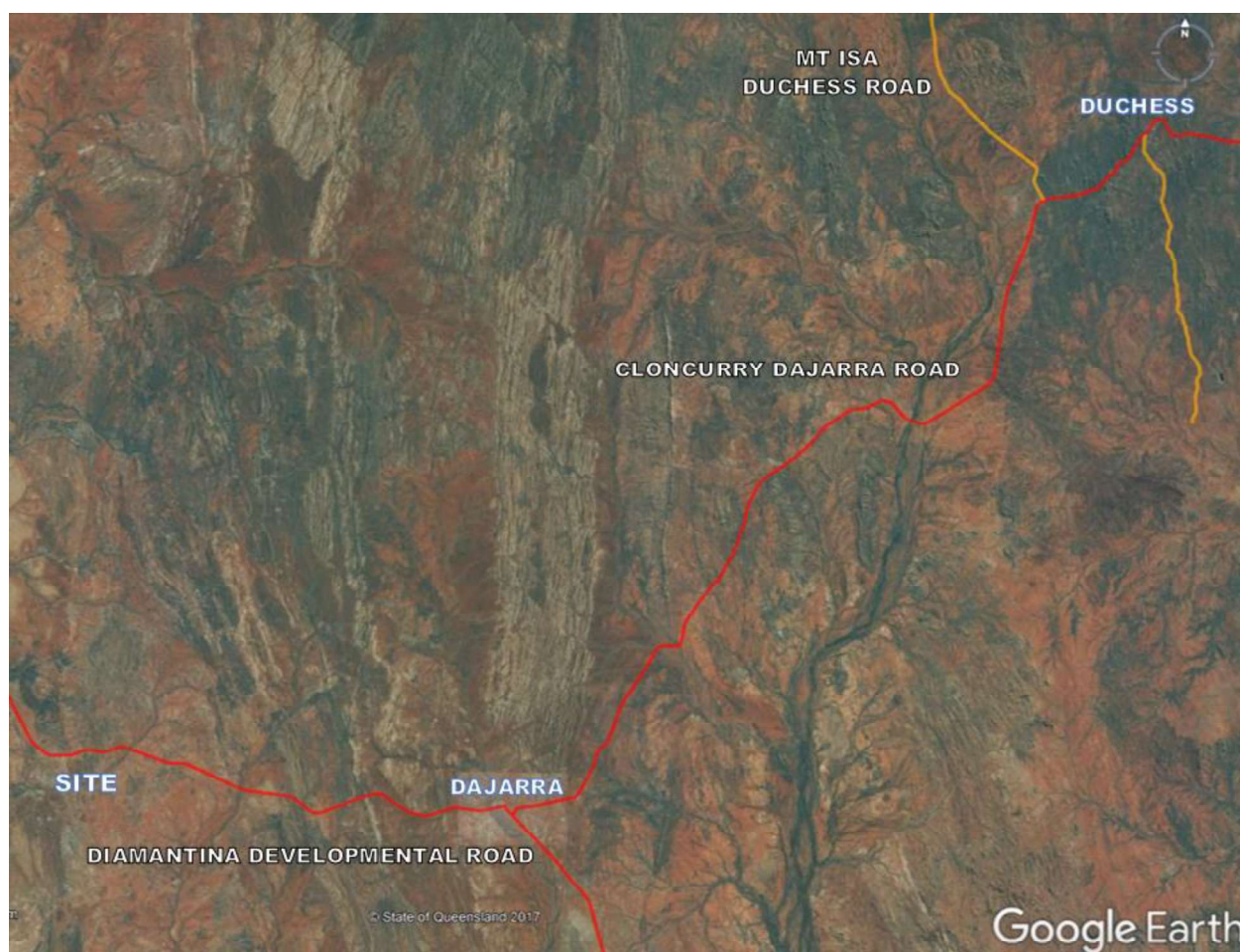


Figure 2-1 Surrounding Road Network

2.2.1 Frontage Road – Diamantina Developmental Road

The subject site has frontage to Diamantina Developmental Road.

Diamantina Developmental Road is a state-controlled road under the governing authority of TMR, it features a single lane seal for two-way traffic flow with a gravel graded shoulder to allow the passing of two vehicles. The posted speed limit on Diamantina Developmental Road is 100km/h at the subject site, reducing to 60km/h through Dajarra and rising to 80km/h at the intersection with Cloncurry Dajarra Road.

2.2.2 Haulage Roads

The haulage road between the subject site and Duchess is made up of Diamantina Developmental Road and the Cloncurry Dajarra Road.

2.2.2.1 Cloncurry Dajarra Road

Cloncurry Dajarra Road is a state-controlled road under the governing authority of TMR. It is an unsealed road with a formation width which generally exceeds six (6) metres. South of Mt Isa Duchess Road, Cloncurry Dajarra Road is a graded natural material road which narrows at creek crossings and cattle grids having a minimum width of 3m. North of Mt Isa Duchess Road, Cloncurry Dajarra Road has a gravel pavement. The posted speed limit on Cloncurry Dajarra Road is 100km/h reducing to 60km/h through Duchess.

2.2.3 Intersections – Diamantina Developmental Road / Cloncurry Dajarra Road

The intersection of Diamantina Developmental Road with Cloncurry Dajarra Road is a priority (unsigned) T-intersection on the state-controlled road network. Diamantina Developmental Roads' single lane seal continues through the intersection as shown by Figure 2-2 with the intersection being identifiable by warning and guide signs installed at the intersection and on its approaches.



Figure 2-2 Diamantina Developmental Road / Cloncurry Dajarra Road Intersection

2.3 Traffic Volumes

TMR supplied 2017 Traffic Analysis and Reporting System (TARS) data for Diamantina Developmental Road and Cloncurry Dajarra Road. Annual average daily traffic (AADT) and heavy vehicle percentage (HV%) for the road segments comprising the proposed haulage route are summarised in Table 2-1.

Table 2-1 TARS Base Traffic Volumes

Road	AADT	HV%
Diamantina Developmental Road (north)	59vpd	25%
Diamantina Developmental Road (south)	79vpd	19%
Cloncurry Dajarra Road	64vpd	22%

TARS data includes historic growth data for the past one (1), five (5) and 10 years which are summarised by Table 2-2

Table 2-2 TARS Growth Summary

Road	Annual Segment Growth		
	1 Year	5 Years	10 Years
Diamantina Developmental Road (north)	-13.24%	-4.54%	-2.55%
Diamantina Developmental Road (south)	-5.95%	-0.84%	-2.37%
Cloncurry Dajarra Road	18.52%	9.26%	7.60%

Traffic volumes on Diamantina Developmental Road (north and south) have been declining over the past one (1), five (5) and ten (10) years.

Traffic growth data for the Cloncurry Dajarra Road indicate that traffic is growing at a rate which reduces when measured over a longer period of time. This may reflect a rapid increase in traffic following an extended period of little or no traffic growth.

The Transportation Globe feature of Queensland Globe includes historic AADT data for the road network for the years from 2010 to 2016. Table 2-3 shows AADT from Queensland Globe for Diamantina Developmental Road (north and south) and Cloncurry Dajarra Road. This table indicates that:

- Diamantina Developmental Road (north) traffic has generally been declining over the past four (4) years;
- Diamantina Developmental Road (south) traffic fluctuates between 75vpd and 92vpd for seven (7) of the last eight (8) years; and
- Cloncurry Dajarra Road traffic has generally been growing over the past six (6) years.

Table 2-3 Queensland Globe Growth Summary

Year	Diamantina Developmental Road		Cloncurry Dajarra Road
	North	South	
2017	59	79	64
2016	68	84	54
2015	65	75	52
2014	71	92	46
2013	*	80	49
2012	*	79	41
2011	*	151	48
2010	*	78	63

* - No data

It is noted that TARS data for Cloncurry Dajarra Road is collected between Duchess and Cloncurry and likely provides a conservative estimate of existing traffic on the proposed haulage route via Cloncurry Dajarra Road from Dajarra to Duchess.

2.4 Road Safety Issues

Existing road safety issues in the impact assessment area were identified through crash rate analysis. The analysis considered all accidents reported in the Transportation Globe feature of Queensland Globe for the period from 2001 to 2017 on the haulage route from the mining lease to Duchess.

There was a total of 10 crashes reported on the haulage route during this period with key features of each crash summarised in Appendix A.

Four (4) of the reported accidents occurred at night. All were casualty accidents and one (1) was a fatal accident where a truck hit a pedestrian on the carriageway. The lack of route lighting was almost certainly a contributing factor in all these accidents.

Two (2) of the reported accidents were left off carriageway crashes on straight sections of Diamantina Developmental Road which occurred during the early afternoon. One (1) accident resulted in hospitalisation and the other in medical treatment.

Driver fatigue was probably a contributing factor in these accidents. It is also likely that the narrow (single lane) seal on Diamantina Developmental Road was another contributing factor.

One (1) of the reported accidents was a head-on collision at a crest on Cloncurry Dajarra Road and resulted in medical treatment. It is likely that narrowing of the Cloncurry Dajarra Road carriageway at creek crossings contributed to this accident.

Three (3) of the reported accidents were off path on curve accidents on Cloncurry Dajarra Road all of which resulted in property damage only. The relatively low friction of the unsealed surface of Cloncurry Dajarra Road was probably a contributing factor in these accidents.

2.5 Site Access

There is currently no access to the site.

2.6 Transport Infrastructure

Joel O'Neill of WSP Global Inc. (WSP) sent Ben Hammond of Centrex a memo dated 6 November 2017 regarding "Dajarra to Duchess haul route – Capital and maintenance cost estimate". The memo:

- Assesses the suitability of the existing road to carry the proposed haul traffic;
- Identifies required upgrades to the road; and
- Estimates annual ongoing maintenance costs associated with the increased traffic.

A copy of the memo is attached in Appendix B with cost information removed.

Transport infrastructure on Cloncurry Dajarra Road is described in section 2.1.2 of the memo.

3 PROPOSED DEVELOPMENT DETAILS

3.1 Development Site Plan

The Project is located 27km west of Dajarra on Diamantina Developmental Road.

Attached in Appendix C is the development site plan which shows that two (2) pits are proposed. The southern pit is situated approximately 6km south of Diamantina Developmental Road. The northern pit is situated on the current alignment of Diamantina Developmental Road. It is proposed to realign Diamantina Developmental Road between approximate chainages 25.5km and 29.0km to the northeast around the northern pit. An accommodation camp for all Project workers is to be constructed within the mining lease roughly halfway between the two (2) pits.

3.2 Operational Details

The proposed development is expected to be constructed in two stages (southern pit and northern pit), with the southern pit to commence mining operations in 2021 and the northern pit to commence mining operations in 2026 following realignment of Diamantina Development Road.

The nominal life of the mine is 10 years. Therefore, the final year of operations is expected to be 2031.

The mine will operate 24-hours per day, seven (7) days per week.

3.3 Proposed Access and Parking

The proposed access to the site is via a new access haulage road located at the eastern (Dajarra) end of the proposed Diamantina Developmental Road realignment as shown in Appendix C.

4 DEVELOPMENT TRAFFIC

4.1 Traffic Generation

Traffic generated by the proposed development has been estimated from a first principles assessment of forecast activity including:

- Product haulage;
- Commuting workers;
- Fuel deliveries;
- Deliveries of stores and food supplies; and
- Other vehicle movements.

The proposed development is expected to produce 800,000 tonnes per annum of Phosphate concentrate which is to be transported by type 2 road trains with a capacity of 84 tonnes. This implies 9,524 outbound loaded triple road trains per year and 9,524 inbound unloaded triple road train trips per year (i.e. 19,048 triple road trains per annum). Assuming a conservative two-week shutdown period per year (i.e. 351 working days in a year) this results in 28 outbound loaded triple road trains per day and 28 inbound unloaded triple road trains per day (i.e. 56 triple road trains per day).

Commuting workers are to be transported by bus on a weekly basis to / from the on-site accommodation camp.

Fuel deliveries, for gas/diesel, are expected to occur on a weekly basis by B-Double.

Deliveries of stores and food supplies are expected to occur on a weekly basis by B-Double.

It is noted that the development is located within 20-minutes' drive of Dajarra, as such it is assumed that the proposed development will produce some light vehicle trips between the Project and Dajarra. It is conservatively estimated that 5 inbound and 5 outbound light vehicles will be generated by the development each day.

Based on the above discussion, the daily traffic generation for the proposed development is conservatively assumed to be:

- 10 light vehicles per day;
- 56 triple road trains per day; and
- Two (2) other heavy vehicles per day (i.e. buses of workers or deliveries by B-double).

The peak hour traffic generation for the proposed development is conservatively assumed to be:

- Four (4) light vehicles per hour.
- Four (4) triple road trains per hour; and
- Two (2) B-Doubles per hour.

The inbound : outbound directional split is assumed to be 50:50 at all times.

4.2 Trip Distribution

The traffic distribution for the proposed development is as follows:

- Product haulage will be to Duchess;
- Commuting workers will be from Mt Isa;
- Deliveries of fuel, stores and food-supplies will be from Mt Isa; and
- Other (light vehicle) trips will be to / from Dajarra.

4.3 Development Traffic Volumes on the Network

Estimated development traffic volumes on the network are shown by Figure 4-1.

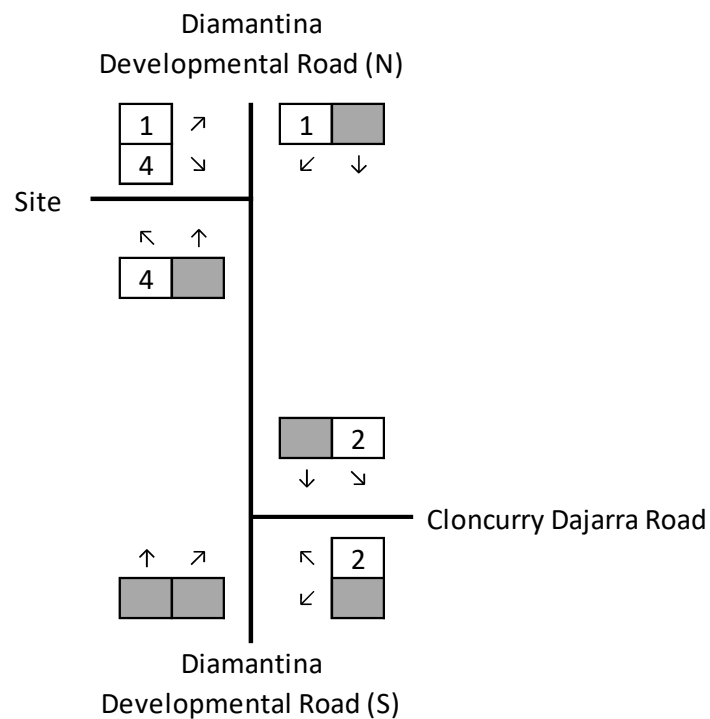


Figure 4-1 Development Traffic Volumes on the Network

5 IMPACT ASSESSMENT AND MITIGATION

5.1 With and Without Development Traffic Volumes

5.1.1 Without Development Traffic Volumes

Two-way daily traffic volumes, determined from the TARS supplied data (refer section 2.3), are shown by Figure 5-1.

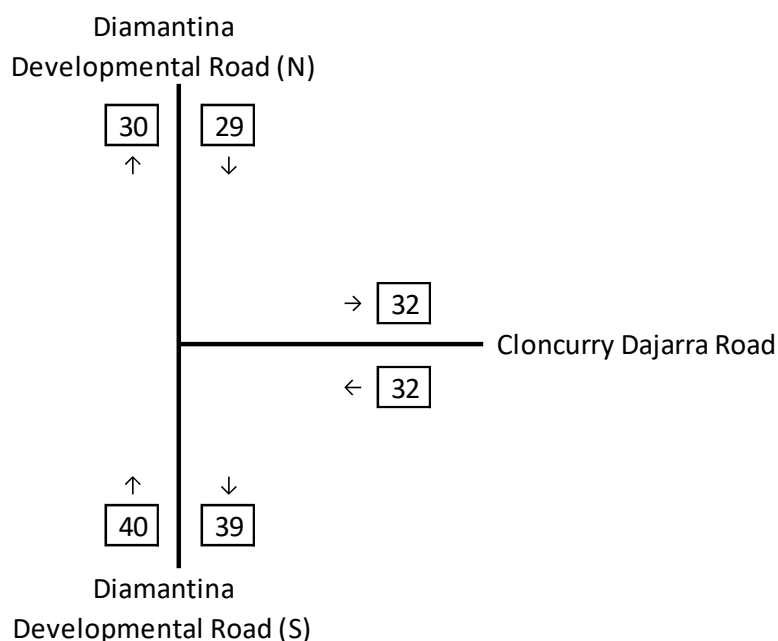


Figure 5-1 Two-way daily traffic volumes - 2017

The two-way turning volumes shown in Figure 5-2 were calculated using the link volumes on each intersection leg.

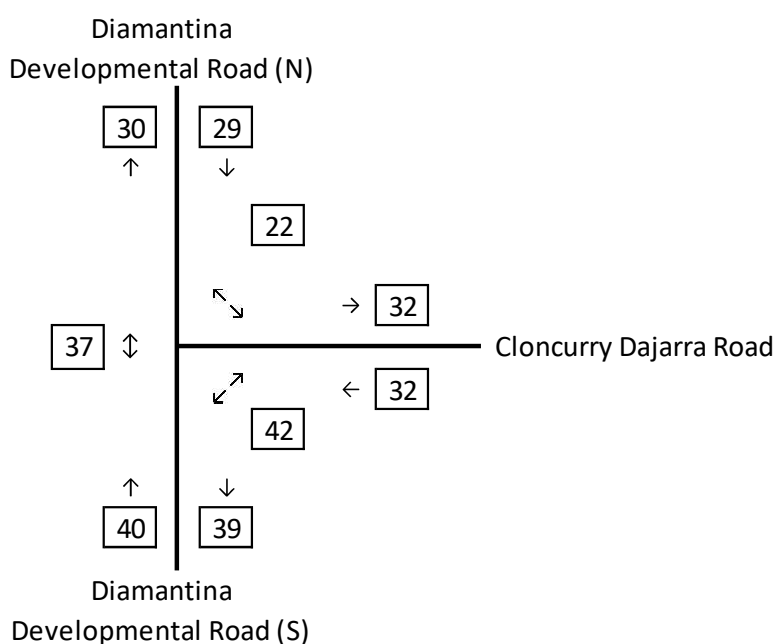


Figure 5-2 Two-way daily traffic volumes with turning volumes - 2017

The GTIA recommends background traffic growth should be based on long term growth rates and the most recently available traffic volumes. Therefore, turning movements in and out of Cloncurry Dajarra Road are assumed to grow at 7.6% per annum. Through movements along Diamantina Developmental Road are conservatively assumed to neither grow nor decline despite the historic decline in this traffic.

Applying the above growth assumptions to current daily traffic shown by Figure 5-2 results in the daily traffic volumes shown by Figure 5-3 for the opening year (2021) and Figure 5-4 for the design year (2031).

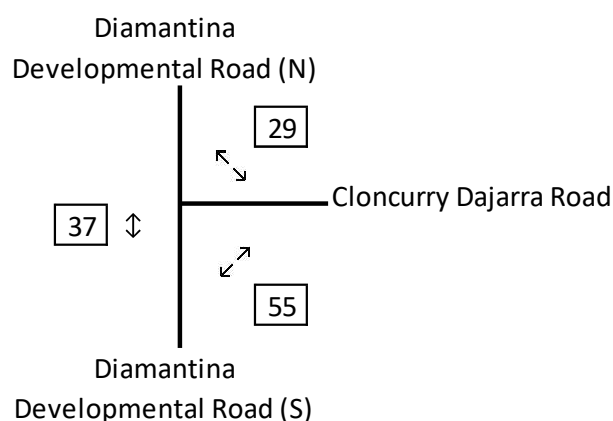


Figure 5-3 Two-way daily traffic volumes with turning volumes - 2021

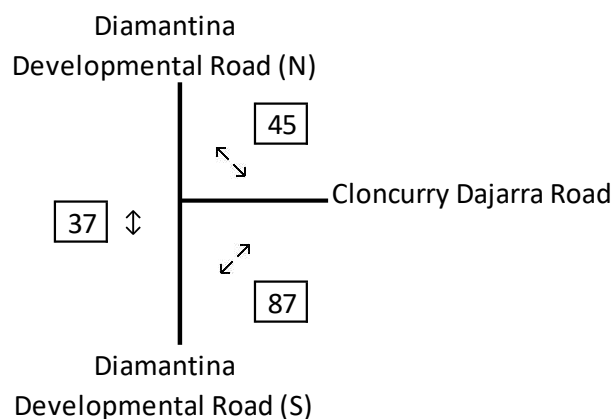


Figure 5-4 Two-way daily traffic with turning volumes - 2031

To determine the peak hour volumes, it has been assumed that the peak hour traffic is 15% of the AADT and the directional split is 50:50. Peak hour traffic volumes without the development for the design year 2031 are shown in Figure 5-5.

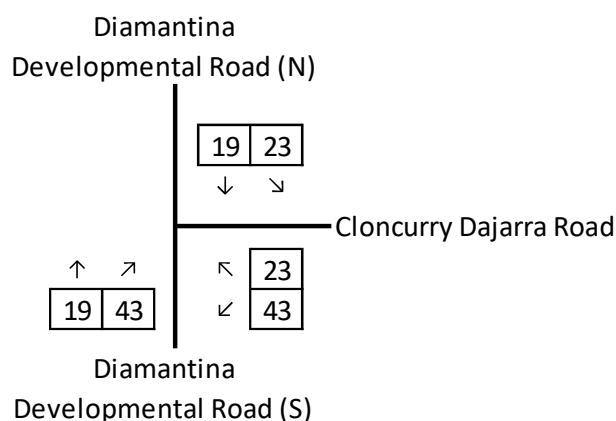


Figure 5-5 Estimated peak hour traffic volumes without development - 2031

5.1.2 With development traffic Volumes

Adding the peak hour development traffic volumes from Figure 4-1 to design year (2031) without development traffic shown by Figure 5-5 results in the peak hour with development traffic volumes for the design year 2031, shown by Figure 5-6.

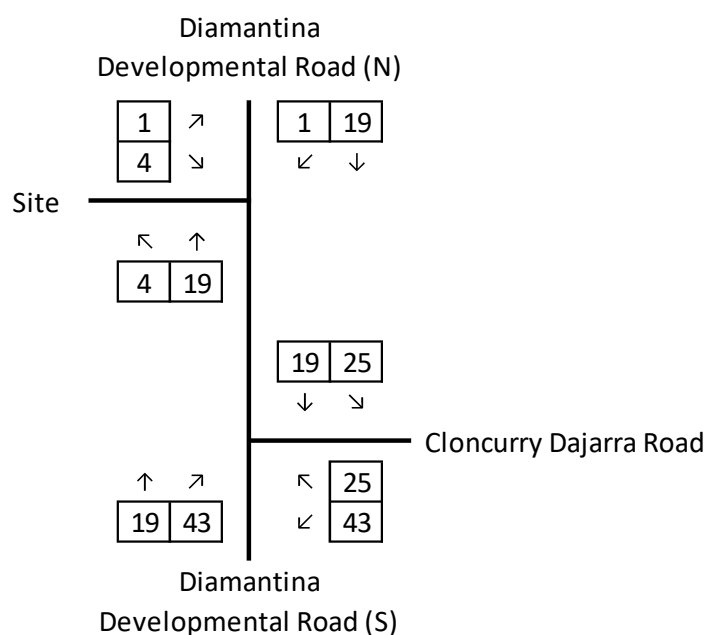


Figure 5-6 Development traffic volumes

5.2 Road Safety Impact Assessment and Mitigation

The road safety risk assessment was conducted in accordance with the risk assessment process specified by GTIA. The risk assessment process involves the following steps:

- Evaluate potential consequences based on accident severity from 1, property damage only, to 5, fatality;
- Evaluate potential likelihood from 1, rare, to 5, almost certain;
- Sum the potential consequence and likelihood values to determine the risk score with scores up to and including 4 considered low risk, 5 to 7 medium risk, and 8 or greater high risk.

To provide an objective assessment of the potential likelihood, Premise uses the average recurrence interval / frequency criteria listed in Table 5-1. These criteria are highly conservative compared to the criteria suggested by TMR's "Guide to Traffic Impact Assessment: Frequently Asked Questions (December 2017)" which proposes that rare could happen once a year whereas almost certain may mean daily. It was found that the highest risk score generally resulted from consideration of the highest consequence / most severe accidents.

Table 5-1: Potential Likelihood Evaluation Criteria

Potential Likelihood	Average Recurrence Interval	Accidents over 17 years
Almost Certain (5)	≤ 1 year	17 or more
Likely (4)	≤ 2 years	9 to 16
Moderate (3)	≤ 4 years	5 to 8
Unlikely (2)	≤ 8 years	3 to 4
Rare (1)	> 8 years	2 or less

A total of seven (7) casualty accidents occurred on the haulage route over the 17-year assessment period. This includes one (1) fatal, three (3) hospitalization and three (3) medical treatment accidents. This implies an overall risk score of medium based on rare likelihood of a fatality, unlikely hospitalization, and moderate likelihood of medical treatment. It is concluded that there are no high-risk items in the impact assessment area which require immediate mitigation.

Risk items in the impact assessment area were identified using accidents reported in Queensland Globe as summarised in Section 0. The road safety risk assessment for each of these items is detailed in Table 5-2.

The traffic generated by the proposed development is expected to increase opening year (2021) traffic on the haulage route by up to 88%. Therefore, the proposed development is expected to increase the likelihood of accidents by one (1) likelihood band.

TARS data indicates that Type 2 Road Trains are already operating on the proposed haulage route. Therefore, the proposed development is not expected to increase the consequence of accidents.

Based on the above assumptions regarding the development's impact on the potential likelihood and consequence of each risk items, Table 5-2 includes the with development road safety risk assessment.

Table 5-2: Road Safety Risk Assessment

	Without development			With development				With development & mitigation		
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score		Likelihood	Consequence	Risk Score
Risk item							Mitigation measures			
Lack of route lighting; Night time crashes	1	5	M	2	5	M	No action			
Diamantina Developmental Road narrow seal; Left off carriageway crashes	1	4	M	2	4	M	No action			
Cloncurry Dajarra Road narrow creek crossings; Head-on collisions	1	3	L	2	3	M	Upgrade creek crossings	1	3	L
Unsealed Cloncurry Dajarra Road; Off-path on curve crashes	2	1	L	3	1	L	No action			

The proposed development is not expected to increase the risk score for three (3) of the four (4) risk items. The risk item that is expected to be significantly affected by the development is the risk of head-on collisions at creek crossings on Cloncurry Dajarra Road.

In section 2.1.2 of the memo attached in Appendix B, WSP recommends upgrading of creek crossings at 11 locations on Cloncurry Dajarra Road due to waterways of significant width (approximately 10m or greater), a deep incised channel (greater than 1m in depth) or entry / exit grade that would limit trafficability by road trains. WSP recommends that these creek crossings be upgraded by installing culverts in accordance with the ARRB Unsealed Road Manual. Installation of culverts and associated improvements in vertical geometry and cross section are considered appropriate to mitigate the increased risk of head-on collisions resulting from the development.

With posted speed limits of 100km/h and AADT of much less than 8,000vpd, both Diamantina Developmental Road and Cloncurry Dajarra Road have a medium road environment safety rating in accordance with the GTIA. The proposed development is a Major Development as defined by the GTIA and therefore, the design of any road network changes will require a "road safety audit" by an accredited Road Safety Auditor (RSA).

5.3 Access and Frontage Impact Assessment and Mitigation

Though not part of the subject site frontage, the following analysis and discussion includes the Diamantina Developmental Road / Cloncurry Dajarra Road intersection.

5.3.1 Turn Warrant Assessment

The “Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections” (Transport and Main Roads, August 2014) indicates that the very low traffic volumes at both the access intersection and the Diamantina Developmental Road / Cloncurry Dajarra Road intersection warrant basic left and right turn treatments (BAL / BAR). The BAL / BAR treatment is the minimum standard of turn treatment allowable in the normal design domain (NDD). Traffic turns from the through traffic lanes of the major road with shoulder widening to provide separation between through and turning traffic in an emergency.

Design details are provided by the following references:

- Rural BAL – Figure 8.2 of the “Guide to Road Design Part 4A: Unsignalised and Signalised Intersections” (Austroads, 2017); and
- Rural BAR – Figure A 28 of the “Guide to Road Design Part 4: Intersections and Crossings – General” (Austroads, 2017).

Copies of both figures are enclosed as Appendix D for ease of reference. The appropriate design speed, V, is 110km/h for the access intersection and 90km/h at the Diamantina Developmental Road / Cloncurry Dajarra Road intersection. These design speeds are 10km/h above the posted speed limit on Diamantina Developmental Road at each of the sites. Based on the above design speeds, the length of parallel widening, P, for the BAL treatments is 35m at the access intersection and 20m at the Diamantina Developmental Road / Cloncurry Dajarra Road intersection. The appropriate design vehicles for turning movements at each intersection are listed in Table 5-3.

Table 5-3: Recommended Design Vehicles for Diamantina Developmental Road Intersections

Diamantina Developmental Road Intersection	Minimum Design Vehicle (Length)		
	Left from Diamantina Developmental Road	Left on to Diamantina Developmental Road	Right from Diamantina Developmental Road
Site Access	Haulage vehicle (46.8m)	B-Double (25.0m)	B-Double (25.0m)
Cloncurry Dajarra Road	Type 2 Road Train (53.5m)	Type 2 Road Train (53.5m)	Type 2 Road Train (53.5m)

It is recommended that both the site access and Cloncurry Dajarra Road be sealed for a minimum of one (1) haulage vehicle length, that is 46.8m, on the approach to Diamantina Developmental Road to minimise:

- Risk of road trains rolling when turning;
- Mud, gravel and dust tracked across Diamantina Developmental Road; and
- Damage to the edge of seal.

5.3.2 Intersection Analysis

The “Guide to Traffic Management Part 3: Traffic Studies and Analysis” (Austroads 2009) states that “at unsignalised intersections with minor roads where there are relatively low volumes of cross and turning traffic, capacity considerations are usually not significant, and capacity analysis is unnecessary.” Table 5-4 reproduced from the Guide to Traffic Management Part 3 lists the intersection volumes below which capacity analysis is unnecessary.

Table 5-4: Intersection Volumes Below Which Capacity Analysis is Unnecessary (Austroads 2009)

Type of road	Light cross and turning volumes maximum design hour volumes vehicles per hour (two way)		
Two-lane major road	400	500	650
Cross road	250	200	150
Four-lane major road	1000	1500	2000
Cross road	100	50	25

Design peak hour traffic volume at the Diamantina Developmental Road / Cloncurry Dajarra Road intersection as shown by Figure 5-6 are well below those values listed in Table 5-4 for the major road (Diamantina Developmental Road) and the cross road (Cloncurry Dajarra Road). Therefore, in accordance with the Guide to Traffic Management Part 3, capacity analysis of the intersection is unnecessary.

Forecast traffic volumes at the proposed development access are even lower than at the Diamantina Developmental Road / Cloncurry Dajarra Road intersection and again capacity analysis of the intersection is unnecessary.

5.3.3 Sight Distances

Approach Sight Distance (ASD) is the distance at which a driver can see the road surface at the access and should be sufficient to allow the driver to react to any pavement markings or kerbing. For a design speed of 110km/h, being 10km/h above the posted speed limit on Diamantina Developmental Road, the "Guide to Road Design Part 4A: Unsignalised and Signalised Intersections" (Austroads 2017) indicates ASD should ideally be no less than 209m.

Safe Intersection Sight Distance (SISD) is the distance at which a driver on the major road can observe a vehicle using the minor road moving into a collision situation and decelerate to a stop before reaching the collision point. To comply with the desirable SISD requirements specified by the Guide to Road Design Part 4A, a vehicle on Diamantina Developmental Road should be able to see a vehicle using the subject site access at a distance of 300m.

Figure 5-7 and Figure 5-8 show visibility along Diamantina Developmental Road from the proposed access location. The level grade of Diamantina Developmental Road is not expected to adversely impact on ASD or SISD nor is the relatively straight alignment east of the proposed access. To the west of the proposed access Diamantina Developmental Road has a sweeping curve with an approximate radius of 800m which is not expected to adversely impact on ASD or SISD.

When Diamantina Developmental Road is realigned to facilitate development of the northern pit acceptable ASD and SISD provisions will need to be maintained.



Figure 5-7 Diamantina Developmental Road looking east from the proposed site access

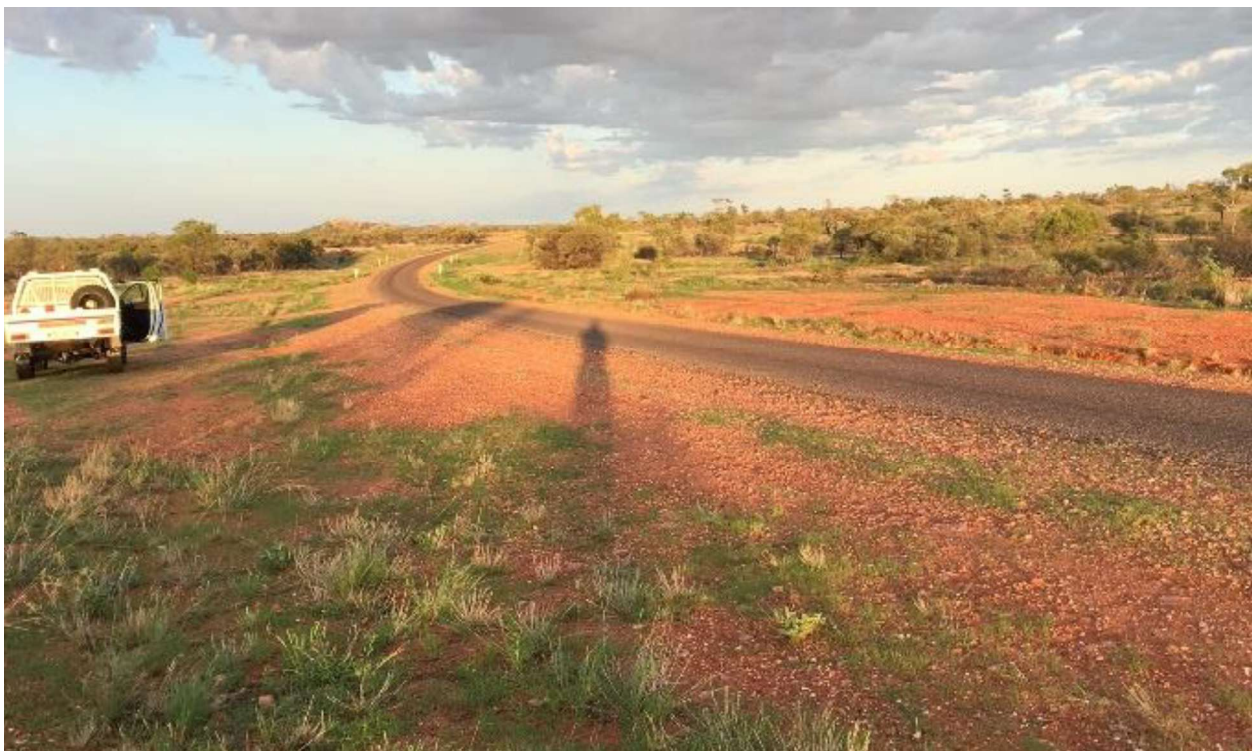


Figure 5-8 Diamantina Developmental Road looking west from the proposed site access

As the Diamantina Developmental Road speed limit is just 80km/h at the Cloncurry Dajarra Road intersection, sight distance requirements at the Diamantina Developmental Road / Cloncurry Dajarra Road intersection are less than at the access intersection.

Google Earth Street View indicates that Diamantina Developmental Road has a straight and level alignment through the intersection and available sight distance is acceptable.

5.4 Transport Infrastructure Impact Assessment and Mitigation

Further to the mitigation measures previously discussed in Section 5.2, the following improvements to Cloncurry Dajarra Road are recommended in accordance with Section 2.1.2 of the WSP memo (refer Appendix B):

- Medium grading / blading, to return the road to a TMR standard with respect to roughness, along with re-establishing a road crown and table drainage;
- Install culverts at 11 locations which were identified as waterways of significant width (approximately 10m or greater), having a deep incised channel (greater than 1m in depth), or entry / exit grade that would limit trafficability by road trains;
- Replace five (5) existing grids which are less than a standard traffic lane in width with TMR standard grids; and
- Replace an existing four (4) cell box culvert and concrete slab causeway at the Wills Creek crossing.

These improvements should be provided prior to the commencement of Project operations.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Impacts and Mitigation Measures

This Traffic Impact Assessment is based on full scale mining operations of the Ardmore Phosphate Project (the Project). Prior to full scale operations commencing, a trial mining operation will occur with haulage of no more 50,000 tonnes.

This version of the Traffic Impact Assessment is provided to inform the Environmental Authority Application for the trial mining operation. It excludes the Pavement Impact Assessment which is currently subject to negotiation with the Department of Transport and Main Roads.

The Project will have a significant impact on the proposed haulage route consisting of Diamantina Developmental Road and Cloncurry Dajarra Road between the proposed site access and Duchess. Impacts and mitigation strategies for each of these roads are summarised below. A road environment safety assessment has determined that any changes to either road should be subject to a “road safety audit” by an accredited road safety auditor (RSA).

6.1.1 Diamantina Developmental Road

The Project is not expected to have a significant impact on road safety risk items on Diamantina Developmental Road.

To comply with normal design domain (NDD) turn treatment warrants, it is recommended that the proposed access intersection and existing Diamantina Developmental Road / Cloncurry Dajarra Road intersection be constructed / upgraded to provide basic left and right (BAL / BAR) turn treatments. It is further recommended that the access and Cloncurry Dajarra Road are sealed for a minimum of one (1) haulage vehicle length, that is 46.8m, on the approach to Diamantina Developmental Road to minimise:

- Risk of road trains rolling when turning;
- Mud, gravel and dust tracked across Diamantina Developmental Road; and
- Damage to the edge of seal.

Very low traffic volumes at both the access intersection and Diamantina Developmental Road / Cloncurry Dajarra Road intersection make capacity analysis unnecessary. Sight distance at both intersections is considered acceptable.

To allow mining operations in the northern pit Diamantina Developmental Road will require realignment to the northeast over a length of approximately 3.5km. This realignment will need to ensure acceptable sight distance is maintained at the Project access.

6.1.2 Cloncurry Dajarra Road

WSP Global Inc (WSP) have recommended the following improvements to Cloncurry Dajarra Road be provided prior to the commencement of Project operations:

- Medium grading / blading, to return the road to a TMR standard with respect to roughness, along with re-establishing a road crown and table drainage;
- Install culverts at 11 locations which were identified as waterways of significant width (approximately 10m or greater), having a deep incised channel (greater than 1m in depth), or entry / exit grade that would limit trafficability by road trains;
- Replace five (5) existing grids which are less than a standard traffic lane in width with TMR standard grids; and
- Replace an existing four (4) cell box culvert and concrete slab causeway at the Wills Creek crossing.

Premise agrees with the recommendations of WSP as part of an overall strategy to mitigate the Project's road safety, pavement and transport infrastructure impacts.

WSP have also recommended ongoing maintenance of Cloncurry Dajarra Road with light blading four (4) times per year and medium blading at extended intervals to mitigate the Project's pavement impacts. These maintenance works would be conducted by Centrex as part of a yet to be negotiated Road Use Management Plan.

6.2 Certification Statement and Authorisation

This report was prepared by Daniel Marais under the direct supervision of Bradley Jones (RPEQ 19986).

Traffic Impact Assessment Certification in accordance with the GTIA is attached in Appendix E.

APPENDIX A

CRASH FACTOR MATRIX

DCA Code	Year	Type of Road Users	Surface	Light Conditions	Time	Severity	Speed	Alignment Horizontal	Vertical
Diamantina Developmental Road (93F), chainage 27km to 0km									
4	2001	1 Truck 1 Pedestrian	Sealed - Dry	Darkness - Not lighted	2	Fatal	100-110 km/h	Straight	Level
803	2010	1 Car	Sealed - Dry	Darkness - Not lighted	2	Hospitalisation	100-110 km/h	Curved - view open	Level
701	2003	1 Car	Sealed - Dry	Daylight	13	Hospitalisation	100-110 km/h	Straight	Level
703	2002	1 Car	Sealed - Dry	Daylight	11	Medical Treatment	100-110 km/h	Straight	Level
702	2016	1 Car	Sealed - Dry	Darkness - Not lighted	18	Medical Treatment	100-110 km/h	Straight	Level
Cloncurry Dajarra Road, Diamantina Developmental Road to Mt Isa Duchess Road									
805	2003	1 Car	Unsealed - Dry	Daylight	11	Property Damage Only	100-110 km/h	Curved - view obscured	Level
800	2003	1 Car	Unsealed - Dry	Daylight	14	Property Damage Only	100-110 km/h	Curved - view open	Level
201	2001	2 Cars	Unsealed - Dry	Daylight	15	Medical Treatment	100-110 km/h	Straight	Crest
Cloncurry Dajarra Road, Mt Isa Duchess Road to Duchess									
805	2011	1 Truck	Unsealed - Dry	Darkness - Not lighted	18	Medical Treatment	100-110 km/h	Curved - view obscured	Crest
801	2004	1 Car	Unsealed - Dry	Daylight	9	Property Damage Only	100-110 km/h	Curved - view obscured	Crest

Figure B 3: Department of Transport and Main Roads Queensland

DEFINITIONS FOR CODING ACCIDENTS

NOTE:- 1 = Key vehicle direction.

ie: The direction in which the key vehicle was travelling as it approached the crash location.

	00	10	20	30	40	50	60	70	80	90
	PEDESTRIAN on foot or in toy/pram	INTERSECTION vehicles from adjacent approaches	VEHICLES from opposing directions	VEHICLES from same lane one direction	MANOEUVRING	OVERTAKING	ON PATH	OFF PATH ON STRAIGHT	OFF PATH ON CURVE	PASSENGERS & MISCELLANEOUS
	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER
1	000 	100 	200 	300 	400 	500 	600 	700 	800 	900
2	001 	101 	201 	301 	401 	501 	601 	701 	801 	901
3	002 	102 	202 	302 	402 	502 	602 	702 	802 	
4	003 	103 	203 	303 	403 	503 	603 	703 	803 	903
5	004 	104 	204 	304 	404 	504 	604 	704 	804 	904
6	005 	105 	205 	305 	405 	505 	605 	705 	805 	905
7	006 	106 	206 	306 	406 	506 	606 	706 	806 	906
8	007 	107 	207 	307 	407 	507 	607 	707 	807 	907
9	008 	108 	208 	308 	408 	508 	608 	708 	808 	
0	009 	109 	209 	309 	409 	509 	609 	709 	809 	
				310 	410 	510 	610 			

APPENDIX B
WSP GLOBAL INC. MEMO



MEMO

TO: Ben Hammond
FROM: Joel O'Neill
SUBJECT: **Dajarra to Duchess haul route – Capital and maintenance cost estimate**
OUR REF: PS106535-CIV-MEM-001 RevB_Cost estimate.docx
DATE: 6 November 2017

1. INTRODUCTION

1.1 PROJECT BACKGROUND

Centrex Phosphate are currently in the process of developing the Ardmere Phosphate Project. The Ardmere Phosphate Project is a proposed phosphate rock project, currently in feasibility stage, 128km south of Mount Isa, and 23km west of the Dajarra township, in North West Queensland. The project is approved under current Mining Lease ML 5524.

The project proposes to utilise the existing Department of Transport and Main Roads (TMR) Route 7708, Cloncurry- Dajarra Road for a portion of the haul operation. An assessment of the route was undertaken to determine the suitability of the existing road to carry the proposed haul traffic, identify any required upgrades to the road, and estimate an annual ongoing maintenance cost associated with the increased traffic.

In addition, a siding is to be reinstated by QR in the Duchess region for product loadout. To support this siding, an access track diversion, high voltage power diversion, lighting and fuel provisioning are required.

1.2 EXISTING CONDITIONS

The road is currently an unsealed road, owned and maintained by TMR. The road is used primarily for passage of cattle vehicles from the several properties taking access from 8 locations along the road length.

The road segment from the partially sealed intersection at Dajarra to the unsealed intersection with Mount Isa-Duchess Road is a graded natural material road. Road width varies, and is approximately 8m in width for a large portion, with several single lane (3-5m) segments at creek crossings and cattle grids. This segment of road includes minimal drainage infrastructure, with very shallow table drains, regular mitre drains, and no cross drainage other than a single creek crossing.

The eastern road segment from the intersection with Mount Isa-Duchess Road to Duchess consists of a 7m wide graded road, including a gravel pavement, and minor cross road drainage for small rain events.

A rail loadout siding has previously existed at the rail bend at Duchess. The loadout, rail and overhead lines have been removed, and the area is currently lightly vegetated. However, the rail embankment and overhead gantries remain.

A council owned and operated road traverses the rail loadout embankment, providing access to the Trekelano Mine, which ceased operation in 2009, has undergone rehabilitation, and is now in a care and maintenance state.

1.3 PROPOSED OPERATIONS

The proposed operation is to consist of a return haul operation from the newly established mine at Dajarra to a loadout facility at Duchess, 60km to the north east. Centrex are reviewing 2 potential haulage cases, being 400,000tpa and 800,000tpa.

Upgrade of road is required to accommodate haul operation. This includes improvements to surfacing, cross drainage, and widening at narrow locations.

In addition, Centrex are to take up an increased maintenance regime to account for the increase in traffic volume, particularly the increase in heavy vehicle loading.

The disused rail loadout is proposed to be reconstructed by Queensland Rail. Centrex propose to construct support infrastructure for this facility, including refuelling facilities, and relocation of the existing council road and other services clear of the loadout area.

1.4 SCOPE

This report provides a review of the existing road condition and infrastructure and recommendation for upgrades to be undertaken in preparation for use as a primary haul route. A capital cost estimate has been prepared to +/-50% accuracy for these recommendations.

This report also addresses the likely maintenance requirements estimated for both the 400,000tpa and 800,000tpa, and estimates annual costs to undertake these works to +/-50% accuracy.

2. CAPITAL IMPROVEMENTS

2.1 HAUL ROAD

2.1.1 BASIS OF DESIGN

The recommended haul road improvements, and capital cost estimate has been prepared on the following basis:

- The road is to be reviewed in reference to, and any upgrades recommended in accordance with ARRB Unsealed Roads Manual, and Austroads Technical Report on Unsealed Road Maintenance and Deterioration Performance;
- The design vehicle is a TMR approved quad road train, carrying a maximum load of 103t;
- For an efficient haul operation, road trains will ideally travel at between 60 and 80km/h;
- Drainage is to be constructed to a level that allows for road closure of less than 4 weeks per year, with opportunity to increase haulage either side of rain events to account for short period closures;

- The road is to undergo a substantial initial road preparation; and
- The road will be subject to ongoing, routine maintenance, and therefore a safe amount of deterioration between maintenance operations is acceptable.

2.1.2 RECOMMENDED IMPROVEMENTS

The following improvements are recommended following a site inspection conducted 25th October 2016.

MEDIUM BLADING

It is recommended that the road undergo a medium grading/blading operation in accordance with ARRB Unsealed Road Manual. The road was observed to showing severe corrugation in areas, with loss of fine material.

A medium grading is a 6 pass process that will return the road to a TMR standard with respect to roughness, along with re-establishing a road crown and table drainage. This will provide for effective drainage of the surface and a reduced on going maintenance requirement.

INTERSECTION WITH DIAMANTINA DEVELOPMENTAL ROAD

The intersection with Diamantina Developmental Road at Dajarra drops steeply into Cloncurry-Dajarra Road. It is recommended that this intersection be filled to allow for a smoother transition and prevent potential rolling of loaded road trains.

CULVERTS AT MEDIUM TO LARGE CROSSINGS

27 dips and floodways were observed during the site inspection. Of these 11 locations had waterways of significant width (approximately 10m or greater), a deep incised channel (greater than 1m in depth), or entry and exit grade that would limit the trafficability by road trains. In these areas, it has been proposed to install low level cross road drainage, by way of a twin cell 450mm diameter culvert in accordance with the ARRB Unsealed Road Manual.

CATTLE GRID UPGRADE

6 cattle grids are existing along the proposed haul route. All grids are constructed for single lane traffic, with 5 of these grids being extremely narrow and less than a standard traffic lane width. 4 of the grids appear to have been constructed on site utilising rail tracks.

It proposed to install TMR standard grids at the 5 narrow locations. The standard grids are 6m in width, and intended for single lane use, but sufficiently wide to allow 2 vehicles to pass should it be necessary.

CREEK CROSSING

The haul route crosses Wills Creek. Wills Creek is a major waterway in the region, collecting runoff from a further 10 tributary creeks.

The existing creek crossing consists of a 4 cell box culvert, and concrete slab causeway approximately 100m in length. The causeway is showing signs of severe subsidence, resulting in major cracking of the concrete slab. It is recommended that the full structure be replaced as the damage was quite extensive, and the full extents were unable to be determined by visual inspection.

2.2 SIDING SUPPORT INFRASTRUCTURE

2.2.1 BASIS OF DESIGN

The recommended siding support infrastructure, and capital cost estimate has been prepared on the following basis:

- A compound is to be constructed adjacent the re-established siding for the purpose of refuelling and storage of loaders;
- The compound is to consist of gravel hardstand, fencing and fuel tanks;
- Lighting is to be provided to the full length of the re-established siding by Centrex;
- The existing Nextgen (Telstra) fibre optic hub is to be relocated 60m to the south west;
- The existing access road is to be reconstructed to a level comparable to the existing road, and remain with council property; and
- The existing 11kV overhead and 19kV underground services are to be relocated clear of the relocated road and re-established siding.

2.2.2 RECOMMENDED IMPROVEMENTS

SITE COMPOUND INC FUEL TANKS

It has been assumed that a the siding compound is to consist of a 20 x 50m gravel hardstand area. The area has been assumed to be fenced with a security fence and gate. An allowance has been made for the provision of 2 x 4,500L self-bunded tanks and fittings. Tanks of this size are able to be installed without requirement for additional bunding or approvals.

FIBRE OPTIC RELOCATION

Based on site observation, the existing Nextgen fibre optic hub, is a demountable building, provided with a single, overhead, low voltage power connection from a pole top transformer and spur line. Coiled fibre optic cable on the external of the building also indicates a significant allowance for potential movement in the building or fibre optic line.

Allowance has been made for the construction of a small gravel compound similar to that existing. Power is to be provided from the pole top transformer relocated to a newly installed pole, and optic fibre to be disconnected and respliced at the new location.

HIGH VOLTAGE ELECTRICAL DIVERSION

Allowance has been made for relocation of the existing 11kV overhead line to alongside the new access road.

The existing eastern most pole indicates an existing 19kV underground service. Allowance has been made for extension of this service clear of the new access road to connect with the relocated poles.

LOADOUT LIGHTING

An allowance for lighting and towers for the full siding length has been made based on similar projects in the region. The lighting has been assumed to be powered by a step down transformer from the existing 11kV network.

NEW ACCESS ROAD

The existing access road is 5m wide, single lane, graded natural material. A second existing track exists to the south west, clear of the proposed siding, and only very sparsely vegetated with grasses. This track can be upgraded to a similar standard as the existing access by a medium blading as described above.

2.3 COST ESTIMATE

The capital cost estimate for the Cloncurry-Dajarra Road upgrades, and Duchess siding compound works is \$ excluding a contingency allowance.

A summary of the cost estimate is shown in Table 2.1 below, with a detailed break down of costs provided in Appendix A.

Table 2.1 Capital Cost Estimate

ITEM	DESCRIPTION	AMOUNT
01.00.00	MEDIUM LEVEL BLADING	\$
02.00.00	INTERSECTION	\$
03.00.00	FLOODWAY	\$
04.00.00	CATTLE GRID	\$
05.00.00	RIVER CROSSING	\$
06.00.00	TEMPORARY WORKS	\$
07.00.00	TRAFFIC CONTROL	\$
08.00.00	EROSION AND SEDIMENT CONTROL	\$
	SUBTOTAL	\$
01.00.00	SITE COMPOUND	\$
02.00.00	FUEL TANKS	\$
03.00.00	FIBRE OPTIC RELOCATION	\$
04.00.00	ELECTRICAL DIVERSION	\$
05.00.00	LIGHTING	\$
06.00.00	ACCESS TRACK	\$
	SUBTOTAL	\$
	SUBTOTAL	\$
	Mobilisation and overheads (20%)	\$
	TOTAL	\$

3. OPERATIONAL MAINTENANCE

3.1 BASIS OF DESIGN

The recommended haul road improvements, and capital cost estimate has been prepared on the following basis:

- The road is to be reviewed in reference to, and any upgrades recommended in accordance with ARRB Unsealed Roads Manual, and Austroads Technical Report on Unsealed Road Maintenance and Deterioration Performance;
- The design vehicle is a TMR approved quad road train, carrying a maximum load of 103t;
- For an efficient haul operation, road trains will ideally travel at between 60 and 80km/h;
- Traffic load has been assumed based on 2 case scenarios, 400,000tpa and 800,000tpa;
- Additional local traffic has been assumed to be negligible based on 8 farmer accesses being utilised for light vehicles and infrequent cattle transport only;
- Rainfall has been assumed as 359mm based on Bureau of Meteorology data; and
- Regrading requirements have been based on maintaining TMR approved maximum International Roughness Index (IRI) value of 2.31 or less before undertaking works.

3.2 RECOMMENDED ACTIONS

LIGHT BLADING

Austroads Unsealed Road Maintenance and Road Deterioration identifies the likely failure mechanism for the road is corrugations. This is as a result composition being gravel with a fines component, and an arid climate. The technical report recommends the implementation of light blading at regular intervals as road is The Light grading has been shown to be appropriate treatment for roads of this type, and significantly extend the period between major reconstruction works.

The road deterioration has been largely shown to be highly dependent on annual rainfall more so than daily traffic. Therefore, there is little difference between the regrading period for the 2 reviewed traffic scenarios. Calculated intervals for regrading have been based on regarding at the TMR maximum IRI of 2.31, reduction in roughness based on improvement calculated as per the technical report, and calculated deterioration rates to again reach a roughness of 2.31. There calculated recommended maintenance intervals are:

- 400,000tpa = 98 days; and
- 800,000tpa = 88 days.

Based on the above, operational maintenance costs have been estimated based on:

- 400,000tpa = light blading 3 times/year; and
- 800,000tpa = light blading 4 times/year.

Medium blading will be required at extended intervals. The medium blading operation includes large road length reduction to single lane, and traffic disruptions. Therefore the frequency of medium blading needs to be explored with operations.

3.3 COST ESTIMATE

The operational maintenance cost estimate for light blading is indicated below.

Table 3.1 400,000tpa Light Blading Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT

Table 3.2 800,000tpa Light Blading Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT

Medium blading has been included in capital as an initial expense. Frequency of repeat cost will need to be determined by Centrex in consultation with operational personnel and TMR.

4. ASSUMPTIONS AND EXCLUSIONS

The following assumptions have been made, and works excluded:

- The haul volume adopted has two scenarios, 400,000tpa and 800,000tpa as advised by Centrex;
- The haul vehicle has been assumed to be the largest road train configuration permitted by TMR;

- Allowance has been made in cost estimates for routine maintenance only. No allowance has been made for unforeseen or major road failures as a result of severe weather or other event;
- Where visibly damaged, culverts have been allowed to be replaced. The structural integrity of all other culverts has not been assessed;
- It has been assumed that the fibre optic hub only provides service to Duchess, and is able to be relocated without wide spread outage;
- It has been assumed that movement of fibre optic hub slackens coiled fibre based on pit locations;
- It has been assumed that the fibre optic hub is relocatable with comparable footings; and
- It has been assumed that the fibre optic hub only receives LV power based on the visible pole top transformer and cable, and no underground service is present.

5. KEY RISKS AND OPPORTUNITIES

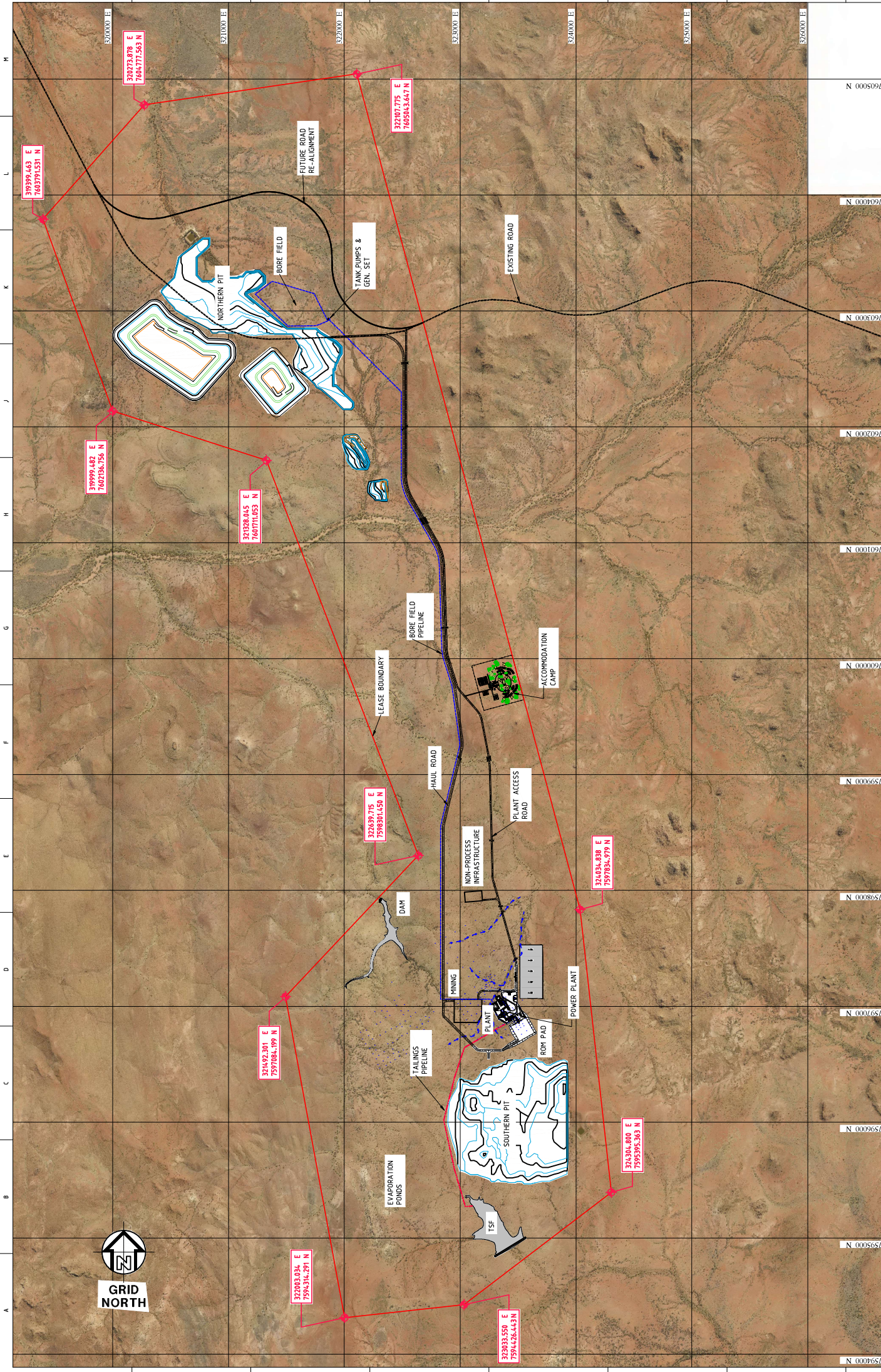
The following Risks and Opportunities have been identified by WSP during the course of the preparation of the Capital and Operational Maintenance Cost Estimates:

5.1 RISKS

The following items have been identified as potential risks to the project, and may result in higher costs than those indicated in this report:

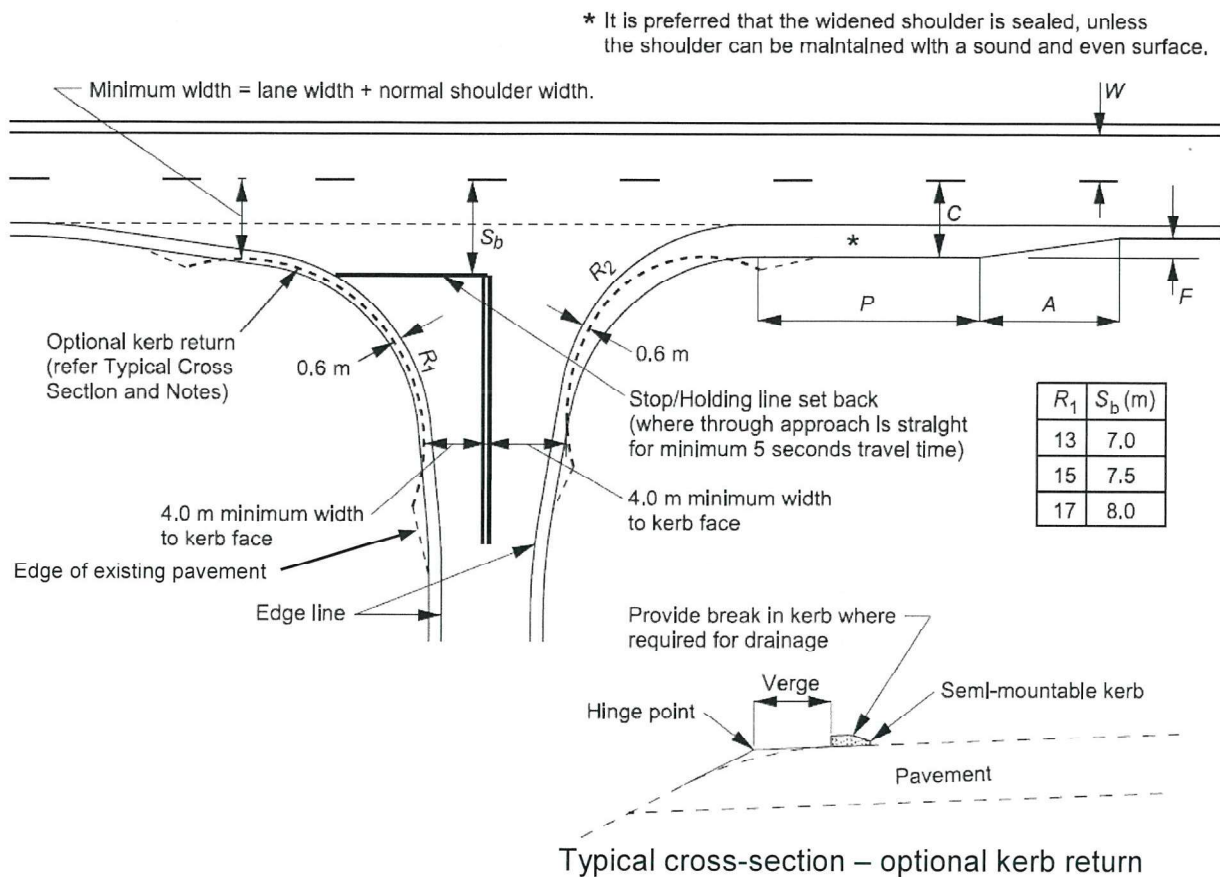
- Locality. Due to the remote nature of the site, and limited accommodation facilities, costs may be higher than indicated, due to travel time and other costs.
- Plant availability. Plant would be required to be sourced from either Mount Isa or Cloncurry, and floated over 100kms to undertake the works.
- Water availability. Water is a key element of the works. A construction water source was not identified during the site inspection.
- Damage after rain. Due to the low lying nature of some segments of the road, and high clay content in areas, the road may be susceptible to damage immediately after rain. The road will require routine inspection after rain events to ensure it is not trafficked while in a wet state.
- Closure duration. Average Annual Time of Closure was unable to be estimated at this time. While allowance has been made for the installation of cross road drainage at sizable waterway crossings, there is potential that unforeseen weather events could prolong closure of the road to greater than 4 weeks per year.
- Dust. The extended dry season in the region may result in extremely dry and dusty conditions that may require lower operating speeds for vehicles.
- Damage to road trains due to corrugations. As corrugations is the primary failure mechanism for the given environment and material, the repeated travel along the road, particularly while fully laden, as the road approaches the end of its maintenance cycle may accelerate wear to the road trains and suspensions.
- Cattle damage. The running of cattle in the area may lead to damage to the road, particularly following rain events.

APPENDIX C
DEVELOPMENT SITE PLAN

[illegible]

APPENDIX D
BAR / BAL DESIGN DETAILS

Figure 8.2: Rural basic left-turn treatment (BAL)



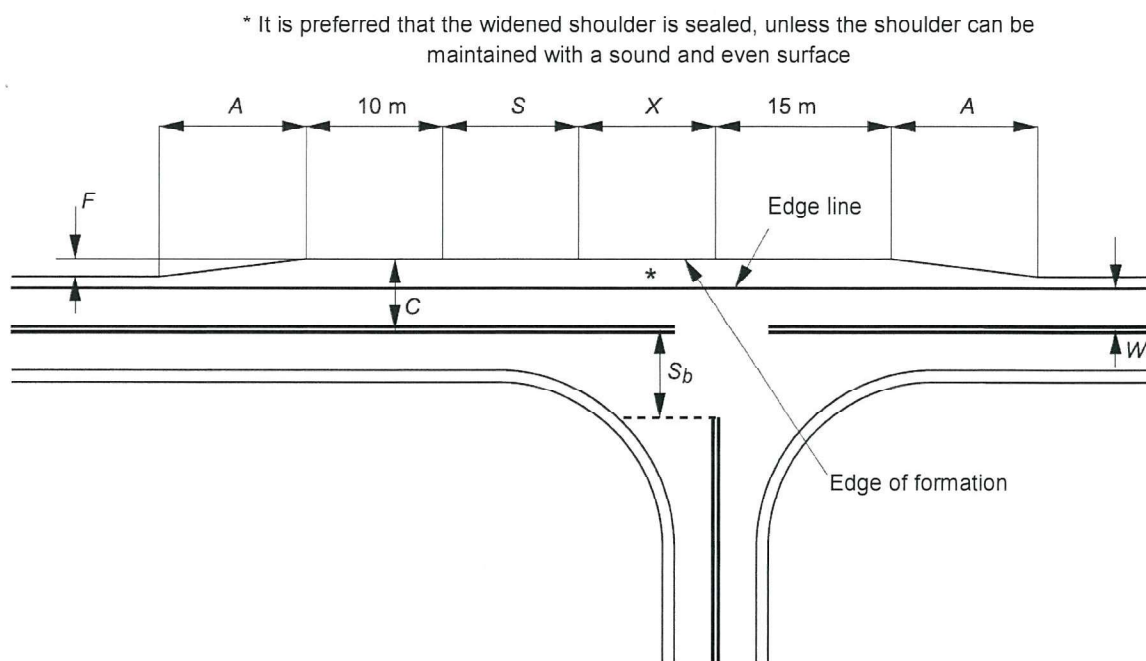
Notes:

- R_1 and R_2 are determined by the swept path of the design vehicle.
- The dimensions of the treatment are defined thus:
 - W = Nominal through lane width (m) (including widening for curves).
 - C = On straights – 6.0 m minimum.
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).
 - $A = \frac{0.5VF}{3.6}$
 - V = Design speed of major road approach (km/h).
 - F = Formation/carriageway widening (m).
 - P = Minimum length of parallel widened shoulder (Table 8.1).
 - S_b = Setback distance between the centre of the major road and the give way or stop line in the minor road.

Source: Department of Main Roads (2006)³⁵.

35 Department of Main Roads (2006) has been superseded and Figure 8.2 has not been carried forward into Queensland Department of Transport and Main Roads (2016).

Figure A 28: Basic right (BAR) turn treatment on a two-lane rural road



Notes:

This treatment applies to the right turn from a major road to a minor road.

The dimensions of the treatment are:

- W = Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.
- C = On straights – 6.5 m minimum
7.0 m minimum for Type 1 & Type 2 road trains
On curves – widths as above + curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle)
- A = $\frac{0.5VF}{3.6}$
Increase length A on tighter curves (e.g. those with a side friction demand greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer the minimum speed used to calculate A is 80 km/h
- V = Design speed of major road approach (km/h)
- F = Formation/carriageway widening (m)
- S = Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m)
- X = Distance based on design vehicle turning path, typically 10–15 m

Source: Department of Main Roads (2006)²⁵.

25 Department of Main Roads (2006) has been superseded and Figure A 28 has not been carried forward into Queensland Department of Transport and Main Roads (2016).

APPENDIX E
TRAFFIC IMPACT ASSESSMENT CERTIFICATION

CERTIFICATION OF TRAFFIC IMPACT ASSESSMENT REPORT
REGISTERED PROFESSIONAL ENGINEER QUEENSLAND
FOR

Project Title	Ardmore Phosphate Project / Diamantina Developmental Road
----------------------	---

As a professional engineer registered by the Board of Professional Engineers of Queensland pursuant to the *Professional Engineers Act 2002* as competent in my areas of nominated expertise, I understand and recognise:

- The significant role of engineering as a profession; and that
- The community has a legitimate expectation that my certification affixed to this engineering work can be trusted; and that
- I am responsible for ensuring its preparation has satisfied all necessary standards, conduct and contemporary practice.

As the responsible RPEQ, I certify:

- I am satisfied that all submitted components comprising this traffic impact assessment, listed in the following table, have been completed in accordance with the Guide to Traffic Impact Assessment published by the Queensland Department of Transport and Main Roads and using sound engineering principles; and
- Where specialised areas of work have not been under my direct supervision, I have reviewed the outcomes of the work and consider the work and its outcomes as suitable for the purposes of this traffic impact assessment; and that
- The outcomes of this traffic impact assessment are a true reflection of results of assessment; and that
- I believe the strategies recommended for mitigating impacts by this traffic impact assessment, embrace contemporary practice initiatives and will deliver the desired outcomes.

Name	Bradley Jones
RPEQ No.	19986
RPEQ Competencies	Civil
Email	Bradley.Jones@premise.com.au
Postal Address	PO Box 1110 TOWNSVILLE QLD 4810
Signature	
Date	03 July 2018

Traffic impact assessment components to which this certification applies	☒
1. Introduction	
Background	☒
Scope and study area	☒
Pre-lodgement meeting notes	☒
2. Existing Conditions	
Land use and zoning	☒
Adjacent land uses / approvals	☐
Surrounding road network details	☒
Traffic volumes	☒
Intersection and network performance	☐
Road safety issues	☒
Site access	☒
Public transport (if applicable)	☐
Active transport (if applicable)	☐
Parking (if applicable)	☐
Pavement (if applicable)	☒
Transport infrastructure (if applicable)	☒
3. Proposed Development Details	
Development site plan	☒
Operational details (including year of opening each stage and any relevant catchment / market analysis)	☒
Proposed access and parking	☒
4. Development Traffic	
Traffic generation (by development stage if relevant and considering light and heavy vehicle trips)	☒
Trip distribution	☒
Development traffic volumes on the network	☒
5. Impact Assessment and Mitigation	
With and without development traffic volumes	☒
Construction traffic impact assessment and mitigation (if applicable)	☐
Road safety impact assessment and mitigation	☒
Access and frontage impact assessment and mitigation	☒
Intersection delay impact assessment and mitigation	☒
Road link capacity assessment and mitigation	☐
Pavement impact assessment and mitigation	☐
Transport infrastructure impact assessment and mitigation	☒
Other impacts assessment relevant to the specific development type / location (if applicable)	☐
6. Conclusions and Recommendations	
Summary of impacts and mitigation measures proposed	☒
Certification statement and authorisation	☒



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