

**Appendix 13.
Fountain Head Gold Project –
Traffic Management Plan**



ERIAS Group Pty Ltd
Fountain Head Gold Traffic and Transport Assessment
Traffic Management Plan

April 2021

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1. Introduction

1.1 Purpose of this report

GHD has been engaged by ERIAS Group to prepare a Traffic Management Plan report which will form an Appendix to an Environmental Impact Statement for the Fountain Head Gold Mine. This report seeks to assess the traffic impacts of the traffic generated by the construction of the Fountain Head Mine on the surrounding road network and identify any general traffic management considerations that will be associated with the traffic.

1.2 Scope and limitations

This report: has been prepared by GHD for ERIAS Group Pty Ltd and may only be used and relied on by ERIAS Group Pty Ltd for the purpose agreed between GHD and the ERIAS Group Pty Ltd as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than ERIAS Group Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.3. of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by ERIAS Group Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has not been involved in the preparation of the Environmental Impact Statement and has had no contribution to, or review of the Environmental Impact Statement other than in the Traffic Impact Assessment. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of the Environmental Impact Statement

1.3 Assumptions

This report has been prepared at a preliminary stage of the development application with limited traffic data available. A number of assumptions have been made associated with the Traffic Assessment section outlined in Section 4.

1.4 Background

1.4.1 Overview of the Fountain Head operation

PNX Metals Limited ('PNX' or 'Company') is a publicly listed Company (ASX: PNX). PNX hold a significant base and precious metals tenement portfolio, primarily in the Northern Territory, and also in South Australia. The Company's focus is the development of the Fountain Head Gold Project, incorporating the mining of the Fountain Head gold deposit, and the processing of the ore via a CIL processing circuit which will also be constructed on site.

Fountain Head project area is located approximately 170 kilometres (km) south of Darwin in the Northern Territory. It is situated approximately 50 km south east of the Adelaide River Township, and is approximately 13 km east of the Stuart Highway, as shown in Figure 1.

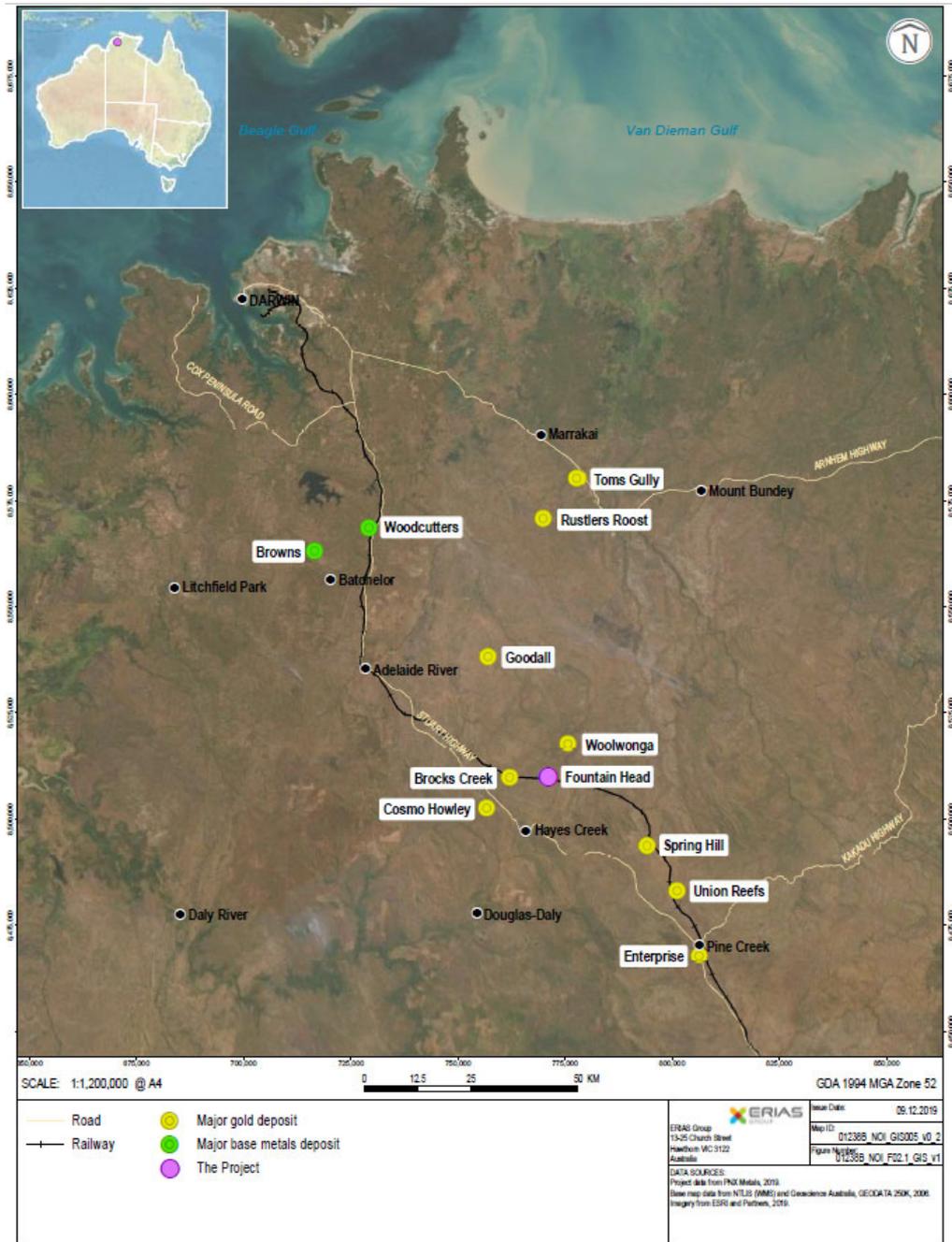


Figure 1 - Regional location

1.4.2 Overview of Fountain Head Gold Project recommencement

PNX proposes to recommence mining of the Fountain Head pit to extract gold from the ore to produce gold ore. Dewatering of the Fountain Head void is required to enable mining to recommence. Modelling suggests that dewatering would need to occur approximately 6 months prior to mining activity to begin. It is also proposed to intensify the mine and surrounding site through the expansion of the existing open pit and waste rock stockpile, and the construction of required facilities and support infrastructure.

In order to begin dewatering prior to mining, the environmental approvals structure (shown below) will be a two-phase approach. The dewatering activity (Phase 1) and remaining activity relating to mining and operations (Phase 2), as outlined below.

Phase 1 - Dewatering

- Dewatering of existing open pit
- Construction of evaporation dam

Phase 2 - Construction and mining

- Expansion of existing open pit.
- Expansion of existing waste rock stockpile (WRS).
- Construction of CIL processing plant, crushing and gold processing facilities.
- Co disposal of tailings within the existing WRS.
- Construction of supporting infrastructure i.e., workshops, power station, roads, offices etc.
- Continued dewatering and evaporation of the pit and evaporation dam.

Ore and other bulk products or by-products will not be required to be transported off-site with the exception of Gold Bullion Dore bars and recyclable waste streams. Heap leach solution will be processed on site.

The majority of reagents and consumables for the operations will be trucked from Darwin and Adelaide using existing road networks, including a turn off from the Stuart Highway onto Fountain Head Road. Fountain Head Road leads to Ban Ban Springs Road which is bituminised up to the Glencoe Mine (approximately 2.5 km's north of the intersection). Access to the site will be via Ban Ban Springs Road.

Approximately 540 m to the south of the operation is the Adelaide to Darwin railway line, this rail line has intermittent passenger and freight services which can pass through at any time day or night.

1.4.3 Traffic assessment of Fountain Head Gold Project recommencement

This assessment has been prepared to examine the potential impact of the proposed construction on the local road transport network.

A separate Traffic Impact Assessment report will assess the operational traffic associated with the mining activities at the site. An assessment of the traffic data provided by ERIAS Group on 04/05/2020 shows that construction traffic has been confirmed to be more than operational traffic.

This assessment has focused on the short-term effects of construction traffic on the road network exclusively. It is recommended that a construction management plan be prepared to outline the construction methodology of the site, including a traffic component to describe the site access and public protection associated with the construction of the site.

1.5 Reference materials

- Traffic Impact Assessment – Stats, PNX Metals, 2020
- NT Traffic Stats & FH CIL Projections_20210223. PNX Metals, 2021
- Fountain Head Gold Project - Traffic & Transport Scope of Work, ERIAS Group, April 2020
- Annual Traffic Report 2019, Department of Infrastructure, Planning and Logistics, 2019.
- ATSB Transport Safety Investigation Report Rail Occurrence Investigation 2006/015, February 2008
- Austroads Guide to Road Design Part 4 – Intersections and Crossings
- Austroads Guide to Traffic Management Part 12 – Integrated Transport Assessments for Developments, April 2020
- Australian Standards 1742.3 – Traffic Control Devices for Works on Roads
- Control of Roads Act 1953
- Traffic Act 1987
- Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010
- Work Health and Safety (National Uniform Legislation) Act 2011
- Northern Territory Code of Practice in Fatigue Management

1.5.1 Traffic data

- Traffic data was taken from the above-mentioned Annual Traffic Report.
- Crash history (21052020 Stuart Hwy) was requested and was received on 21/05/2020 from DIPL Road Safety Team for the section of Stuart Highway in the vicinity of Fountain Head Road.
- Rail crossing information was requested and supplied by AustralAsia Rail Corporation on 26/05/2020.
- Operational and construction traffic data, ERIAS Group, 06/05/2020.

2. Existing conditions

2.1 Road network

The transport network that will carry traffic from the Fountain Head Operation includes major highways and minor roads. A desktop assessment of the road network has been undertaken and is described in the following sections and in the figure below:

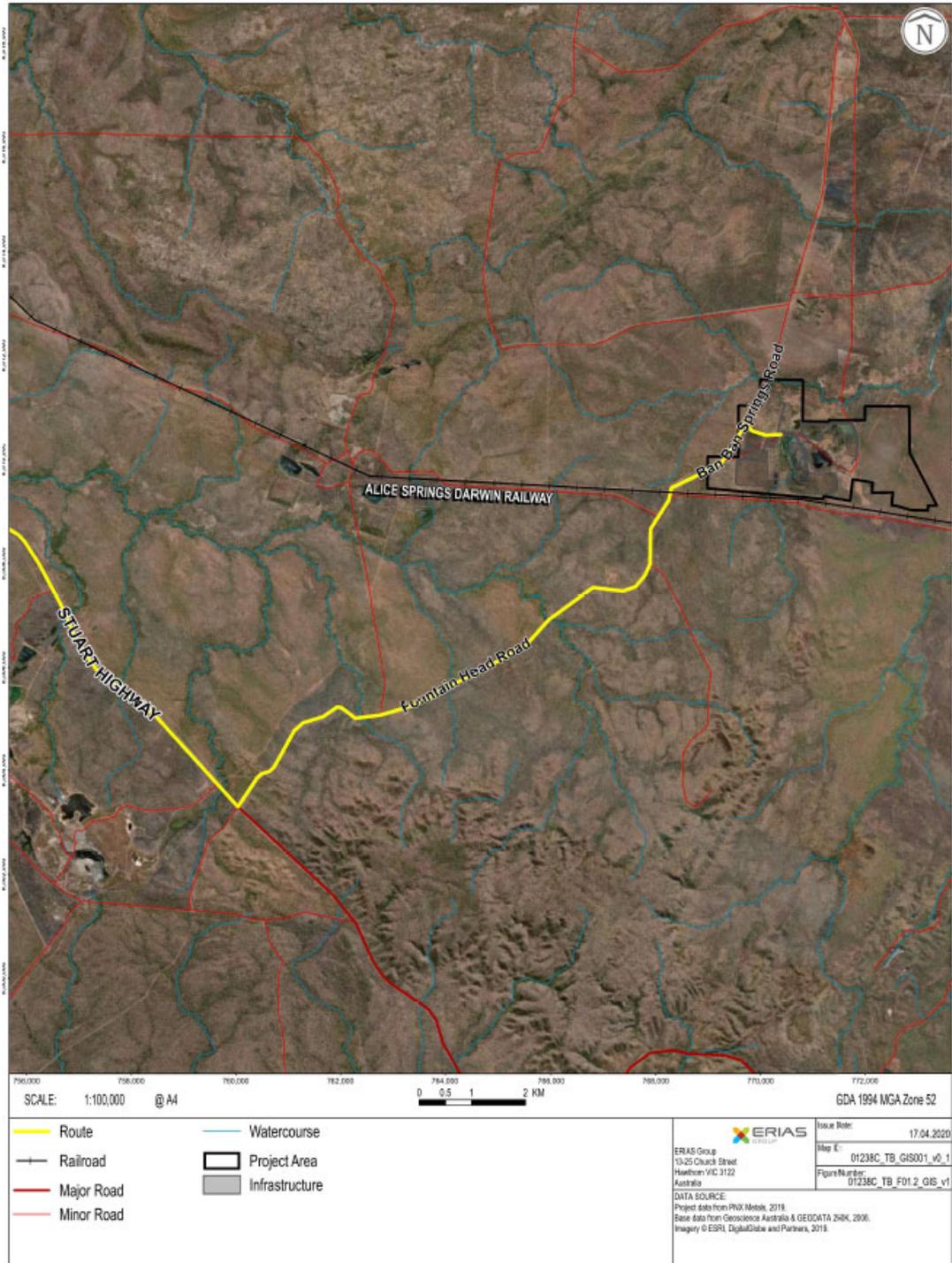


Figure 2 - Road network in vicinity of site

2.1.1 Stuart Highway

The Stuart Highway is the major north-south highway connecting Darwin with Adelaide in South Australia and is part of the National Land Transport Network. It is used for freight and tourism traffic and is managed and maintained by DIPL.

The Stuart Highway is typically constructed to a rural highway standard, with one lane travelling in each direction, additional turning lanes at key intersections and a posted speed limit of 130 kilometres per hour (km/h). Through townships and urban centre (such as Darwin and Adelaide River) Stuart Highway is an urban arterial road with a reduced speed limit.

There are no current plans for any major upgrades on the Stuart Highway.

2.1.2 Fountain Head Road (east)

Fountain Head Road (east) is managed and maintained by DIPL and is a standard sealed rural road with one lane in each direction. The sealed width is approximately 6.6 meters with no shoulders. Fountain Head Road originates at Stuart Highway and continues for approximately 11.3 km up to the Adelaide-Darwin Railway crossing where it continues as Ban Ban Springs Road.

2.1.3 Ban Ban Springs Road

Ban Ban Springs Road is a private road and partially sealed road that originates as the continuation of Fountain Head Road (east) at the Adelaide-Darwin Railway Crossing. Ban Ban Springs Road is approximately 11 km in length, with only the first 4.5 km north of the rail crossing with sealed pavement. There is an access gate 100 m beyond the level crossing.

The level crossing is passive controlled via stop signs on the road approach and was the site of a collision between the Ghan Passenger Train and a road-train in December 2016. This is further outlined in the traffic assessment in Section 4.4.

2.1.4 Mount Wells Road

Mount Wells Road is managed and maintained by DIPL and runs parallel to the Adelaide-Darwin Railway Line and is an unsealed road.

It runs from the intersection with Fountain Head Road to Kakadu Highway approximately 80 km to the south-east. Mount Wells Road crosses the railway line at several points along its length. There are also several adjoining roads leading to Stuart Highway such as Grove Hill Road.

A load limit sign for Mount Wells Road exists at Fountain Head Road, at the Stuart Highway.

Mount Wells Road forms part of the Northern Goldfields Loops which is a popular tourist attraction.

2.1.5 Fountain Head West Road

Fountain Head West Road is maintained and managed by DIPL. It runs in a north-south direction between Stuart Highway and Dorat Road. The road is sealed with one traffic lane in each direction.

2.2 Key intersections

2.2.1 Stuart Highway / Fountain Head Road (east) / Fountain Head West Road

The intersection of Stuart Highway and Fountain Head Road is a stop sign controlled 4-way intersection.

The intersection currently has basic left and right turn treatments on all legs, with the exception of the left turn from Fountain Head Road onto Stuart Highway which provides a wide slip lane / acceleration lane.

An overview image of the intersection is provided below:



Figure 3 - Stuart Highway / Fountain Head Road intersection

2.2.2 Fountain Head Road (east) / Mount Wells Road

The intersection at Fountain Head Road / Mount Wells Road is a skewed T- intersection, with Mount Wells Road forming the minor road. The intersection is uncontrolled.

An overview image of the intersection is provided below:



Figure 4 - Fountain Head Road / Mount Wells Road intersection

2.3 Existing traffic volumes

2.3.1 Daily traffic volumes

The Department of Infrastructure, Planning and Logistics releases an Annual Traffic Report which provides traffic counts on a number of Northern Territory Government roads.

Stuart Highway has two (2) traffic monitoring stations in proximity to the Fountain Head site to measure the volume and type of traffic. These sites are located 500 m south of Adelaide River (RDVDP003 – 48 km north of Fountain Head Road), and a monitoring point 2 km north of Kakadu Highway turnoff near Pine Creek (RDVDP005 - 61km south of Fountain Head Road).

Similarly, Fountain Head Road has a traffic monitoring station located 2 km east of Stuart Highway (RDVDC057). The locations of the traffic monitoring stations are shown in the figure below:

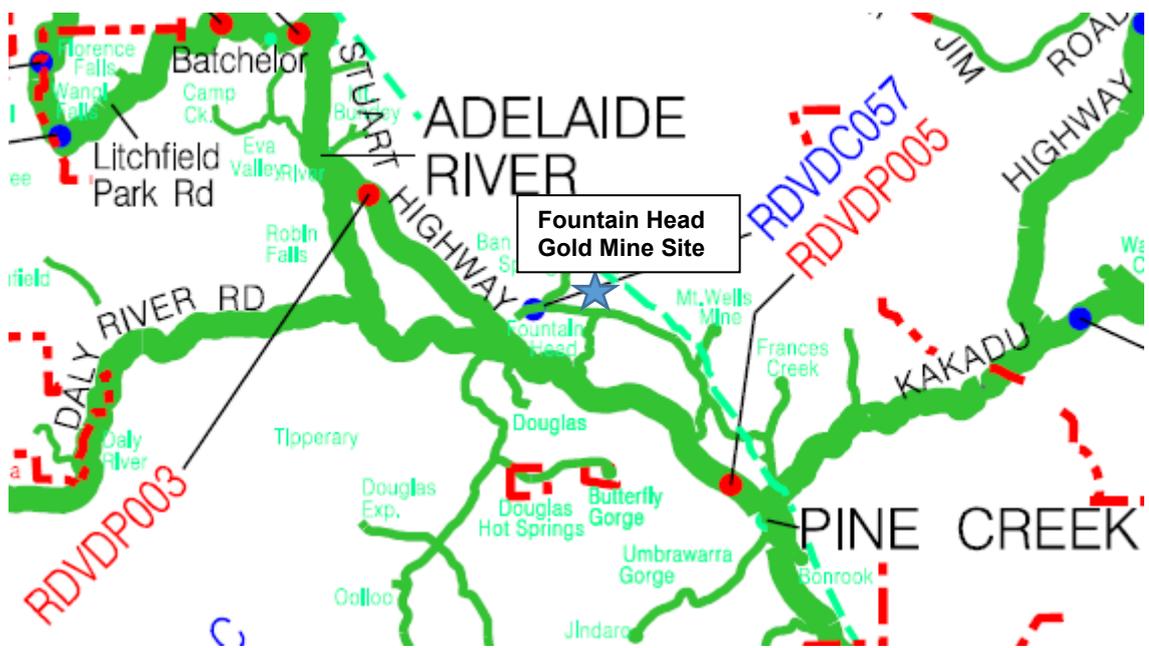


Figure 5 - Traffic monitoring locations

The traffic monitoring locations also include the percentage of heavy vehicles as per the Austroads vehicle classification system in the figure below:

AUSTROADS Vehicle Classification System

Level 1 Length (indicative) Type	Level 2 Axles and Axle Groups		Level 3 Vehicle Type		AUSTROADS Classification		
	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration	
Short up to 5.5m		1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	$d(1) \leq 3.2m$ and axles = 2		
			Short - Towing Trailer, Caravan, Boat, etc	2	$d(1) \geq 2.1m, d(1) \leq 3.2m,$ $d(2) \geq 2.1m$ and axles = 3, 4 or 5		
Medium 5.5m to 14.5m	3, 4 or 5	3	Two Axle Truck or Bus	3	$d(1) > 3.2m$ and axles = 2		
			Three Axle Truck or Bus	4	axles = 3 and groups = 2		
			Four Axle Truck	5	axles > 3 and groups = 2		
Long 11.5m to 19.0m		3	Three Axle Articulated Three axle articulated vehicle, or Rigid vehicle and trailer	6	$d(1) > 3.2m, axles = 3$ and groups = 3		
			Four Axle Articulated Four axle articulated vehicle, or Rigid vehicle and trailer	7	$d(2) < 2.1m$ or $d(1) > 2.1m$ or $d(1) > 3.2m$ axles = 4 and groups > 2		
			Five Axle Articulated Five axle articulated vehicle, or Rigid vehicle and trailer	8	$d(2) < 2.1m$ or $d(1) > 2.1m$ or $d(1) > 3.2m$ axles = 5 and groups > 2		
			Six Axle Articulated Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3		
Medium Combination 17.5m to 36.5m	> 6	4	B Double B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6		
			Double Road Train Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6		
Large Combination Over 33.0m	> 6	> 6	Triple Road Train Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6		

Definitions: Group: Axle group, where adjacent axles are less than 2.1m apart
 Groups: Number of axle groups
 Axles: Number of axles (maximum axle spacing of 10m)

$d(1)$: Distance between first and second axle
 $d(2)$: Distance between second and third axle

Figure 6 - Austroads vehicle classification

The Annual Average Daily Traffic (AADT) at the three stations are shown below with projected traffic volumes up to 2025 extrapolated from the existing data:

Table 1 - Traffic volumes along Stuart Highway (RDVDP003)

Location		2018	2019	2020*	2021*	2022*	2023*	2024*	2025*
RDVDP003 - Stuart Highway 500 m South of Adelaide River Bridge	Inbound	657	671	688	704	719	735	752	769
	Outbound	649	661	692	714	725	747	770	794
	Total	1306	1332	1380	1418	1443	1482	1522	1564

*Denotes forecasted years

The average heavy vehicle split at this location was determined to be approximately 17.0%

Table 2 - Traffic volumes along Stuart Highway (RDVD005)

Location		2018	2019	2020*	2021*	2022*	2023*	2024*	2025*
RDVDP005 - Stuart Highway 2 km North of Kakadu Highway	Inbound	605	631	640	650	660	669	679	690
	Outbound	586	610	617	623	630	637	644	651
	Total	1191	1241	1257	1273	1290	1306	1323	1340

*Denotes forecasted years

The average heavy vehicle split at this location was determined to be approximately 26.4%.

Table 3 - Traffic volumes along Fountain Head Road (RDVDC057)

Location		2017	2018	2019	2020*	2021*	2022*	2023*	2024*	2025*
RDVDC057- Fountain Head Road - 2 km East of Stuart Highway	Inbound	17		12	12	11	11	10	10	9
	Outbound	16		12	12	11	11	10	10	9
	Total	33		24	24	22	22	20	20	19

*Denotes forecasted years

The average heavy vehicle split at this location as determined to be approximately 21.9%

2.4 Crash history

An assessment of the crash history along Stuart Highway within 3 km to the north and south of Fountain Head Road has been undertaken to assess whether there are any particular safety concerns at the Fountain Head Road / Stuart Highway intersection. Over the last 5 years (2015-2019) of available data shows that 9 crashes have been recorded on this section of road.

There have been 6 crashes within 3 km north of Fountain Head Road, one in the vicinity of the intersection between Stuart Highway and Fountain Head Road, and two between the intersection and Dorat Road 3 km to the south. The crash that occurred in the vicinity of the Fountain Road intersection involved a vehicle that ran off the road heading north on the Stuart Highway.

The crash types and fatalities/injuries have been summarised below in Table 4.

Table 4 - Crash history (2015-2019)

Crash type	Number of crashes		
	Total	Casualties	Injured
Hit other Animal	2	0	2
Overtuned	3	0	3*
Ran off Road	3	0	6*
Side swipe	1	0	0*

** Denotes that one of the listed crashes reported no injuries.*

Based on the number and types of crashes, there does not appear to be any specific accident trends associated with this section of road.

3. Proposed construction methodology

3.1 Fountain Head Gold construction

Construction of the gold mine is expected to begin in 2022 and take approximately 10 months. It is proposed that all mobile plant required for civil works, future mining equipment, infrastructure and componentry will be transported to the site during the construction phase.

Workshops, offices, heap leach facility and the processing plant will be constructed during this phase of works.

It is proposed to utilise the mining fleet for some of the construction works to minimise the number of additional pieces of plant and equipment required to be hauled to the site. Any mining fleet proposed to be used as part of construction will be brought to the site prior to the start of mining.

All staff are expected to be housed and accommodated at the Kirkland Lake Cosmo Village, located along Fountain Head West Road.



Figure 7 – Map of site

4. Traffic assessment

4.1 Traffic generation

The traffic generation for the Fountain Head construction has been split into the movement of the fleet required for construction, the trips required to move materials and equipment, and the movement of construction staff.

4.1.1 Mobile fleet, equipment, and construction infrastructure traffic generation

The details as shown below have been provided by PNX Metals. The following assumptions are made based on the data provided:

- It is assumed that the construction will occur over a 10 month period.
- It is assumed that the construction mobile fleet, mining mobile fleet and construction infrastructure trips will be evenly spread across the 10 months, with trips occurring on a daily basis (7 days a week).
- It is assumed that the trips will occur in the AM or PM peak hours (of the road network).
- The largest size vehicle will be a 25-metre-long B-Double (refer to Class 10 and 11 within Figure 6 for side profile).
- The peak daily movements have been rounded up as a conservative assumption
- Mobile fleet, equipment, and construction infrastructure traffic will travel along Stuart Highway and turn onto Fountain Head Road.

Table 5 below show the mobile fleet, equipment and construction infrastructure traffic generated by the site.

Table 5 – Mobile fleet, equipment, and construction infrastructure traffic generation details

Duration	Entering		Total	Exiting		Total
	Light Vehicles	Heavy Vehicles		Light Vehicles	Heavy Vehicles	
Total over 10 months	18	205	223	18	205	223
Daily Peak Hour	1	1	2	1	1	2

4.1.2 Staff traffic generation

The staff traffic data as shown below have been provided by the PNX Metals. The following assumptions are made based on the data provided:

- Construction staff will make daily trips to the site.
- The construction staff will arrive in the AM Peak and depart in the PM Peak (peak traffic on surrounding road network).
- Construction staff will be transported to site via shuttle bus where possible (represented as a heavy vehicle). All other trips will be via light vehicles.
- Construction staff trips will occur over the whole 10 months of construction.
- Construction staff will travel between the Kirkland Lake Cosmo Village and the site only.

Table 6 - Staff traffic generation details

Duration	Entering		Total	Exiting		Total
	Light Vehicles	Heavy Vehicles		Light Vehicles	Heavy Vehicles	
AM Peak Hour	19	2	21			
PM Peak Hour				19	2	21

4.1.3 Trip generation summary

The total trips have been summarised in the table below:

Table 7 - Summary of traffic generation details

Time	Entering		Exiting		Total
	Number of light vehicle trips	Number of heavy vehicle trips	Number of light vehicle trips	Number of heavy vehicle trips	
Month 1					
AM Peak Hour	20	3			23
PM Peak Hour			20	3	23
Daily Total					46

Based on the above assessment, there will be an additional 46 trips generated on the road network each day.

The projected AADT along Fountain Head Road (east) in 2022 is 22 vehicles. The combined additional peak daily trips generated by the construction of the site of 46 movements will result in an increase of 209%, resulting in total movements of 68 movements per day along Fountain Head Road. Austroads publishes guidance on capacity of roads and traffic lanes, where interrupted flow conditions exist a traffic lane can carry about 900 vehicles per hour (21,600 vehicles per day). Even though there has been a 209% increase of traffic on Fountain Head Road, the total number of additional trips is considered quite low compared to the capacity. Based on the existing daily traffic volumes, Fountain Head Road will have sufficient capacity to cater for the increased traffic generated by proposal.

The projected AADT along Stuart Highway is 1443 vehicles in 2022. The combined additional trips generated by the construction of the site along Stuart Highway (2 trips) will result in an increase of traffic by 0.1%, resulting in a total movements of 1445 movements per day along Stuart Highway. Based on the existing traffic volumes and the small percentage increase (<5%) as a result of the development, Stuart Highway has sufficient capacity to cater for the increased traffic generated by the proposal.

4.2 Trip distribution**4.2.1 Mobile fleet, equipment and infrastructure delivery traffic distribution**

It is assumed that the fleet traffic and infrastructure delivery fleet traffic will be readily available from Darwin and Katherine and will arrive to the site 50% from the north and 50% from the south.

4.2.2 Staff traffic generation

It is assumed that all staff will be housed at the Kirkland Lake Cosmo Village and as a result their trips to and from site would be carried out between Fountain Head Road East and Fountain Head Road West across the Stuart Highway.

4.2.3 Overall traffic generation

The trip distribution at the intersection of the Stuart Highway / Fountain Head Road is provided in the following sections for each of the three months.

The figures below show the AM and PM Peak traffic distribution across the 10 months, with LV representing light vehicles and HV representing heavy vehicles.

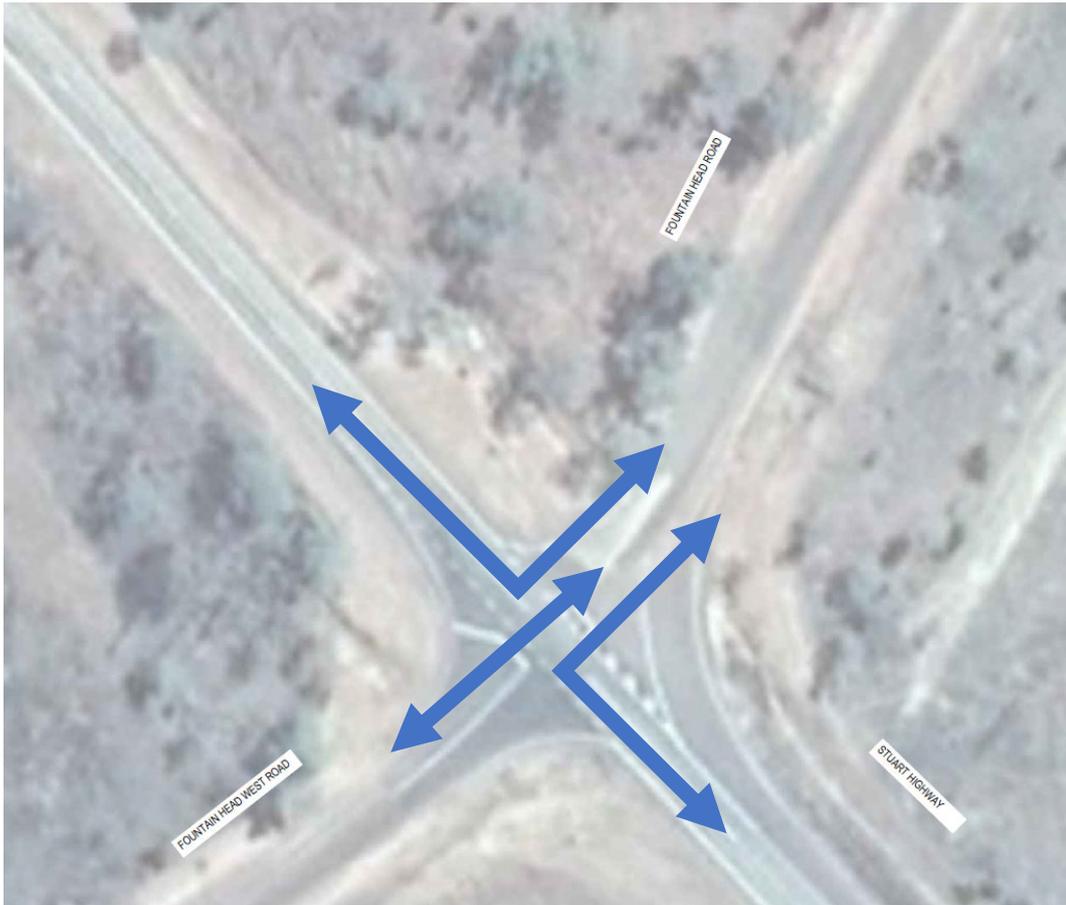


Figure 8 - Traffic movements at Stuart Highway / Fountain Head Road intersection

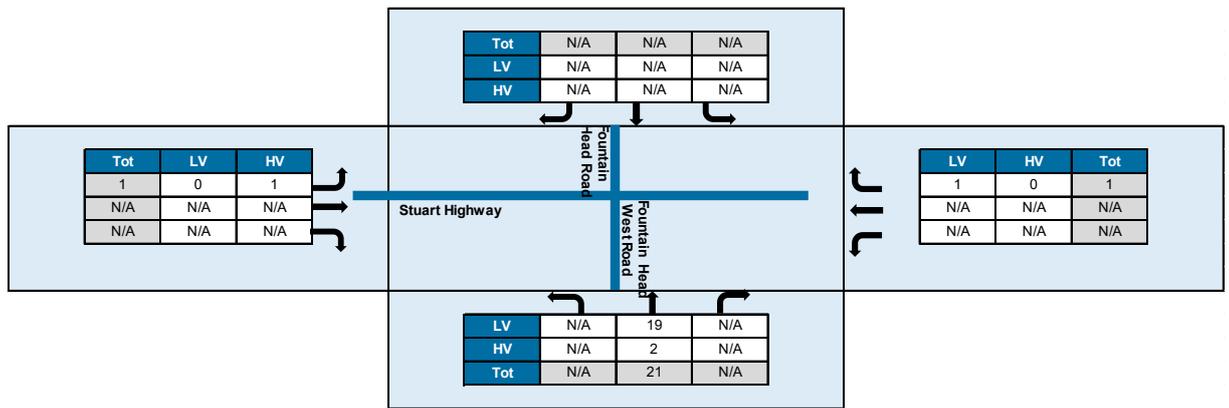


Figure 9 – Trip distribution - AM peak

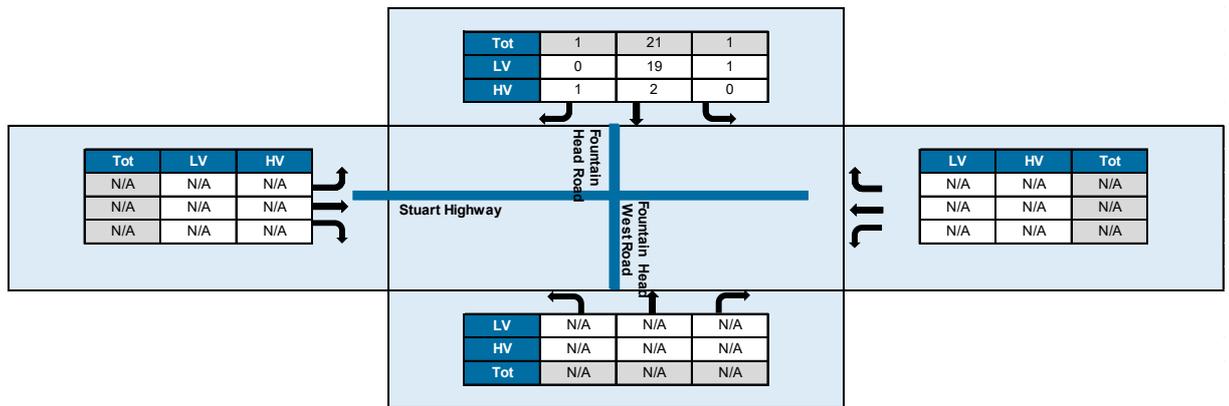


Figure 10 –Trip distribution - PM peak

4.3 Stuart Highway / Fountain Head Road intersection assessment

4.3.1 Sight line assessment

A desktop sightline assessment at the intersection of Fountain Head Road and Stuart Highway has been undertaken to determine whether there are sufficient sightlines for vehicles to safely turn out of Fountain Head Road onto the Stuart Highway. The assessment shows that there are clear sightlines to both the north and the south of Stuart Highway from Fountain Head Road, with vegetation cleared for approximately 9 metres from the side of the road.

4.3.2 Warrants for turn treatments

Due to an increase in turning traffic from the Stuart Highway into Fountain Head Road, an assessment as to whether an intersection upgrade is warranted to allow vehicles to safely turn into Fountain Head Road has been undertaken.

The following assumptions have been made:

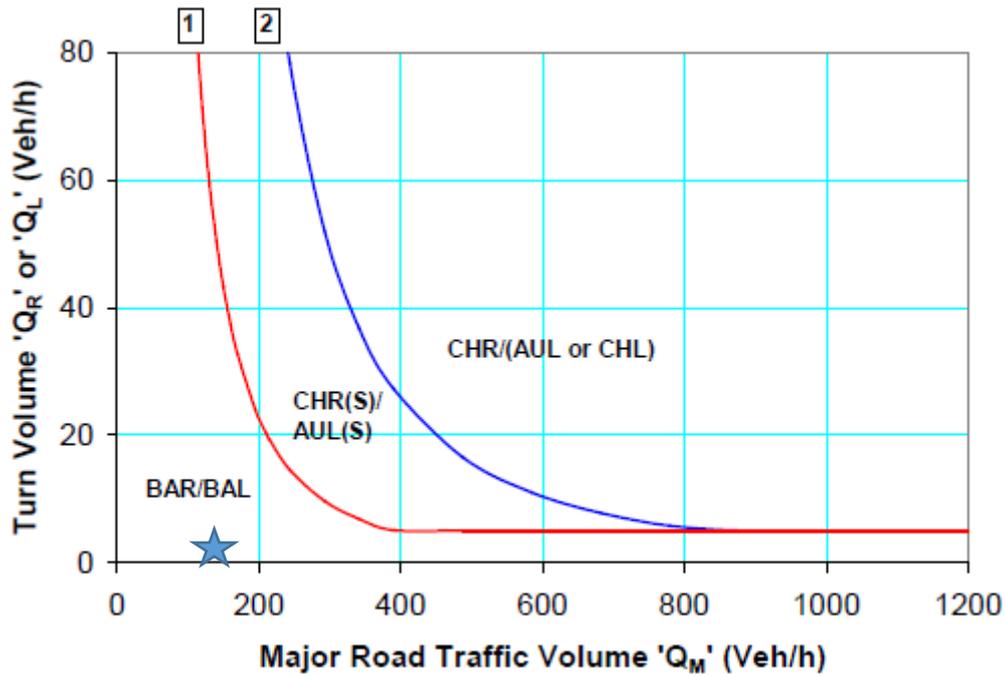
- The section of Stuart Highway around Fountain Head Road will have the same traffic volume as the survey site RDVDP003 (Stuart Highway, 500 m South of Adelaide River).
- Based on the reported traffic data, the average year on year growth in two-way AADT at the survey station is approximately 2.49%.
- The existing traffic directional split will be based on the existing traffic data (approximately 50% in each direction).

- Given the traffic volumes available are provided as AADT, the upper limit of 16% of the overall daily traffic for rural roads will be utilised as per Austroads Guide to Road Design Part 4 to calculate the peak hour traffic. Therefore, the major traffic volume for Stuart Highway is approximately 115 vehicles northbound and 115 vehicles southbound.
- The assessment conservatively assumes all traffic during construction will occur during the peak hour, however this is unlikely to be the case.
- There is no growth in traffic along Fountain Head Road, with the exception of traffic generated by the proposed development.
- The peak turn movements throughout the 10- month construction period will be used for the left turn and right turn movements.
- The left turn volume is therefore determined to be 1 vehicles and the right turn movements are determined to be 1 vehicle.

The assessment is shown below:

4.3.2.1 Left turn into Fountain Head Road

The assessment below is based on Figure A10(a) from Austroads Guide to Road Design Part 4 – Intersections and Crossings for the turn treatment warrants and has been undertaken for the left turn from Stuart Highway into Fountain Head Road.



(a) Design speed \geq 100 km/h

Figure 11 - Southbound (left in) assessment

The assessment is based on the existing major road traffic volume (Stuart Highway) and the proposed volume of traffic turning into Fountain Head Road, as indicated by the star in Figure 11. The assessment shows that a basic auxiliary left (BAL) treatment is considered sufficient in terms of the intersection capacity. The basic auxiliary left turn is depicted in the figure below:

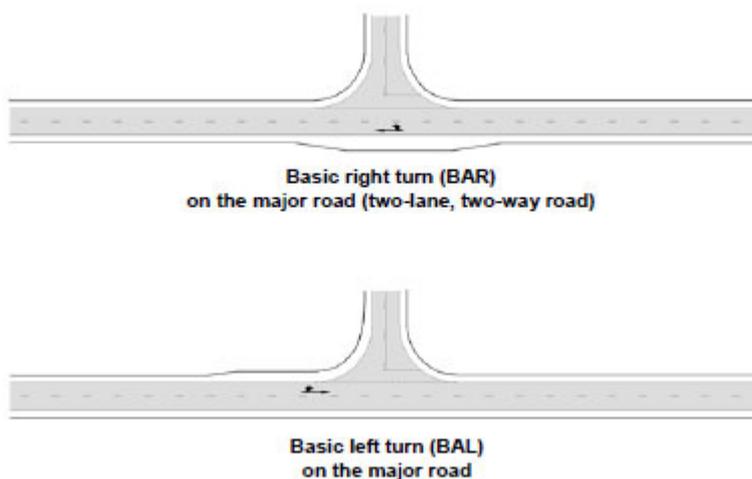
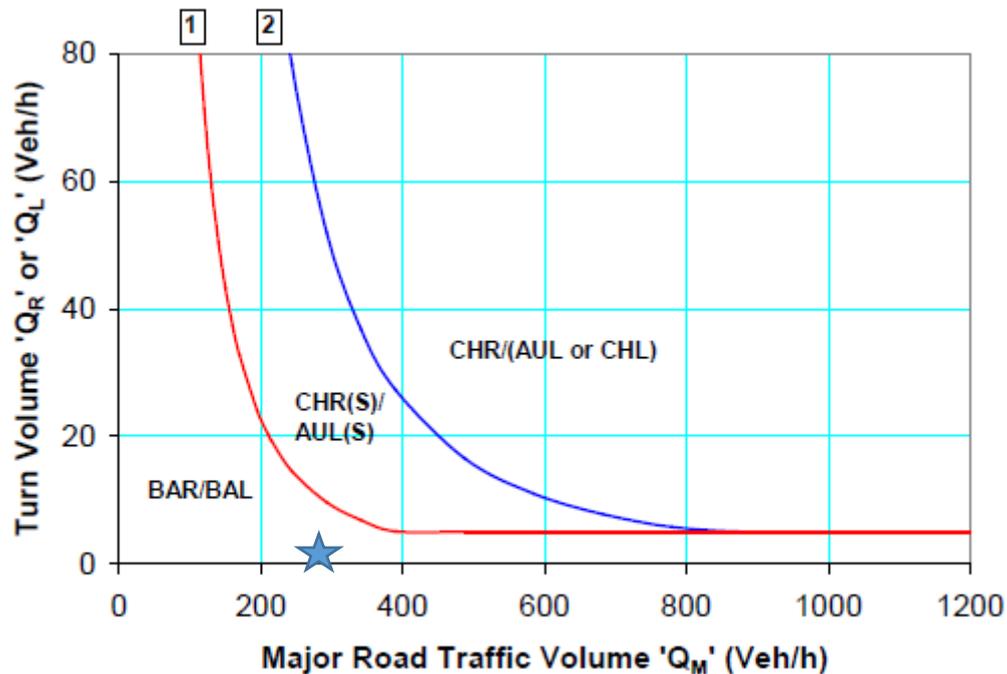


Figure 12 - BAR and BAL treatments (reproduced from Austroads)

The existing left turn treatment at the intersection is a basic auxiliary left turn, so therefore based on the assessment above, the existing turn treatment is considered acceptable.

4.3.2.2 Right turn into Fountain Head Road

The assessment below is based on Figure A10(a) from Austroads Guide to Road Design Part 4 – Intersections and Crossings for the turn treatment warrants and has been undertaken for the right turn from Stuart Highway into Fountain Head Road.



(a) Design speed ≥ 100 km/h

Figure 13 - Northbound (right in) assessment

The assessment is based on the existing major road traffic volume (Stuart Highway) and the proposed volume of traffic turning right into Fountain Head Road, as indicated by the star in Figure 13. The assessment shows that a basic auxiliary right (BAR) treatment is considered sufficient in terms of the intersection capacity. The BAR treatment is depicted in Figure 12.

The existing left turn treatment at the intersection is a basic auxiliary left right, so therefore based on the assessment above, the existing turn treatment is considered acceptable.

4.3.3 Swept path assessment

While the type of turn treatment is considered acceptable, an assessment of the geometric design of the intersection will be undertaken via swept path assessment to determine whether the largest size vehicle used within the project will be able to successfully and safely turn into and out of Fountain Head Road from Stuart Highway.

The largest size vehicle is expected to be a 25-metre-long B-Double, used during the deliveries phase of the operation of the site. The swept path assessment has been undertaken of the B-Double turning left into the Fountain Head Road from Stuart Highway without crossing the centreline.

The swept path assessment shows that some widening of the radii will be required to facilitate the B-Double movement at the intersection. Refer to Appendix A for the swept path assessment.

The Ban Ban Springs Station currently use B-Triple road trains to transport cattle to and from the site and undertaken this manoeuvre twice monthly. Based on the swept path assessment, this manoeuvre would require the full width of the pavement for a B-Triple to turn from Stuart Highway into Fountain Head Road.

4.4 Desktop pavement and route review

The majority of operational vehicle trips will involve the Stuart Highway, Fountain Head Road, Fountain Head West Road and Ban Ban Springs Road.

A desktop assessment of whether the operational routes are paved is provided below to determine whether the pavements are suitable for the operation of the project:

4.4.1 Stuart Highway

The Stuart Highway is paved with no formal shoulders, but clearings on either side. The line marking is visible along the road.

4.4.2 Fountain Head Road (east)

Fountain Head Road is paved with no formal shoulders. An assessment of the intersection with Stuart Highway shows that the pavement at the intersection is worn, with some cracking, worn line marking and a lot of debris.

4.4.3 Fountain Head West Road

Fountain Head West Road is paved with no formal shoulder and has line marking for the length of the road.

4.4.4 Ban Ban Springs Road

Ban Ban Springs Road is paved for the section which will provide access to and from the Fountain Head Gold mining site.

The number of heavy vehicles is considered to be low during the operational phase of the development. Permits may be required for any Oversize Overmass (OSOM) vehicles that are proposed to be used on DIPL roads.

4.5 Adelaide to Darwin rail level crossing

A review of the Adelaide to Darwin Rail Level Crossing along Ban Ban Springs Road has been undertaken below to determine if the level crossing condition is suitable for Project use.

4.5.1 Crash history

The Ban Ban Springs Level Crossings was the site of a Ghan passenger train and road-train truck collision on the 12th of December, 2006. Based on the ATSB Transport Safety Investigation Report the road-truck train carrying road base material failed to stop and check for oncoming trains and the collision caused the derailment of two locomotives, one motorail wagon and nine passenger wagons. The train had been traveling northbound and collided with the vehicle. There were two hospitalisations, and several others were treated for minor injuries on site. The driver of the road-train was found to have slowed whilst crossing, instead of coming to a complete stop and checking for oncoming trains.

4.5.2 Assessment to upgrade the rail crossing

The ATSB Level Crossing Collision report in December 2006 specified that the existing traffic management arrangement at the Adelaide to Darwin Level Crossing at Ban Ban Springs Road consists of the road traffic control measure of 'stop and give way to trains' signs. A desktop assessment of the level crossing from existing aerial photography suggests that the arrangement is currently in place.

In addition to the signage, there is a gate located 100 metres to the north of the rail crossing along Ban Ban Springs Road, associated with the cattle farm. This gate is typically closed until access is required along the road and acts as an informal traffic control measure at the level crossing. It is likely that the gate will remain open during the construction of the site.

GHD has contacted Australasian Rail Corporation in regard to their requirements in determining the standard for the rail/road level crossing. They have confirmed that an assessment of the crossing will be required for the increase in road traffic in accordance with ALCAM (Australian Level Crossing Assessment Model) once the train and road traffic numbers are confirmed.

It is understood that there are currently 12 return train services weekly made up of (4) bulk mining products trains, (6) intermodal freight and (2) passenger services.

The construction traffic will generate up to 46 movements per day over a 10-month period, including 3 heavy vehicle movements.

Given the short-term nature of the construction works, if the ALCAM assessment deems that no upgrade will be required to the level crossing, it will be recommended that traffic management be in place for all vehicles driving across the level crossing.

5. Traffic management

The following section outlines a number of traffic management items which will need to be considered during the construction of the site.

5.1 Legislative requirements

There are a number of legislative requirements that will need to be considered during the construction of the site.

5.1.1 Control of Roads Act 1953

The Control of Roads Act provides that, subject to the Planning Act and the Local Government Act, the control, care and management of all public roads in the Northern Territory vests with the Minister. This Act outlines the process by which public roads can be opened and closed. Any public or gazetted roads that are required to be opened or closed because of construction or operation in the Project Area would be required to follow the provisions of the Act.

5.1.2 Traffic Act 1987

The objective of this Act is to regulate traffic, which includes provisions in relation to the erection and operation of traffic control devices. Traffic control devices refer to signals, signs or markings displayed for the purpose of regulating, warning or guiding traffic. Under the Act, consent from the applicable competent authority (DIPL) is required prior to the erection and operation of traffic control devices.

5.1.3 Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010

The object of this Act and associated Regulations is to regulate the transport of dangerous goods on land in order to promote public safety and protect property and the environment, achieved within a nationally consistent context.

The provisions of this Regulation reflect, with minor modifications, the provisions of the Model Subordinate Law on the *Transport of Dangerous Goods by Road or Rail 2010* prepared by the National Transport Commission. The Regulation establishes a system of standards and licensing for the transport of dangerous goods by road and rail and applies the Australian Code for the Transport of Dangerous Goods by Road and Rail to such transport.

This Act makes provision for safety in the transport of dangerous goods by road and rail. Involvement in the transport of dangerous goods by road or rail includes, but is not limited to, being the consignee of dangerous goods, loading or unloading dangerous goods that have been transported or the importation or arrangement to import dangerous goods.

5.1.4 Work Health and Safety (National Uniform Legislation) Act 2011

The Northern Territory Work Health and Safety (National Uniform Legislation) Act 2011 commenced on 1 March 2012, and represents a movement by state and territory governments towards harmonising work health and safety legislation across Australia. Under the Act, approved codes of practice provide practical guidance to meeting legislative obligations.

5.1.5 Code of Practice

The *Northern Territory Code of Practice in Fatigue Management* is a voluntary code of practice for fatigue management for road transport with the objective to provide operators with a basic set of key principles to be applied.

Fatigue is a common problem in both short and long-distance truck driving. The 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.

Managing driver fatigue

PNX and/or its contractors will be required to have a driver fatigue management procedure developed for its drivers. This procedure shall be developed in accordance with Northern Territory Road Transport Fatigue Management Code of Practice. Drivers on long haul consignments will be encouraged to plan their trips to make use of safe stopping locations for resting.

5.1.6 Permits

If any construction works are required within the Northern Territory Government road reserves an application must be submitted to the Department of Infrastructure, Planning and Logistics (DIPL). This will apply to any required upgrades of intersections on the Stuart Highway, Fountain Head Road. The application must be accompanied by a Traffic Management Plan and associated documents for approval.

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 that a vehicle can use, depending on its size and mass.

PNX or its contractors will need to apply for a permit to use over-dimensional or over-mass vehicles prior to using them in either the construction or operational phases of the Project area.

5.2 Community and stakeholder communications

It will be important to liaise with community and regulatory stakeholders regarding any proposed changes that mining operations may have on the public road network and property access. This would also apply to any accident on or adjacent to any public roads that may affect their operation and use.

5.3 Occupational health and safety

All activities involving access to and from the mine site will be managed under PNX's Occupational Health and Safety (OH&S) Management System.

5.4 Traffic control

Traffic control may be required for various activities including the installation of any signs, barriers, ensure vehicles can safely cross the level crossing, or to provide over-dimensional vehicle access to site. A qualified traffic control company will need to be engaged to provide such traffic control services. This will be required in order to ensure a safe work site on public roads.

5.5 Monitoring, auditing, reporting and review

The TMP is a strategic active document that will be updated or modified during the life of the project. Updates are likely to be undertaken following:

- Throughout the Project authorisation phases.

- Scheduled management plan reviews will be undertaken annually as part of the internal annual reporting requirements, internal auditing plan and Mine authorisation (Mining Management Plan) documentation.
- Changes to on-site operational activities.
- Changes to roads, tracks and road furniture.

5.6 Incident reporting

All traffic management incidents both on-site and externally, associated with the Project activities, will be recorded. Notifiable incidents will be reported to the Regulators and non-reportable incidents will managed through internal processes.

Under the Work Health and Safety (National Uniform Legislation) Act 2011 it is a requirement to notify NT Work Safe if certain incidents occur in the workplace. Notifiable incidents that are reportable under the WHS Act are:

- The death of a person – whether an employee, contractor or member of public
- A serious injury or illness
- A dangerous incident in the workplace

The operator is required to notify NT WorkSafe immediately after becoming aware of a notifiable incident in their workplace.

5.7 Potential low carbon emission transport

This section outlines some potential options to reduce the transport carbon footprint:

- Reduce the number of trips through recommending carpooling of staff or use of shuttle buses
- Reduce number of trips through thorough planning of delivery of materials and machinery to site
- Sourcing consumables and equipment locally if possible, to reduce trip lengths
- Use of more fuel-efficient vehicles

6. Conclusion and recommendations

A recommencement of mining operations has been proposed at the Fountain Head mine. The following are the findings regarding the introduction of traffic related activity during the various stages of its construction and operation:

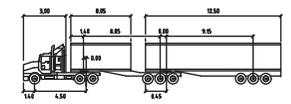
- The proposed increase in peak daily traffic generated (46 trips) during the construction of the site will result in a traffic increase of 209% along Fountain Head Road and 0.1% along Stuart Highway. Both roads have sufficient capacity to cater for the increase in traffic generation.
- An assessment of the warrants for turn treatments at the intersection of Stuart Highway and Fountain Head Road shows that the current basic turn treatments for both the left and right turn are considered appropriate.
- A swept path analysis shows that the intersection will need to be widened to facilitate the movement of the B-Double turning left from Stuart Highway into Fountain Head Road without crossing the centre line.
- A desktop pavement assessment shows that the pavement along the construction routes is sealed.

The following recommendations are outlined based on the assessment:

- A desktop assessment of the level crossing along Ban Ban Springs Road shows that it is controlled by stop signage. It is likely that a formal ALCAM assessment will need to be undertaken to review the increased risks associated with the increase in traffic.
- Permits are required for oversize/overmass vehicles on DIPL roads and should be obtained for any OSOM vehicles prior to transport movement if required.
- Adoption of and adherence to legislative requirements
- Preparation of a traffic management plan which provides guidance on mine access arrangements and establishes protocols for safe access and mitigations.
- Consultation with local community and interest groups. This is especially important when there are any planned changes to typical mine operations or public road access or in the event of any incidents affecting the public road network.
- Consult with DIPL and Council regarding additional signage to help make drivers aware of the presence of the mine and that vehicles and pedestrians may be entering/exiting the mine site.
- Consult with the National Heavy Vehicle Regulator (NHVR) as necessary for required trucks/routes to ensure safe and efficient truck movements.
- A site access procedure for employees be developed to outline and encourage safe and appropriate travel to and from Kirkland Lake Cosmo Village to the site.
- Liaison with DIPL and local road authorities to ensure access to roads such as the Fountain Head Road are to be suitable for the purpose of haulage of equipment and materials for construction.
- Encourage low carbon emission transport options.

Appendices

Appendix A – Swept path assessment



B-DOUBLE 20M

	metres	metres	metres
Traactor Width	2.30	Lock to Lock Time	4.6
Trailer Width	2.30	Steering Angle	23.6
Tractor Track	2.30	Articulating Angle	7.8
Trailer Track	2.30		

PRELIMINARY

rev	description	app'd	date
A	INITIAL ISSUE	FLK	27.05.20

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 Swept Path Assessment



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scale | 1:500 | for A3 | job no. | 12531420
 date | MAY 2020 | rev no. | A

approved (PD) | FLK | SK001

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12549079-1099-4/C:\Users\fkhung\Desktop\Projects\12531420 - Fountain Head
Gold\Update\12531420-REP_Traffic_Management_Plan.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	F. Khung	M. Byrne		N. Fries		26/06/2020
1	F. Khung	M. Byrne		N. Fries		14/04/21

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