

18. Traffic and Transport

This chapter describes the existing transport elements in the project area including the existing transport network, traffic volumes, existing users, road network capacity and infrastructure, key intersections information and road safety. Potential impacts, both direct and indirect, during the construction, operation, and closure and rehabilitation stages of the Project are considered, and measures for the mitigation of any impacts are proposed.

A detailed traffic and transport impact assessment is provided in Appendix V. The potential impacts and associated mitigation measures identified in this chapter form the basis of the traffic and transport component of the project risk assessment undertaken in Chapter 5. The project risk assessment includes consequence, likelihood and residual risk ratings for transport and traffic impacts after management measures are implemented.

18.1 Project Overview

The following provides an overview of the Project as it relates to transport generating activities. A full project description is provided in Chapter 2.

The proposed development phases for the mine are:

- ▶ construction over a two year period consisting of:
 - pre-mining site preparation such as reclamation of existing infrastructure and mine facilities; and
 - construction of Ore Processing Plant, WTP, Power Station and supporting infrastructure including sumps, decant towers, collection ditches, Sludge Disposal Cell Equalisation Pond and tailings storage facilities.
- ▶ operations consisting of the mining and processing of ore over a 13 year period; and
- ▶ mine closure and rehabilitation over a four year period.

Workforce

The construction workforce is expected to peak at around 450. This workforce would be the responsibility of a construction contractor. Construction works will take place largely between 6am to 6pm, with construction workers working 12 hour shifts with rotating shift patterns based on 7 x 7 day roster. Administration and management personnel will work a standard 5 x 2 day roster.

The operations workforce, including operations, maintenance, engineering, geological and support personnel, is expected to peak at around 350 in production years 5 to 7. This workforce will be employed by Vista Gold. It is assumed that mine operations will be 24-hour, split across two shifts (6am – 6pm and 6pm – 6am).

It is expected that around 40 personnel would be required for closure and rehabilitation.

Accommodation

Construction personnel will be housed in a purpose built camp. The location of this camp is still to be determined but it is likely to be located within 25km of the project area to be acquired by Vista Gold.

The operations workforce of 350 is expected to comprise 60 personnel drawn from the region with the remaining 290 personnel being new. The preferred accommodation strategy consists of:

- ▶ 70 workers at the construction camp. This would accommodate mainly FIFO / DIDO personnel;
- ▶ 120 workers (family households with or without children) in a mixture of:
 - new three and four bedroom houses located on existing vacant Katherine and regional land;
 - existing houses located in Katherine and regionally; and
 - a small contained development on land in Katherine.
- ▶ 100 workers located in a Katherine based single person accommodation facility.

The ultimate accommodation strategy adopted will be developed following further discussions with local and Northern Territory Government agencies.

For the closure and rehabilitation phase, the 40 workers would be housed in either the previous FIFO / DIDO accommodation or in the Katherine based single person accommodation.

In order to conservatively assess the impacts of generated traffic, it has been assumed that the above accommodation sites are located south of Edith Falls Road resulting in similar traffic movements to access the project area.

18.2 Methodology

The following tasks were undertaken to complete the traffic and transport assessment:

- ▶ a site visit on a typical day was undertaken to establish existing traffic conditions, identify any safety and accessibility issues and identify any heavy vehicle facilities;
- ▶ existing information of the project area was reviewed including:
 - legislation, reports and existing traffic data;
 - recent crash history data; and
 - other information including public transport and local community information.
- ▶ traffic generation and distribution associated with each stage of the Project was estimated;
- ▶ an impact assessment of each stage of the Project was undertaken considering issues identified in the Guidelines for the preparation of a Draft EIS for the Mt Todd Gold Project (NT EPA (formerly NRETAS) 2011) and raised during agency and community consultation including:
 - staff transportation;
 - road network capacity and key intersections;
 - road network infrastructure;
 - access routes; and
 - road safety issues.
- ▶ recommendations for the management and mitigation of any impacts were made.

18.3 Existing Environment

18.3.1 Local Community

Katherine

Katherine is the largest township to the Mt Todd Gold Project, located approximately 55km from the mine site. It is the fourth largest town in the Northern Territory. The Katherine town council covers an area of 17.3km² with a residential population of 6,094 in 2011.

Werenbun Community

Werenbun Community (also known as Barnjaru) is located approximately 6.5km from the mine site. The community has a usual population of 20 to 30 persons. The community consists of permanent and semi-permanent residences with a water supply. Access is via Edith Falls Road.

18.3.2 Road Network

Stuart Highway

The Stuart Highway is a national highway extending approximately 2,700km from Darwin to Port Augusta. Within the study area, the highway is a Declared Road controlled by DLPE. The Stuart Highway will provide connections from the major population centres to the mine via Edith Falls Road.

The Highway has a 130km/h posted speed limit at its intersection with Edith Falls Road, and is generally a two-lane, two-way road with a seal width of 7m. The Highway is flanked by unsealed or grassed shoulders, varying in width from 2.5m to 5m (Plate 18-1).

Near the intersection with Edith Falls Road, the Stuart Highway widens to a four-lane, two-way road (Plate 18-2). The highway at this location has a 15m wide median, 3.5m wide right-turn and left-turn lanes and a road reserve width of approximately 36m. This dual carriageway section is approximately 3.25km long, extending about 750m to the south of the Edith Falls Road intersection, and about 2.5km to the north. The left-turn lane from the north into Edith Falls Road is approximately 180m long.

Sight distance along the Highway is good and typically exceeds one kilometre, with the exception of the Edith Falls Road intersection where sight distance is reduced to 850m to the south due to the horizontal curvature of the road.

There is no lighting provided along the road in the vicinity of the Edith Falls Road intersection however, guide posts provide delineation for night time driving.



Plate 18-1 Stuart Highway Typical Two-lane Two-way Cross Section



Plate 18-2 Stuart Highway Dual Carriageway Cross Section at Edith Falls Road Intersection, View to South

Edith Falls Road

Edith Falls Road is a two-way, two-lane road which connects the Stuart Highway with Edith Falls. The road is a Declared Road controlled by DLPE. The road is used mainly by local residents and tourists and intersects with Jatbula Road (Mine Access Road), the main access to the mine site. The road has a typical cross section width of 7m (2 x 3.5m lanes) and the shoulders are a mix of rocks, grass and crushed rock with a width between 2.0m and 2.5m. The posted speed limit along the road is 80km/h.

Roadside signage indicates that Edith Falls Road is subject to flooding. There is no lighting provided along the road, although guide posts provide delineation for night time driving. Cross sections of Edith Falls Road are shown in Plate 18-3 and Plate 18-4.



Plate 18-3 Edith Falls Road, View to West



Plate 18-4 Edith Falls Road, View to West

Jatbula Road (Mine Access Road)

Jatbula Road is a private road providing access to the mine. The road is two-way with no line markings and a speed limit of 80km/h (Plate 18-5). Seal widths vary from 7.5 to 8m and in most cases shoulder widths are less than 1m due to embankments on the side of the road or the presence of rocks and debris. Pavement conditions along the Road vary with some sections in very poor condition (Plate 18-6). Roadside signage indicates that sections of the road are subject to flooding.



Plate 18-5 Jatbula Road, View to North



Plate 18-6 Jatbula Road, View to North

Internal Mine Roads

Jatbula Road (Mine Access Road) continues within the mine site as an internal road. Conditions along the internal mine roads vary, sections range between sealed and dirt roads (Plate 18-7 and Plate 18-8).



Plate 18-7 Internal Mine Roads, Sealed



Plate 18-8 Internal Mine Roads, Unsealed

18.3.3 Intersections

Stuart Highway / Edith Falls Road

The Stuart Highway / Edith Falls Road intersection is a Give Way sign controlled T-intersection, where Stuart Highway is the major movement. At the intersection the Stuart Highway is a four-lane, two-way divided road with a median width of 15m. An Auxiliary Left Turn treatment facilitates left turn movements from the northern approach of the highway and a Channelised Right Turn treatment facilitates right turn movements at the southern approach. The separation of turning traffic from the through lanes on both the northbound and southbound carriageways makes provision for the deceleration of turning vehicles.

The width of the median of Stuart Highway allows for vehicles turning right from Edith Falls Road to perform a two-stage crossing of the intersection i.e. waiting at the median after crossing the southbound carriageway before entering the northbound carriageway.

Sight distances to the south and north along the Stuart Highway from the intersection are shown in Plates 18-9 and 18-10. Sight distances are approximately 850m in both directions on Stuart Highway. This is greater than the desirable minimum stopping sight distance value of 257m for a 130km/h road, as per Table 5.4 of Austroads Guide to Road Design Part 3: Geometric Design (Austroads 2009).



Plate 18-9 Sight Distances at the Stuart Highway / Edith Falls Road Intersection, View to South on Stuart Highway

Plate 18-10 Sight Distances at the Stuart Highway / Edith Falls Road Intersection, View to north on Stuart Highway

Edith Falls Road / Jatbula Road

The Edith Falls Road / Jatbula Road intersection is a Give Way sign controlled T-intersection, where Edith Falls Road is the major movement. A short auxiliary left turn lane provides for left turn movements from Edith Falls Road into Jatbula Road from the west and a Basic Right-turn Treatment on the major road provides for right turns from a shared right-turn and through lane from the east. A rural basic left turn treatment on Jatbula Road provides for left and right turn movements for vehicles exiting the road.

From Jatbula Road, sight distances along Edith Falls Road to the east (Plate 18-11) are restricted to 600m due to the horizontal curvature of the road. To the west sight distances are restricted to 70m (Plate

18-12), limited by a dip in the road. This is less than the desirable minimum stopping sight distance of 114m, as per Table 5.4 of Austroads Guide to Road Design Part 3: Geometric Design. There are existing warning signs on Edith Falls Road on the approach to the intersection.



Plate 18-11 Sight Distances at the Edith Falls Road / Jatbula Road Intersection, View to East on Edith Falls Road

Plate 18-12 Sight Distances at the Edith Falls Road / Jatbula Road Intersection, View to West on Edith Falls Road

18.3.4 Traffic Volumes

Recorded Traffic Volumes

Traffic volume information collected by the Road Network Division of DLPE has been provided for the project area for 2009, the most recently available full year of data (DLP 2009). The records present daily average two-way volumes for each month. Significant seasonal variability of traffic volumes is observed, primarily due to the Wet and Dry Seasons. For that reason, traffic volume data for Stuart Highway and Edith Falls Road in Table 18-1 lists the minimum, maximum and average daily two-way volumes. The maximum daily volumes are considerably below typical capacity for a two-lane highway, which could be expected to carry up to 1,800 vehicles per hour (vph) (one way) in uninterrupted flow conditions.

Table 18-1 Traffic Volume Data

Road Name / Location	Minimum recorded daily traffic (two-way)	Maximum recorded daily traffic (two-way)	Average daily traffic (ADT) (two-way)	ADT Station
Stuart Highway / 2km north of Kakadu Highway	668 (February 2009)	1,570 (July 2009)	1,070 (2009)	RDVDP005
Stuart Highway / 20km north of Katherine River Bridge	907 (January 2009)	1,930 (July 2009)	1,312 (2009)	RKVDP001
Edith Falls Road / 2km east of Stuart Highway	N/A	N/A	175 (2009) ¹	RKVDC033

¹ 2009 traffic volume data for ADT Station RKVDC033 only available for March – April

Heavy Vehicles

Classified vehicle counts are undertaken at fixed ADT stations for selected periods of the year. The most recent heavy vehicle data are presented in Table 18-2.

Table 18-2 Percentage Heavy Vehicles

Road Name / Location	Percentage LV (two-way)	Percentage HV (two-way)	Record Period (Days)	ADT Station
Stuart Highway / 2km north of Kakadu Highway	74.3%	25.7%	November 2009 (14)	RDVDP005
Stuart Highway / 20km north of Katherine River Bridge	84.0%	16.0%	March & April 2009 (28)	RKVDP001
Edith Falls Road / 2km east of Stuart Highway	90.5%	9.5%	March & April 2009 (28)	RKVDC033

Traffic Growth Rates

Background traffic growth rates sourced from existing traffic count data are shown in Table 18-3. The low traffic growth rates on the road network are likely due to the rural nature of the study area.

Table 18-3 Observed Traffic Growth Rates

Road Name / Location	Count Dates	Average Growth Rate (p.a.)	ADT Station
Stuart Highway / 2km north of Kakadu Highway	2000 - 2009	0.8%	RDVDP005
Stuart Highway / 20km north of Katherine River Bridge	2000 - 2009	2.7%	RKVDP001
Edith Falls Road / 2km east of Stuart Highway	2001 - 2009	-1.7% ¹	RKVDC033

¹ Incomplete data for the comparison period

18.3.5 Crash History

Crash data provides an indication of the road safety performance of an area, and can assist in determining existing road safety deficiencies. A review of the crash history for the Stuart Highway and Edith Falls Road in the vicinity of the project area has been undertaken using the five year period between June 2006 and June 2011 and was sourced from DLPE (formerly Department of Lands and Planning).

There have been nine crashes on Stuart Highway in the project area and one on Edith Falls Road. All recorded crashes have been single vehicle incidents. Of these, one crash resulted in hospital admission and another in minor medical treatment. No other injuries were recorded (DLP 2011).

The Darwin to Adelaide railway line has an at-grade crossing with Edith Falls Road. Flashing lights and associated signage are present at this location. No crashes associated with the rail crossing have been observed in the past five years of available data.

18.3.6 Railway Line

The single track Darwin to Adelaide railway line runs parallel to the Stuart Highway within the project area. Interstate passenger services and container and bulk freight services operate between Darwin and Adelaide along the line. Six services a week operate from Darwin to Adelaide, with additional bulk train services operating between regional mine sites and the Port of Darwin. The Ghan passenger service operates two return services per week.

An at-grade level crossing of the Darwin to Adelaide Railway line is located on Edith Falls Road approximately 280m west of the Stuart Highway (Plate 18-13 and Plate 18-14). The crossing is controlled by flashing lights and associated signage. No casualty crashes associated with the rail crossing have been observed in the last five years (DLP 2011).



Plate 18-13 Edith Falls Road Level Crossing, View to West

Plate 18-14 Edith Falls Road Level Crossing, View to East

18.3.7 Public Transport

A bus service provides a return service from Alice Springs to Darwin. On route, the service makes stops at Katherine and Edith Falls.

No current or proposed local public transport routes exist within the project area. Due to the rural nature of the area, public transport is not expected to be an influencing factor on project generated traffic.

18.3.8 Truck Facilities

Parking for heavy vehicles is currently facilitated in the northbound direction on Stuart Highway, approximately 5km north of Edith Falls Road. The truck rest stop has a sealed surface, though does not provide for any amenities. The rest stop was constructed in 2009, and is considered to provide for adequate acceleration, deceleration and sight distances on approach and departure.

18.3.9 Load Sensitive Assets

Load sensitive assets typically refer to bridges or culverts with lower load limits within the road network. No load sensitive assets were identified in the project area.

18.4 Estimated Traffic Generation

18.4.1 Construction

Traffic generated by construction activity would principally be associated with the transport of machinery and equipment to-site, import and disposal of materials by truck, the removal of machinery post-construction and the construction workforce.

The main construction and commissioning activities for the mine are anticipated to extend over 24 months with the main activities being construction of:

- ▶ temporary facilities (i.e. lay down areas, offices, workshops);
- ▶ administration and plant site buildings including workshops, offices and maintenance facilities;
- ▶ concrete batch plant, pipelines, Ore Processing Plant and Power Station;
- ▶ new sumps, decant towers and collection ditches; and
- ▶ a new WTP, Sludge Disposal Cell and Equalisation Pond.

It is assumed that 90% of construction personnel will be transported to the site by bus and the remaining 10% will drive in private vehicles. This allows for the possibility that some workers will need to move around the site by light vehicle and are therefore likely to drive to site.

At peak construction, up to fifty heavy vehicle deliveries per day are anticipated, delivering plant and associated materials. In addition to standard 19.5m rigid trucks, this would also include oversize vehicles.

Based on the above, up to 127 heavy vehicle trips (of which 24 are personnel buses) and up to 60 light vehicle trips are anticipated per day during peak construction. Based on typical construction activities, it is assumed that 30% of personnel movements (light and heavy vehicles) and 10% of heavy vehicle delivery movements would occur in the typical peak hour.

18.4.2 Operations

Activities associated with the generation of traffic during the operation of the mine will principally be the transport of mine personnel and the delivery of reagents, fuel and explosives.

Mine personnel would be transported between accommodation and the mine site by 30 seat buses, transporting personnel by 12 bus trips (six buses in each direction per shift). It is assumed that around 7% of the workforce will require a light vehicle whilst on-site and therefore will drive to and from the mine.

Diesel will be stored on-site for mining equipment and owner vehicles. It is anticipated that 90,000L of diesel will be used daily. Diesel is assumed to be transported to the mine site by means of two deliveries per day from via triple road tankers.

Various reagents used in the Ore Processing Plant and materials for use around the mine will be transported to and from site:

- ▶ Sodium cyanide, 13,668tpa, as a solid in a vendor bulk sparging unit by seven heavy vehicle deliveries per week;
- ▶ Sodium hydroxide, 710tpa, in 1t bags by four deliveries per week;
- ▶ Flocculant, 266tpa, as a solid powder by four heavy vehicle deliveries per week;

- ▶ Sodium metabisulfite, 12,958tpa, as powder in 20 foot containers by four heavy vehicle deliveries per week;
- ▶ Hydrochloric acid, 1,441tpa, in 1,150kg Intermediate Bulk Containers by four deliveries per week;
- ▶ Activated carbon, 355tpa, in 500kg bulk bags by five deliveries per week;
- ▶ Lead nitrate, 1,775tpa, 1t bags by two delivery per week;
- ▶ Quick lime, 16,153tpa, in 20-foot containers by four deliveries per week;
- ▶ Fluxes, 3.6tpa, palletised to approximately 1t per pallet by one truck delivery per week;
- ▶ Waste oil would be stored and transported off site by two heavy vehicle collections per week;
- ▶ Blasting materials, 3,000tpa, by three heavy vehicle deliveries per week; and
- ▶ Mill balls, 16,901tpa, in 20-foot containers by six B-triple deliveries per week.

Dore would be transported to Darwin by one armoured truck delivery per week.

On the basis of the above, up to 47 light vehicle trips and 47 heavy vehicle trips (including rounding of vehicle numbers) are anticipated per day during peak operations. It is assumed that during a typical peak hour 50% of bus trips (buses delivering staff to site at the beginning of a shift and also returning staff that have just completed their shift), 25% of light vehicle personnel trips and 10% of all other trips would occur.

18.4.3 Closure and Rehabilitation

A maximum of 40 personnel will be required for the closure and rehabilitation phase and the generation of traffic will consequently be less than that assessed for the construction of the mine. Therefore, the assessment of traffic impacts for this stage of the Project is considered to be adequately considered through the assessment for construction impacts.

18.4.4 Proposed Haulage Routes and Traffic Distribution

During all phases of the mine, access to the mine site will be from Jatbula Road (Mine Access Road), via Edith Falls Road and Stuart Highway.

Plant, equipment and materials associated with construction are anticipated to be transported to site from the north, including greater Darwin and the Port of Darwin. Additionally, 50% of the heavy vehicle trips for personnel are expected to be from the north. The remainder of trips, including light vehicle trips transporting personnel, are expected to be from the south at Katherine.

Mine operations personnel will be transported to site by bus from accommodation in Katherine and possibly Pine Creek. It is estimated that of the light vehicle trips transporting other personnel, 90% of trips will be to Katherine with the remainder to the north. All heavy vehicle deliveries and collections are assumed to be originating from, or destined to, the north.

On the basis of the above, the distribution of light and heavy vehicles during construction and operations is provided in Table 18-4.

Table 18-4 Estimated Vehicle Trip Ends (VTE) – Construction and Operations

Phase	Origin / Destination	Trips per day		Trips per typical peak hour	
		Light Vehicles (vte)	Heavy Vehicles (vte)	Light Vehicles (vte)	Heavy Vehicles (vte)
Construction	North, incl. Darwin	-	114	-	14
	South – Katherine	60	14	18	4
Operations	North, incl. Darwin	5	23	1	2
	South – Katherine	42	24	11	12

18.5 Potential Impacts

18.5.1 Cumulative Traffic Volumes

This section identifies the cumulative traffic impacts of the Project during construction and operations.

Construction

The majority of traffic during construction will be concentrated on Stuart Highway south of Edith Falls Road and on Edith Falls Road east of Stuart Highway (Table 18-5). Most of this traffic is expected to be heavy vehicles.

Table 18-5 Estimated Cumulative Traffic Volumes during Construction

Location	Peak Daily Traffic Generation (two-way)		Typical Peak Hour Traffic Generation (two-way)	
	Light Vehicles (vte)	Heavy Vehicles (vte)	Light Vehicles (vte)	Heavy Vehicles (vte)
Stuart Hwy, north of Edith Falls Rd	-	114	-	14
Stuart Hwy, south of Edith Falls Rd	60	14	18	4
Edith Falls Rd, east of Stuart Hwy	60	127	18	18

Operations

The majority of traffic during operations will be concentrated on Stuart Highway south of Edith Falls Road and on Edith Falls Road east of Stuart Highway (Table 18-6). Most of the traffic is expected to be light vehicles.

Table 18-6 Estimated Cumulative Traffic Volumes during Operations

Location	Peak Daily Traffic Generation (two-way)		Typical Peak Hour Traffic Generation (two-way)	
	Light Vehicles (vte)	Heavy Vehicles (vte)	Light Vehicles (vte)	Heavy Vehicles (vte)
Stuart Hwy, north of Edith Falls Rd	5	23	1	2
Stuart Hwy, south of Edith Falls Rd	42	24	11	12
Edith Falls Rd, east of Stuart Hwy	47	47	12	14

18.5.2 Road Network Capacity Assessment

This section assesses the impact that traffic volumes associated with the Project are expected to have on the operation of the arterial road network i.e. reduction in the Level of Service (LOS). LOS is a measure of operational conditions within a stream of traffic, where LOS A indicates free flowing travel. The actual traffic capacities associated with each LOS are dependent on a range of determinants including speed limits, terrain, geometry, lane widths and percentage of heavy vehicles. Details of each LOS are provided in Appendix V.

Stuart Highway

The current LOS for Stuart Highway in the vicinity of the Project has been determined to be LOS A based on the traffic data, the assumptions outlined in Table 18-7 and the guidance provided in the Highway Capacity Manual (Chapter 20) (Transportation Research Board 2000).

Table 18-7 Stuart Highway Level of Service Factors

Determinant	
Traffic volume (ADT)	1,930
Peak hour percentage of ADT (assumption)	10%
Percentage of heavy vehicles	20%
Terrain (site observations)	Level
Directionality during typical peak hour (assumption)	Even directionality
Percentage of road with available sight distance less than 450m (site observations)	Up to 10%

Table 18-8 outlines the anticipated change to peak period two-way traffic volumes on Stuart Highway as a result of the construction and operation of the mine.

Table 18-8 Traffic Capacity Assessment, Stuart Highway

		Stuart Highway / 2km north of Kakadu Highway	Stuart Highway / north of Edith Falls Road	Stuart Highway / 20km north of Katherine River Bridge
	Maximum recorded (ADT)	1,570 (July 2009)	< 1,900 ¹	1,930 (July 2009)
	Estimated peak hour volume	157	190	193
	Existing peak hour LOS	LOS A	LOS A	LOS A
Construction	Estimated maximum peak hour traffic generation	14	14	20
	Estimated resultant peak hour volumes	171	204	213
	Resultant peak hour LOS	LOS A	LOS A	LOS A
Operation	Estimated maximum peak hour traffic generation	2	2	22
	Estimated resultant peak hour volumes	160	193	215
	Resultant peak hour LOS	LOS A	LOS A	LOS A

¹ Due to absence of data at this location, two-way volumes have been conservatively extrapolated from existing network volume data in the vicinity

During peak construction and operations, the results of the above analysis indicate that the LOS A is expected to be maintained along Stuart Highway north and south of Edith Falls Road. This represents no change in the peak period operational characteristics of the Highway.

Edith Falls Road

The current LOS for Edith Falls Road in the vicinity of the Project has been determined to be LOS A based on the traffic data, the assumptions outlined in Table 18-9 and the guidance provided in the Highway Capacity Manual (Chapter 20) (Transportation Research Board 2000).

Table 18-9 Edith Falls Road Level of Service Factors

Determinant	Details
Traffic volume (ADT)	175
Peak hour percentage of ADT (assumption)	10%
Percentage of heavy vehicles	10%
Terrain (site observations)	Level
Directionality during typical peak hour (assumption)	Even directionality
Percentage of road with available sight distance less than 450m (site observations)	Up to 20%

Table 18-10 outlines the anticipated change to peak period two-way traffic volumes on Edith Falls Road as a result of the construction and operation of the mine.

Table 18-10 Traffic Capacity Assessment, Edith Falls Road

		Edith Falls Road / 2km east of Stuart Highway
	Maximum recorded ADT	175 (2009)
	Estimated peak hour volume	18
	Existing peak hour LOS	LOS A
Construction	Estimated maximum peak hour traffic generation	36
	Estimated resultant peak hour volumes	54
	Resultant peak hour LOS	LOS A
Operation	Estimated maximum peak hour traffic generation	25
	Estimated resultant peak hour volumes	43
	Resultant peak hour LOS	LOS A

During the peak construction phase, the results of the analysis indicate that LOS A is expected to be maintained along Edith Falls Road. The two-way roadway capacity for Edith Falls Road associated with LOS A is estimated to be 230vph. Consequently, there is estimated to be significant capacity for Edith Falls Road to operate at free flowing travel.

During operation of the mine, the analysis indicates that the LOS A will be maintained on Edith Falls Road. This represents no change in the peak period operational characteristics of the road.

18.5.3 Intersections

The safety and operation of intersections is an important consideration for the Project. The operation and safety of an intersection has the potential to influence where the Project will generate additional traffic volumes for extended periods of time and where there is a significant change to the traffic composition of turning vehicles.

Stuart Highway / Edith Falls Road

Based on the anticipated cumulative traffic projections, the estimated turning volumes during construction and operation are shown in Table 18-11.

Table 18-11 Estimated AM Peak Turning Movements, Stuart Highway / Edith Falls Road

	Light vehicles	Heavy vehicles	Total vehicles
Construction			
Left turn from Stuart Highway	0	7	7
Right turn from Stuart Highway	18	4	22
Left turn from Edith Falls Road	0	0	0
Right turn from Edith Falls Road	0	7	7
Operation			
Left turn from Stuart Highway	1	1	2
Right turn from Stuart Highway	8	6	14
Left turn from Edith Falls Road	2	6	8
Right turn from Edith Falls Road	1	1	2

Turning Movements and Capacity

The width of the median on Stuart Highway at this location allows for vehicles less than 15m in length turning right from Edith Falls Road to perform a two-stage crossing of the intersection, i.e. waiting in the median after crossing the southbound carriageway before entering the northbound carriageway. For longer vehicles, such as quad B-doubles, which are up to 25m long, right turns will have to be made in one movement and this is dependent on there being enough gaps in traffic on Stuart Highway.

Two-way traffic volumes on Stuart Highway are expected to be approximately 204vph in the peak hour. Assuming a uniform flow rate, this equates to approximately one vehicle every 17 seconds on average. In this location, the Stuart Highway is four lanes two-way with a wide median which will allow through vehicles to overtake vehicles accelerating up to the posted speed from the minor road. As such, a left turn vehicle turning from the minor road would require a 5 second gap to enter the traffic stream while a right turning vehicle would require an 8 second gap to enter the traffic stream due to the additional crossing distance. It is considered that 17 seconds is adequate to allow vehicles to turn onto the highway without experiencing undue delay.

No significant impacts are anticipated on existing road users of the Stuart Highway.

Sight Distances

Sight distances to the north and south along the Stuart Highway from the intersection are approximately 850m in both directions. Sight distance requirements given in Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, assuming a reaction time of 2.5 seconds are:

- ▶ stopping sight distance – 275m;
- ▶ safe intersection sight distance – 383m;
- ▶ approach sight distance (value for trucks has been used) – 275m; and
- ▶ minimum gap sight distance – 305m for a right turn (the maximum distance given in Austroads 2009a).

The available distances are all greater than these and are therefore acceptable.

Deceleration Lanes

There are currently deceleration lanes for left and right turn movements into Edith Falls Road. The right turn lane is approximately 270m long, while the left turn lane is approximately 180m long. The design of these lanes exceeds the requirements identified in Austroads guidelines for turning treatments accommodating a major road flow of 204vph and a turning volume of 22vph.

Edith Falls Road / Jatbula Road (Mine Access Road)

Based on the anticipated cumulative traffic projections, estimated turning volumes during construction and operation are shown in Table 18-12.

Table 18-12 Estimated AM Peak Turning Movements, Edith Falls Road / Jatbula Road

	Light vehicles	Heavy vehicles	Total vehicles
Construction			
Left turn from Edith Falls Road	18	11	29
Right turn from Jatbula Road	0	7	7
Operation			
Left turn from Edith Falls Road	9	7	16
Right turn from Jatbula Road	3	7	10

Turning Movements and Capacity

As there is no median in which to wait when turning right, all turns onto Edith Falls Road must be made in one movement, which is dependent on there being enough gaps in traffic. As shown in Table 18-10, traffic volumes on Edith Falls Road are expected to be approximately 51vph in the peak hour. Assuming a uniform flow rate, this equates to approximately one vehicle every 70 seconds. For a right hand turn from a minor road, a 14 to 40-second gap is required for the turning vehicle not to interfere (i.e. slow) with the major road traffic. It is considered that the average gap of 70 seconds is adequate to allow vehicles (including heavy vehicles) to turn onto the major road without experiencing undue delay.

No significant impacts are anticipated on existing road users of the Edith Falls Road.

Sight Distance and Safety

Visibility to the left from Jatbula Road is approximately 600m, limited by the horizontal curvature of Edith Falls Road. Visibility to the right is approximately 70m, limited by a dip in the road which partially obscures approaching vehicles for a brief time. It is noted that visibility for truck drivers would be greater than these distances due to their higher ride height.

Sight distance requirements in Austroads guidelines are:

- ▶ stopping sight distance – 151m;
- ▶ safe intersection sight distance – 226m;
- ▶ approach sight distance – 151m; and
- ▶ minimum gap sight distance – 250m for a right turn.

Sight distance to the left satisfies all these criteria, but the sight distance to the right does not.

There are existing 'T-intersection' warning signs on Edith Falls Road on the approach to the intersection. Given the very low volumes on both roads, and the presence of warning signs on approach to the

intersection, it is considered that there are no other practical or cost-effective mitigation measures to physically improve visibility (i.e. such as regrading the road).

Deceleration Lanes

There is currently a channelised deceleration lane for the left turn movement into Jatbula Road which is approximately 100m long. The right turn lane is a Basic Right Turn Treatment with widening on the left hand side of the road. Both treatments meet Austroads guidelines for a major road flow of 54vph and a turning volume of 29vph.

18.5.4 Over-dimensional Loads

During construction it is expected that over-dimensional vehicles will be used to deliver over-sized components to the mine. Where these loads are excessively wide, long, or restrict the haulage vehicle to speeds more than 20km/h lower than the posted speed limit, it is recommended that vehicles be escorted. Additionally, consideration should be given to using traffic controllers to manage turning movements at intersections.

It is anticipated that this issue will be addressed in the Traffic Management Plan.

18.5.5 Pavement Deterioration

Heavy vehicles contribute the greatest proportion of wear on road surfaces. The forecast increase in heavy vehicles (and, importantly, axle repetitions) is expected to potentially increase the rate of deterioration of the road surface. However, the expected increase in vehicle volumes due to the development of the mine is low and the condition and age of the road surfaces (beyond a visual inspection) are unknown at this stage. It is therefore not possible to quantify the impacts of the increase in truck volumes on the road surface.

18.5.6 Rail Crossing

Construction and operations traffic will increase the exposure of vehicles to the rail crossing.

While vehicle numbers will increase over existing crossing movements, it is considered that the existing flashing lights are adequate to control vehicles at the rail crossing. No significant impacts are anticipated.

18.5.7 Load Sensitive Assets

No load sensitive assets have been identified within the study area. Confirmation of the absence of assets that could be impacted could be made through consultation with the Department of Lands and Planning prior to construction.

18.5.8 Road Safety

Vehicle accidents

Increased personnel traffic to the project area and an increased number of heavy vehicles using Edith Falls Road and the Stuart Highway increases the risk of accidents including major single vehicle, vehicle to vehicle or vehicle to pedestrian accidents leading to fatality.

Fatigue

Fatigue is a common problem in both short and long distance truck driving. This loss of alertness is accompanied by poor judgement, slower reactions to events, and decreased skill, such as in vehicle control. It affects the efficiency, effectiveness and safety of a driver's performance in carrying out the driving task. The transportation of material associated with the construction and operation of the mine may expose drivers to fatigue.

Haulage Routes

Vehicles that operate within legal size and mass limits are permitted to travel without special permission on any road in the Northern Territory. For vehicles which exceed these limits (including their load), special permits are required and pilot or escort vehicles may also be required. The permit would place limits on the roads a vehicle can use, depending on its size and mass.

A permit for the use of over-dimensional or over-mass vehicles will need to be sought from the Northern Territory Government prior to using them in either the construction or operations phases of the Project. It is anticipated that this issue will be investigated in the Traffic Management Plan.

Transportation of Hazardous Substances

Transportation of hazardous substances carries the risk of spills and releases to surrounding environment in the event of an accident.

18.6 Management Measures

The following management and mitigation measures will be implemented to address potential impacts.

Traffic Management Plan

A Traffic Management Plan will be prepared prior to construction works taking place. The Traffic Management Plan will address both the construction and operations phases. A community consultation strategy will be part of the Traffic Management Plan.

The construction Traffic Management Plan will address the following parameters:

- ▶ haulage routes;
- ▶ requirement for over-dimensional permits;
- ▶ requirement for traffic controllers;
- ▶ community consultation strategy; and
- ▶ dates and times of construction.

The operations Traffic Management Plan will address the following parameters:

- ▶ haulage routes;
- ▶ requirement for over-dimensional permits;
- ▶ community consultation strategy; and
- ▶ dates and times of operation.

Pavement Deterioration

A pavement condition monitoring program will assist in identifying any pavement deterioration during the life of the Project. A baseline condition assessment prior to mine construction commencing will establish the existing condition of public roads that form part of the haulage routes. Vista Gold will liaise with Northern Territory Government agencies to determine funding and maintenance routines.

Securing Loads

Loads being transported to and from the mine will be secured in accordance with the relevant legislation.

Hazardous Goods

There are international standards for the movement of cyanide and other hazardous substances and the movement of these substances will be carried out in accordance with the relevant legislation. This issue will be dealt with in the Traffic Management Plan and will consider, but not be limited to:

- ▶ sensitive land uses (e.g. schools) on proposed haul routes;
 - ▶ times of day for haulage to minimise potential conflicts;
 - ▶ traffic volumes on proposed haul routes; and
 - ▶ sensitive infrastructure such as tunnels and bridges.
- ▶ Transport of cyanide will comply with the International Cyanide Management Code.

Tracking of Dirt

Measures to minimise the tracking of dirt off-site will be implemented at access gates. The controls may include exit rumble grids or wheel wash facilities, sweeping of sealed roads to remove deposited material where applicable, and / or stabilisation of site roads / tracks with aggregate where appropriate.

Road Safety

The use of pooled vehicles such as buses and work vehicles for construction and operational personnel will reduce the number of vehicles on the road, reducing the risk of accidents. As part of Vista Gold's operational health and safety obligations, a driver fatigue management plan will be developed to reduce the impacts of fatigue and fitness for work assessments will be undertaken. A Contractor Management Plan will also be implemented to reduce risk of accidents.

Incident Management

It is expected that adherence to relevant guidelines and legislation regarding the movement of hazardous substances and the securing of loads, will minimise the occurrence and severity of any incident that may occur. It is expected that an Incident Management Plan will be prepared to set out ways in which Vista Gold and the emergency services should respond to a variety of incident scenarios.