

8 Traffic and Transport

8.1 Introduction

The potential impacts of increased road, air and sea traffic to existing infrastructure at the McArthur River Mine (MRM) and Bing Bong concentrate storage and ship loading facility (Bing Bong) are detailed in this chapter, together with mitigation measures for the McArthur River Phase 3 Development Project (the Project).

Access to the MRM site is by a sealed road from Carpentaria Highway, approximately 1.5 km to the west of the mine site. MRM's airport, located on the existing Mineral Lease, allows all personnel movements between the Project's mining facilities and the airfield to be conducted on its internal road network. Bing Bong is located approximately 120km north of MRM (refer to Figure 8-1).

8.1.1 Study Methodology

A Road Impact Assessment (RIA) was carried out on 16th May 2011. The agreed methodology for this study has been prepared on the basis of the following Queensland Department of Transport and Main Roads (DTMR) planning documents and standards:

- Guidelines for Assessment of Road Impacts of Development (GARID) (DTMR, 2006)
- Road Planning and Design Manual—Chapter 13 Intersections at Grade (RPDM) (DTMR, 2006).

The Queensland guidelines and manual have been used as no specific Northern Territory guidelines exist. In addition to the Guidelines and Manual, the methodology was further informed by discussions with the Northern Territory Government Corridor Land Management – Road Network Division. A complete outline of the study elements and methodology used in the study is as follows:

8.1.1.1 Site investigation

The site inspection of the MRM site and Carpentaria Highway (between the Mine and Bing Bong) was undertaken on Monday 16th May 2011.

8.1.1.2 Consultation

The following authorities were contacted and entered into discussions with as part of this study:

- Northern Territory Government
- Northern Territory Government's Corridor Land Management—Road Network Division
- information dissemination and data gathering from both Northern Territory Government agencies.

8.1.1.3 Data collection and collation

Data input into the analyses are listed below:

- timelines for Project construction and operational phases
- anticipated location for each traffic generating component of the Project
- expected employee and visitor requirements during each Project phase
- planned employee shift times
- expected number of heavy vehicle movements to and from the Project by times of day and vehicle type
- likely origins and destinations for construction materials

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- likely modes of transport used during the Project's construction and operational phases
- existing road network details such as network geometry, existing road hierarchy and posted speed limits (provided by Northern Territory Government)
- future road network provision
- tube count data, along with associated historical growth rates (provided by the Northern Territory Government).

8.1.1.4 Traffic generation and assignment

Determination of anticipated vehicle movements was undertaken through the following:

- consultation with MRM regarding Project specific details as outlined above (see data collection and collation)
- conversion of these Project details into peak hour flows for the intersection impact assessment
- conversion of these Project details into daily flows for the link assessment.

Rather than using standard trip generation rates from DTMR's RPDM or any other reference resource, trip generation was calculated through first principles and the knowledge of employee/heavy vehicle movements for different periods of the day.

Traffic was distributed onto the road network based on engineering judgement and information provided.

8.1.1.5 Traffic impact assessment

The Project's impact analysis presented in this report is based upon the principles defined within GARID, as agreed with the Northern Territory Government.

The analysis identifies the road links that incur an increase of more than 5% of baseline Annual Average Daily Traffic (AADT) volumes as a result of the traffic generated from the Project. These roads are then assessed on a volume to capacity ratio basis by comparing the estimated capacity of the road (in accordance with Austroad's calculations) against the estimated future traffic volumes of the road.

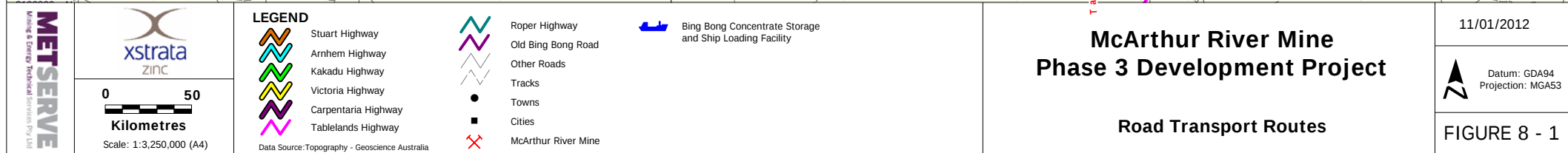
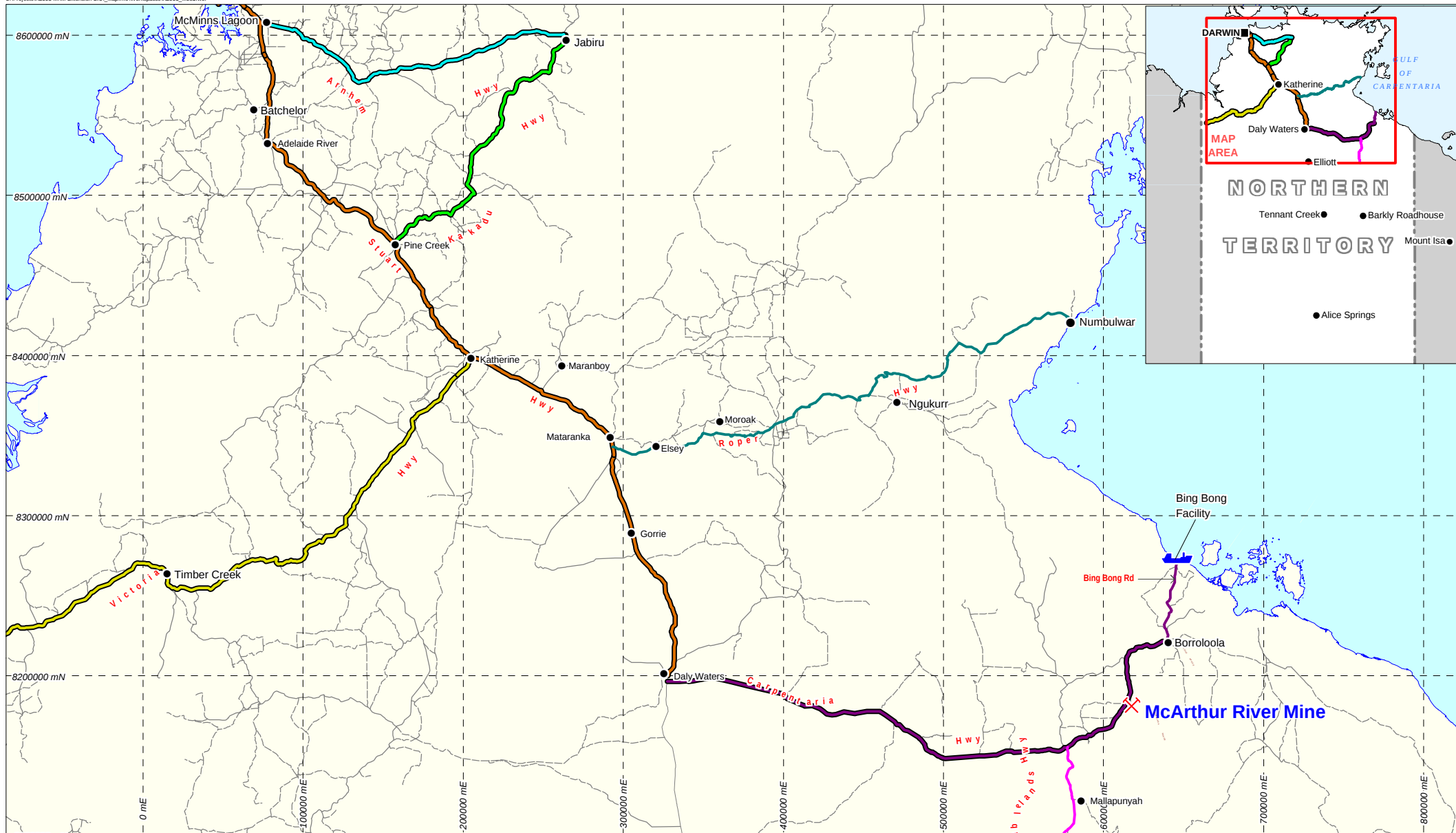
Due to the very low existing traffic volumes at the Carpentaria Highway/MRM's mine access road intersection, it is considered that operational performance assessment is not required. However, the layout of the intersection has been compared with DTMR's RPDM to confirm that the intersection can adequately and safely accommodate turn movements from all vehicle types (including road trains).

8.1.1.6 Impact management and mitigation

Based on the outcomes of the intersection and link impact analysis, alternative intersection/link forms and associated traffic management strategies were recommended for the Project.

These have been based on Northern Territory Government requirements with due consideration of both operational and safety characteristics. Any proposed treatments also consider future infrastructure provision within the region.

As the air and port infrastructure is specific to the current and expanded operations, and is owned by the Proponent, the assessment of impacts on the capacity of this infrastructure associated with the Project was undertaken with a comparison of current and projected movements.



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8.1.2 Project Timing

The Project is planned to commence in late 2012. Timing considered for this assessment is as follows:

- 2012 – Year 1 of construction
- 2013 – Year 2 of construction (peak construction period)
- 2014 – First year of operations
- 2020 – Peak Project operations
- 2024 – 10 year design horizon.

These years represent the expected periods of crucial traffic generation, along with an effective 10 year design horizon as required by the GARID.

8.1.3 Approvals

The RIA forms part of the Project's overarching environmental impact assessment process which will be submitted to the Northern Territory Government for assessment.

8.2 Existing Conditions

8.2.1 Road Network

The current access and road network to MRM is via the Carpentaria Highway that connects to Old Bing Bong Road to Bing Bong to the north-east and the Stuart Highway to the north-west and is shown in Figure 8-1. These access points and road network will continue to be utilised for the Project.

8.2.1.1 Carpentaria Highway

The Carpentaria Highway is a Northern Territory Government controlled road connecting the Daly Waters area, McArthur River, and Borroloola. It is a sealed, 6.8 metres (m) to 7.4 m wide, two lane single carriageway with one lane in each direction (from Cape Crawford to the Stuart Highway, large portions are single lane only). The maximum posted speed limit is 110 kilometres per hour (kmph).

8.2.1.2 Stuart Highway

The Stuart Highway is a Northern Territory Government controlled road connecting Darwin, Katherine, Daly Waters, Tennant Creek, Alice Springs and Port Augusta in South Australia. It is a sealed, approximately 7 m wide, two lane single carriageway with one lane in each direction joining the Carpentaria Highway intersection. The maximum posted speed limit is 130 kmph.

8.2.1.3 Old Bing Bong Road

Old Bing Bong Road is a Northern Territory Government controlled road connecting Borroloola and Bing Bong. It is a sealed, 6 m wide, two lane single carriageway with one lane in each direction. The maximum speed limit is 110 kmph.

8.2.1.4 Existing Traffic Flows

The existing traffic volumes for the Stuart Highway and Carpentaria Highway for 2009 have been provided by Northern Territory Government's Department of Lands and Planning. A summary of the Average Annual Daily Traffic Volumes (AADT) and the percentage of heavy vehicles are provided in Table 8-1.

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Table 8-1 Background 2009 Traffic Volumes (Northern Territory Government Controlled Roads)

Road	Description	AADT	% Heavy vehicles
Old Bing Bong Road	Carpentaria Highway (Borroloola) to Bing Bong	80*	N/A
Carpentaria Highway	Old Bing Bong Road (Borroloola) to MRM mine access road	100**	N/A
	MRM mine access road to Tablelands Highway	70**	N/A
	Tablelands Highway to Stuart Highway	60	17.3%
Stuart Highway	Carpentaria Highway to Roper Highway	390	19.8%***
	Roper Highway to Victoria Highway	540**	15.0%
	Victoria Highway to Kakadu Highway	1,310	10.0%***

*2009 AADT is estimated from 2006 AADT based on a 3% per annum compounding growth rate.

**2009 AADT is estimated from 2008 AADT based on a 3% compounding growth rate.

***Vehicle Classification for the month of April in 2009.

8.2.2 Airport

As the majority of existing employees are Fly-In/Fly-Out (FIFO) operating on a rolling shift rotation, there is an existing single sealed runway at MRM: 2,500 m in length and 23 m in width with sealed and paved turning areas at each end. The airstrip is also fenced to exclude cattle.

At the mid-point of the runway are a taxiway, turning areas, a parking apron and the terminal building. The current parking apron is capable of holding one 76 seat regional jet-sized aircraft and the parking area can hold approximately four general aviation aircraft. The runway and approach areas have regulation runway lighting.

The terminal building is of modular construction, containing a security screening area, sterile waiting area, office, ticketing/baggage area and ablution facilities.

Air North is the only regular operator into the airport, providing six flights (12 movements) weekly via an Embraer 170 Jet. The operation is primarily to provide rotation of mining personnel, although contractors, consultants and some members of the public are also carried.

The airport is licensed under a 'private' rating, and users must submit a request to operate into the airport 24 hours before the intended operation.

Approved fuel storage facilities at the airstrip comprise:

- Jet A1 (30 kL capacity) for turbo-propeller or jet aircraft
- AvGas (2 x 1.5 kL transportable pods) for piston-engine planes.

The commercial airport currently used by MRM for FIFO employees is the Darwin Airport.

Approximately, six flights a week are made to MRM's airport from Darwin Airport.

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8.2.3 Bing Bong Concentrate Storage and Ship Loading Facility

Bing Bong loading facility receives and stores bulk concentrate and operates a self propelled discharging barge, the MV Aburri, which transfers concentrate offshore to ocean-going vessels for shipment to the export market. This loading facility is owned by MRM with barging services provided under contract by Carpentaria Shipping Services. Currently, the average number of return trips taken by the MV Aburri is approximately 110 per annum (pa).

8.2.4 Existing Road Safety

During the site investigation, consultation was undertaken with Hamptons, the haul contractors contracted to MRM, which transport bulk concentrate product from MRM to Bing Bong. From these discussions, and as observed on the road network, a number of deficiencies with the existing Carpentaria Highway and Old Bing Bong Road (between the MRM's mine access road and Bing Bong) were observed. These included the following:

- water damage and pot holes on sections on the roadway which are a safety hazard to both light and heavy vehicles
- uneven surfaces and reverse cambers which have been reported to cause road train trailers to swing both off-road and out onto the opposing carriageway (see Figure 8-2 and Figure 8-3)
- narrow sections of road (particularly on causeways), where road train operators have reported that there is a potential for road trains to rollover if the vehicle accidentally leaves the paved carriageway (see Figure 8-4).

It is recommended these deficiencies be investigated further and rectified to cater for existing traffic, regardless of whether the Project proceeds.

Under the *McArthur River Project Agreement Ratification Act 1992* (MRMAR Act), the roles and responsibilities for the provision of roads, airport and port facilities are clearly defined between MRM and the Northern Territory Government.

Under the MRMAR Act, the Northern Territory Government's responsibility is: 'where necessary construct and maintain all the roads from the intersection of the access road from the HYC (Here's Your Chance) deposit with the Carpentaria Highway to the Mineral Lease on Bing Bong Pastoral Lease No 686'. The MRMAR Act refers to the Carpentaria Highway as a public road.

In addition, MRM has in cooperation with Colinta Holdings, an Xstrata Zinc subsidiary, agreed to make available a road corridor to Mule Creek across the associated Mineral and Pastoral Leases. This provides an all-weather access to the Mule Creek boat ramp and the waters of the south-west Gulf of Carpentaria for tourists and the Traditional Owners living on the Sir Edward Pellew Islands. MRM has continually maintained this road, including repairs following flood damage. Roads have also been graded to provide Traditional Owners with access to Indigenous sites of cultural significance.

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Figure 8-2 Example of uneven surface and incorrect camber



Figure 8-3 Example of uneven surface and incorrect camber

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Figure 8-4 Narrow carriageway with sudden drop-off at causeway

8.2.5 Dust

In relation to road safety and dust emissions during the trucking of bulk concentrate from MRM to Bing Bong, experience to date has shown that the concentrates moisture content of 12% is high enough to control fugitive dust generation to other road users. However, a number of controls are in place to control dust from the loading and hauling of the bulk concentrate including:

- all truck unloading is undertaken within the enclosed concentrate storage shed at Bing Bong
- all trucks leaving the storage shed pass through a wheel wash
- roads at MRM are cleaned by a road sweeper
- bulk concentrate loads on the haul trucks are covered with a specially designed protective cover.

These mitigation measures will continue with the proposed Project haulage activities. Dust emissions for the Project are further discussed in Chapter 11- Air Quality and Greenhouse Gases.

8.2.6 Noise

Currently no measures are required to mitigate against noise nuisance due to the distance from Borroloola, the nearest sensitive receptor to the Carpentaria Highway haulage route. Noise emissions from the Project are further discussed in Chapter 12 – Noise and Vibration.

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8.2.7 Safeguard management and monitoring strategies

MRM has a number of management and monitoring strategies in place to minimise traffic and transport issues, these include:

- axle limits – all loads on-site and off-site are presently weighed for compliance at MRM. This will continue as part of the day-to-day operation of the Project and is part of the Traffic Management Plan currently in place at MRM
- securing loads – standard load handling strategies are in place to ensure all loads on-site and off-site are compliant at MRM. These strategies will continue in relation to the Project as part of the Traffic Management Plan currently in place at MRM
- traffic noise – measures are in place to keep all traffic noise to a minimum. These measures will continue on-site in relation to the Project as part of the Traffic Management Plan currently in place at MRM
- community consultation—MRM recognises that an effective consultation program involves not only engaging with the community to listen to their views, but also addressing community opinions and concerns within planning. Reporting back to the community on action taken is a fundamental factor in the community consultation process:
 - effectiveness of the consultation program in addressing stakeholder concerns is further detailed in Chapter 15 – Social and Appendix D10. Full notes of all stakeholder meetings and discussions will be retained for the Project
 - consultation with the community, which has continued since August 2005, includes formal methods such as:
 - structured meetings with elected representatives
 - letters in return confirming the outcomes of discussions and issues raised
 - information provision (e.g. factsheets, website, community information line)
 - community meetings to provide information to, and gain feedback from a wide group
 - establishment of a MRM Community Reference Group which will remain active throughout the Project's life.
- driver fatigue – MRM currently implements measures to manage effectively driver fatigue. These measures will continue on-site in relation to the Project as part of the Traffic Management Plan currently in place at MRM.

8.3 Potential Impacts

8.3.1 External Haul Routes

The expected origin of the majority of the Project's construction and operational inputs will be Darwin and the destination of all bulk concentrate will be Bing Bong, as is the current practice. Haul routes to and from the Project are as follows:

- mine input delivery haul route—Darwin → Stuart Highway → Carpentaria Highway → Project Site
- bulk concentrate delivery haul route—Project site → Carpentaria Highway → Old Bing Bong Road → Bing Bong
- bulk concentrate export delivery route—Bing Bong → Aburri → Mother Ship → Overseas smelters → Market.

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As these haulage routes are currently in place for MRM, no new haul roads will be required for the Project.

8.3.2 Haulage Activity

The proposed haulage activity for construction and operational phases are shown in Table 8-2 and Table 8-3 respectively.

8.3.3 Daily Traffic Generation

With regards to estimating the daily traffic generation of the township-based employees, the following conservative assumptions have been made:

- all employees that are not FIFO reside in the township of Borroloola
- vehicle occupancy is one person per vehicle
- two vehicle trips are made per day
- 100% of Borroloola-based employees work at the Project site each day.

Based on these assumptions, it is estimated that traffic generated daily, based on employees travelling from Borroloola to the Project site will be:

- 60 vehicle trip ends per day between 2012-14
- 100 vehicle trip ends per day during the 2020 and 2024 future year scenario.

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Table 8-2 Project Construction Heavy Vehicle Movement Description

	Movement 1	Movement 2	Movement 3	Movement 4	Movement 5	Movement 6	Movement 7	Movement 8	Movement 9	Movement 10
Haulage description	Delivery of fuel and other general supplies	Delivery of concentrator process equipment	Delivery of concentrator steelwork	Delivery of raw materials for concrete batching	Delivery of conveyor modules	Low Loader fleet	Semi-trailer fleet	Delivery of accommodation village buildings and other transportable offices	Delivery of civil works machinery	Delivery of power station extension
Austrroads vehicle class	Class 10	Class 10	Class 10	Class 10	Class 10	Class 10	Class 10	Class 10	Class 10	Class 10
Description of goods and material to be transported	Fuel for construction, general supplies	Process machinery	2,500 tonnes of fabricated steelwork and platework	10,000 cubic metres of cement and aggregates for concrete	1,300 metres (m) of conveyor galleries	Trucks, wheel loader, wheel dozer, dozer trucks, water cart and excavator	Trucks, wheel loader, wheel dozer, grader, dozer trucks, water cart, compactor and excavator	30 transportable buildings	12 items comprising excavators/trucks dozer	16 gas engines 16 enclosures switch rooms, etc.

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Table 8-2 Project Construction Heavy Vehicle Movement Description (cont)

	Movement 1	Movement 2	Movement 3	Movement 4	Movement 5	Movement 6	Movement 7	Movement 8	Movement 9	Movement 10
Quantity of goods to be transported	Allowance of one extra road train of fuel per month and one extra triple per week of general consumables	100 truck deliveries of components	50 truck deliveries (semi-trailers)	150 truck deliveries (triple road trains)	60 truck deliveries (extendable single trailers)	87 machines to be transported	169 machines to be transported	Two transportable buildings per truck movement	One piece equipment per truck, both ways	60 truck deliveries
Origin and destination of goods	Darwin – Project site	Various Australia – Project site	Various Australia – Project site	Darwin/ Katherine – Project site	Various Australia – Project site	Darwin – Project site	Darwin – Project site	Darwin – Project site	Various Australia – Project site	Darwin Port – Project site
Is the product hazardous or oversized?	Hazardous	Approximately 30% oversized	Approximately 50% oversized	Unknown	90% oversized	Unknown	Unknown	Oversized	Oversized	Oversized
Duration of haul movement	Project construction demand: one per week in 2012 one per week in 2013	50% - Quarter (Q) 4 2012 50% - Q1 2013	25% - Q3 2012 50% - Q4 2012 25% - Q1 2013	25% - Q2 2012 50% - Q3 2012 25% - Q4 2012	100% - second half (2H) of 2012	2012	2012	100% - Q4 2012	100% - Q1 2012	100% - Q4 2012

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Table 8-3 Project Operation Heavy Vehicle Movement Description

	Movement 1	Movement 2	Movement 3	Movement 4	Movement 5	Movement 6	Movement 7
Haulage Description	Low loader fleet	Semi-trailer fleet	Delivery of fuel	Delivery of tyres	General deliveries	Chemical deliveries	Concentrate haulage
Vehicle class	Class 10	Class 10	Class 12	Class 12	Class 12	Class 12	Class 12
Description of goods and material to be transported	Mobilise trucks, wheel loader, wheel dozer, drill rig, dozer trucks, water cart and excavator	Mobilise trucks, drill rig, wheel loader, wheel dozer, grader, dozer trucks, water cart, compactor and excavator	Fuel deliveries split between triple and quad trucks	Tyres delivered on triples which carry six tyres per trailer	General deliveries come in triples	Flotation process inputs	Bulk concentrate of zinc and lead bearing minerals
Quantity of goods to be transported	276 machines to be transported (over mine life)	645 machines to be transported (over mine life)	Diesel deliveries to range from 3000 kilolitres (kL) per year to 38000 kL per year	Tyre requirements to range from 20 tyres per year to 310 tyres per year	Range between 18-40 trailers per week	60 tonne (t) trucks delivering 5,555 tonnes per annum (tpa) mill steel media, 555 tpa liners, 611 tpa ceramic media, 450 tpa ferrosilicon medium, 940 tpa of ethyl xanthate, 2,820 tpa of isopropyl xanthate, 150 tpa of MIBC, 1,300 tpa of dextrin, 1,430 tpa of suparex, 11,000 tpa of copper sulphate pentahydrate, 150 tpa flocculent	The plant will produce 800,000 dry metric tonnes per annum of bulk concentrate

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Table 8-3 Project Operation Heavy Vehicle Movement Description (cont)

	Movement 1	Movement 2	Movement 3	Movement 4	Movement 5	Movement 6	Movement 7
Origin and destination of goods	Darwin – Project site	Darwin – Project site	Darwin – Project site	Darwin – Project site	Darwin – Project site	Darwin – Project site	Bing Bong – Project site
Is the product hazardous or oversized?	Unknown	Unknown	Hazardous	Unknown	Unknown	Hazardous	Unknown
Duration of haul movement	Major haul movement years: 4 in 2014 107 in 2020 1 in 2024	Major haul movement years: 6 in 2014 245 in 2020 1 in 2024	Major fuel delivery years: 169 in 2014 301 in 2020 305 in 2024	Major tyre delivery years: 9 in 2014 16 in 2020 16 in 2024	Estimated average delivery of 10 trucks per week	Estimated yearly chemical deliveries: two per week for mill steel media one per month for liners one per month for ceramic media one per month for ferrosilicon medium four per quarter for ethyl xanthate one per week for isopropyl xanthate one per quarter for MIBC two per month for dextrin two per month for suparex four per week for copper sulphate pentahydrate one per quarter for flocculent	Nine additional truck trips per day (on top of existing nine trips per day), seven days per week

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8.3.4 Link Analysis

8.3.4.1 Link Capacity

For the Project, link capacity is calculated using the procedures prescribed in the AUSTRROADS Guide to Traffic Engineering Practice Part 2 – Roadway Capacity (GTERC). For the purposes of the Project, the impacted sections of the Carpentaria Highway, including Old Bing Bong Road, (as identified in Table 8-4 and Table 8-5) are assumed to be uninterrupted two lane road with a lane for each direction.

The following assumptions were used in the link capacity calculations:

- capacity is reached when the volume to capacity ratio is equivalent to one
- the identified sections operate under rolling terrain with approximately 20% of the total length having sight distances of less than 450 m
- direction distribution is split 50/50 each way over the whole day
- lanes are 3 m in width and have no usable shoulders
- the traffic stream consists of the following heavy vehicle proportions:
 - approximately 20% heavy vehicles between Stuart Highway and the Project's mine access road
 - approximately 90% heavy vehicles between Project's mine access road and Bing Bong
- the peak hour to daily conversion rate is 6.67 (i.e. peak hour traffic is approximately 15% of total daily traffic as per DTMR advice published in GARID).

The assumptions adopted are considered to be conservative.

Based on the assumptions and equations provided in GTERC, capacities calculated for each of the road sections on the Carpentaria Highway are:

- 9,000 vehicles per day between Stuart Highway and the Project's mine access road
- 3,900 total vehicles per day between Project's mine access road and Bing Bong (Carpentaria Highway and Old Bing Bong Road).

8.3.5 Potential Impact Identification

The full link impact assessment is provided in Appendix A of the RIA technical report located in Appendix D2. The impact analysis indicates that an increase in daily traffic of more than 5% is anticipated for the road sections presented in Table 8-4.

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Table 8-4 Roads estimated to experience more than 5% increase above background Traffic Volume Increase Roads

Road	Description	Percentage Increase above Background Traffic				
		2012	2013	2014	2020	2024
Old Bing Bong Road	Carpentaria Highway to Bing Bong	46.4%	46.4%	46.4%	51.8%	49.6%
Carpentaria Highway	Old Bing Bong Rd to Project's mine access road	41.5%	41.5%	39.4%	47.6%	44%
	Project's mine access road to Tablelands Highway	9.1%	<5%	9.1%	10%	7.4%
	Tablelands Highway to Stuart Highway	11.8%	<5%	11.8%	12.5%	9.1%

All other assessed roads at all other assessment years are expected to experience insignificant impacts, as indicated DTMR's definition in GARID.

While the percentage increase is relatively high, it should be noted that the background traffic volumes are very low and in reality these are not significant increases in traffic and are significantly below the existing link capacity as discussed below.

Future year traffic volumes in 2024 for the impacted road sections are presented in Table 8-5.

Table 8-5 Estimated 2024 Impacted Road Sections Daily Traffic Volumes

Road	Description	Estimated 2024 Daily Traffic Volumes	
		'Without' Project	'With' Project
Old Bing Bong Road	Carpentaria Highway to Bing Bong	120 vpd	240 vpd
Carpentaria Highway	Old Bing Bong Rd to Project's mine access road	150 vpd	270 vpd
	Project's mine access road to Tablelands Highway	100 vpd	110 vpd
	Tablelands Highway to Stuart Highway	80 vpd	90 vpd

vpd = vehicles per day

The capacity calculation for these road sections indicates that the capacity of Carpentaria Highway is estimated to be in the order of 9,000 vpd between the Stuart Highway to the Project's mine access road and 3,900 total vpd between the Project's mine access road and Bing Bong. The anticipated future year traffic volumes at 2024 are expected to remain well below existing link capacity, and as such, no upgrade works (from an operational performance perspective) are warranted.

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However, as noted previously, the existing Carpentaria Highway (including Old Bing Bong Road) carriageway has pavement condition issues which require rectification to improve overall traffic safety. Works are required regardless of whether the Project proceeds and would form part of the business as usual maintenance program for the Northern Territory Government.

8.3.6 Intersection Analysis

The existing layout for the Carpentaria Highway / Mine Access Road intersection is shown in Figure 8-5.

Due to the very low existing traffic volumes at the Carpentaria Highway/MRM mine access road intersection, it is considered that intersection turning movement analysis is not required. However, the layout of the intersection has been compared with the standard accepted layouts in DTMR's RPDM to confirm that the junction can adequately and safely accommodate turn movements for all vehicle types expected to use the intersection during the Project's life.

The intersection is consistent with the requirements of a Basic Right Turn Treatment (BAR) on a Two Lane Rural Road as specified in RPDM for a 53.4 m long A-Triple Road Train design vehicle. This standard requires a minimum 119 m long widened shoulder on the approach to the right-turn and a minimum 57 m long on the departure of the intersection. The intersection currently provides approximately 170 m on each side of the intersection, and therefore adequately caters for an A-Triple Road Train.

The intersection is also consistent with the requirements for a 100 kmph speed environment Auxiliary Left Turn Treatment with a Short Left Turn Slot AUL(S) on a Rural Road as specified in RPDM. According to this standard, a minimum Auxiliary Left Turn Lane of 70m is required, inclusive of a 30 m taper. Currently, the intersection provides a 120 m left turn lane with a 30 m taper, which is also considered acceptable for the safe manoeuvring of an A-Triple Road Train.

8.3.7 Airport

The airport is expected to experience a weekly increase in flights from Darwin Airport from six to seven in 2012 and to nine per week during the peaks in construction (2013) and mining (2020 to 2025). The airport's existing capacity is sufficient to carry this Project related traffic and accordingly, it is anticipated that upgrades will not be required. Given the relatively minor additional demand of Project employees utilising Darwin Airport it is not anticipated that impacts to this facility will be significant.

8.3.8 Bing Bong Concentrate Storage and Ship Loading Facility

Offshore movements by the Aburri at Bing Bong are expected to increase to approximately 250 return trips pa from approximately 110 pa. The existing capacity of the Aburri and associated port facilities are sufficient to carry Project related shipments of concentrate and accordingly, an upgrade is not required.



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8.4 Potential Mitigation Measures

The RIA for the Project's construction and operational phases was undertaken in accordance with GARID as agreed during consultation with the Northern Territory Government. Key findings and conclusions from this assessment are summarised below.

8.4.1 Traffic Generation

Light vehicle traffic generated, based on light vehicle trips made daily from Borroloola to and from the Project is estimated to be in the order of the following:

- 60 vehicle trip ends per day from 2012-14
- 100 vehicle trip ends per day during the 2020 and 2024 future year scenarios.

Heavy vehicle traffic generated, based on daily to and from heavy vehicle movements for the Project, is estimated to be in the order of the following:

- a maximum of 26 vehicle trip ends per day from 2012-2014
- a maximum of 28 vehicle trip ends per day during the 2020 and 2024 future year scenarios.

These additional traffic movements are considered to be low and are not anticipated to impact on traffic flows at any stage of the Project.

8.4.2 Road Link Impact

The impact analysis indicated that an increase in daily traffic of more than 5% would occur for the following road sections:

- Old Bing Bong Road between Carpentaria Highway to the Old Bing Bong Road
- Carpentaria Highway between Old Bing Bong Road to the Project's mine access road
- Carpentaria Highway between the Project's mine access road and Tablelands Highway
- Carpentaria Highway between Tablelands Highway and Stuart Highway.

However, despite the increase in traffic generation on these roads, upgrade works will not be required in order to accommodate projected future year traffic volumes.

Notwithstanding this, a number of current road safety deficiencies were identified on the Carpentaria Highway between the Project's mine access road and Bing Bong. These included:

- water damage and pot holes on sections on the roadway, which are a safety hazard to both light and heavy vehicles
- uneven surfaces and incorrect cambers which have been reported to cause road train trailers to swing both off-road and into the opposing carriageway
- narrow sections of road (particularly on causeways), where road train operators have reported that there is a potential for road trains to rollover if the vehicle accidentally leaves the paved carriageway.

The Carpentaria Highway requires reconstruction works to a suitable road pavement standard to provide adequate safety to all current and future road users. These works are required regardless of whether the Project proceeds.

If these works are undertaken to rectify the safety concerns related to the current road pavement condition of the Carpentaria Highway, the resulting pavement is likely to be sufficient to avoid any further pavement maintenance works for the life of the Project.

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As discussed in Section 8.2.4, under the MRMAR Act, the Northern Territory Government's responsibility is: 'where necessary construct and maintain all the roads from the intersection of the access road from the HYC (Here's Your Chance) deposit with the Carpentaria Highway to the Mineral Lease on Bing Bong Pastoral Lease No 686'.

8.4.3 Intersection Impact

Intersection volumes are anticipated to remain very light even with the presence of additional road traffic generated by the Project's construction and operation. No mitigation works are anticipated on any of the intersections on the identified external haul roads.

8.4.4 Airport and Bing Bong Concentrate Storage and Ship Loading Facility

The existing capacity of the airport and the Aburri at Bing Bong are expected to carry the increased Project related movements, accordingly, no upgrades to facilities are required.

8.4.5 Dust and Noise

The existing measures to control dust from concentrate haulage are adequate for Project related activities. Traffic generated noise is not anticipated to be a significant issue due to the absence of nearby sensitive receptors.