

CHAPTER 12 – Road transport and traffic management

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12.1 Introduction

The potential impacts and proposed routes of increased road and air traffic are discussed in this chapter, including details of proposed road construction and /or upgrades to existing infrastructure.

The site is located approximately 625 km north-west of Alice Springs and 267 km south-east of Halls Creek. It is accessed via the Tanami Road from Alice Springs or Halls Creek.

Principle access to site for supplies will be by road, from the Tanami Road south via an existing exploration road established by previous explorers. The development of the Twin Bonanza project will involve upgrading existing road access across leases outside the proposed Mineral Lease. After discussion with the Central Land Council (CLC), leases pursuant to Section 19 of the Aboriginal Land Rights Act 1976 (ALR Act) have been granted from the relevant Land Trust for roads which will be outside the Mineral Lease area. ABM's Airstrip, located on a granted Section 19 area, allows personnel movements to and from the site.

No upgrade of the access point to the Tanami Road is presently planned; however if this is deemed necessary ABM will seek the relevant legislative approvals.

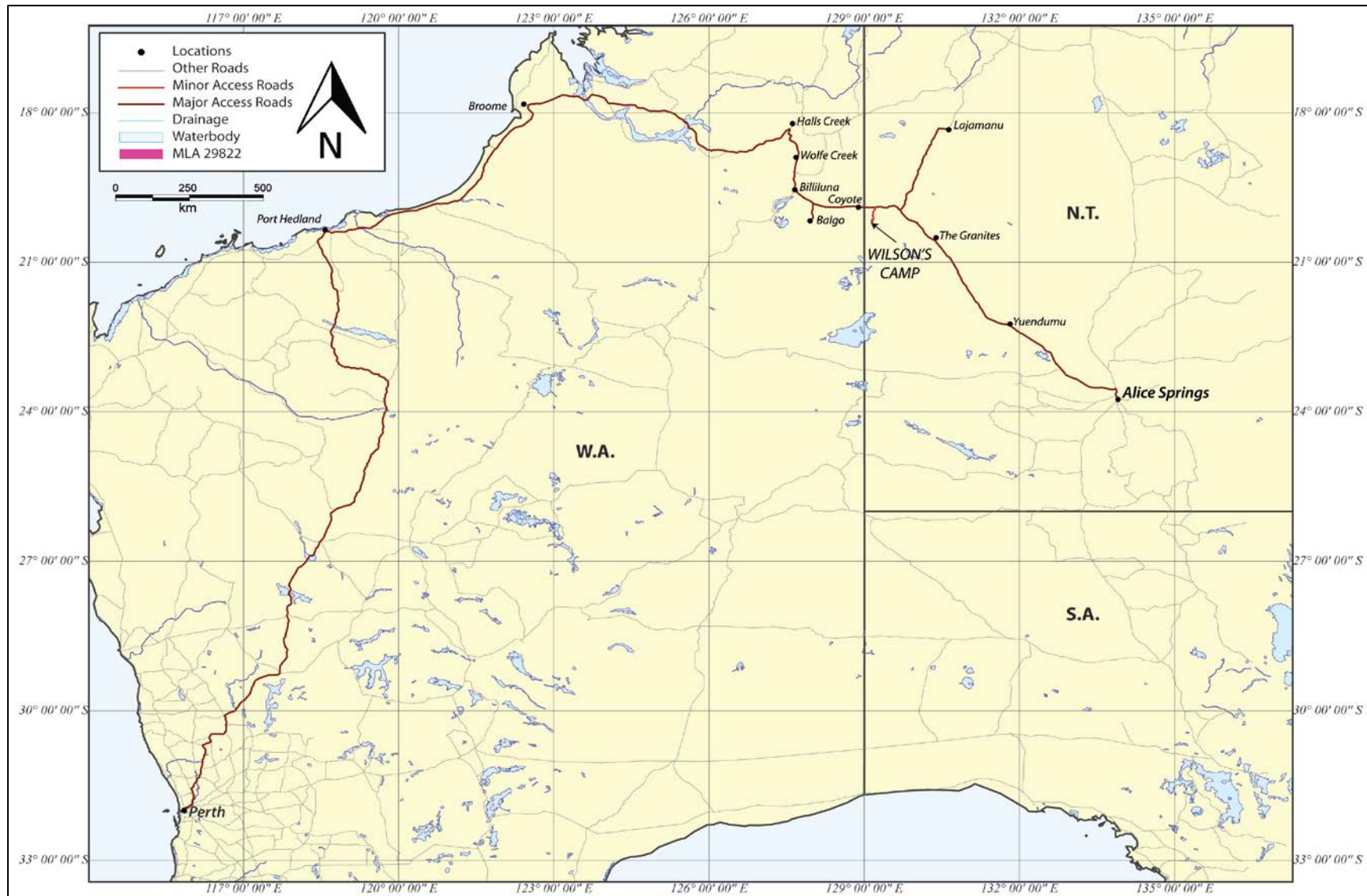


Figure 12-1. Twin Bonanza mine – Road transport routes.

12.2 Existing road infrastructure

The proponent will utilise existing road infrastructure for the majority of its trucking requirements from two supply areas, Alice Springs (primary) and Perth, Western Australia. Both trucking routes will utilise the existing Tanami Road.

12.2.1 Tanami Road

The principle public infrastructure to be used in the project is the Tanami Road. The Tanami Road is (for the most part) a wide unsealed road linking Alice Springs to Halls Creek. The support and logistics requires the use of the public road on regular occasions which will increase the wear on the road. Estimated trips are:

Table 12-1. Estimated use of public roads (TB refers to Twin Bonanza).

Vehicle type	Journey	Trips per week (including return = 2)	Purpose
Light vehicle	TB to Halls Creek	2	Personnel and supplies
Light vehicle	TB to Alice Springs	2	Personnel and supplies
Light vehicle	TB to Balgo	2	Indigenous employees / personnel
Light vehicle	TB to Granites	4	Personnel (if using Granites flights)
Heavy vehicle	TB to Alice Springs	2	Fuel
Heavy vehicle	TB to Alice Springs	2	Supplies, logistics and equipment
Heavy vehicle	TB to Perth	0.5	Assay samples, supplies, logistics and equipment

The governments of the Northern Territory and Western Australia maintain the road. From time to time the road closes due to flooding or wash-outs. ABM observes all road closures and reports any road problems to the relevant authorities. ABM would ideally like to see more sections of the road sealed to reduce the number of closures and will hold discussions with the relevant authorities for this.

A 2010 Senate Rural and Regional Affairs and Transport Legislation Committee (Cumplings Economics (tabled by Senator Alan Eggleston, 2010)) studied road usage on the Tanami Road including the impact of upgrading the Tanami Road. The work included detailed estimates of the number of vehicles using the road on a daily basis. Table 12-2, below, estimates the increase in the overall usage compared to the statistics presented in Senator Eggleston's tabled report.

Table 12-2. Estimates the increase in the overall usage compared to the statistics presented in Senator Eggleston's tabled report (Cummings Economics (tabled by Senator Alan Eggleston, 2010)).

LIGHT VEHICLES	2010 Estimation (daily)	2010 Estimation weekly	Increase with Twin Bonanza gold project weekly	% increase
Turn off to Wolfe Creek	35	245	2	0.8%
Wolfe Creek to Billiluna	29	203	2	1.0%
Billiluna to Balgo turnoff	23	161	2	1.2%
Balgo turnoff to Coyote	17	119	4	3.4%
Coyote to Lajamanu turn-off	15	105	4	3.8%
Lajamanu turn-off to Granites	20	140	6	4.3%
Granites to Yuendumu	27	189	2	1.1%
Average	23.7	166.0	3.1	1.9%
HEAVY VEHICLES	2010 Estimation (daily)	2010 Estimation weekly	Increase with Twin Bonanza gold project weekly	% increase
Turn off to Wolfe Creek	7.1	49.7	0	0.0%
Wolfe Creek to Billiluna	6.1	42.7	0	0.0%
Billiluna to Balgo turnoff	5.1	35.7	0	0.0%
Balgo turnoff to Coyote	2.1	14.7	0	0.0%
Coyote to Lajamanu turn-off	1.1	7.7	4	51.9%
Lajamanu turn-off to Granites	2.1	14.7	4	27.2%
Granites to Yuendumu	10.1	70.7	4	5.7%
Average	4.8	33.7	1.7	5.1%

The Tanami Road is the most direct route from Alice Springs to the Kimberley, passing through the Tanami Desert; along its route are Yuendumu, Tilmouth Well Roadhouse and the Granites Mine, owned by Newmont Mining. In the Northern Territory it passes through land owned by the Aboriginal Warlpiri people, and across the Western Australian border it passes through vacant crown land and pastoral land.

About 20% of the road is bitumen, the remainder is dirt and gravel and can be corrugated in places. The road is under the Central Desert Shire jurisdiction within the Northern Territory and the Shire of Halls Creek within Western Australia.

The Tanami Road is already subject to use for mining haulage, supplying consumables and materials to the Granites, Tanami Central and Tanami Coyote mine sites operated by Newmont and Tanami Gold respectively. The maximum speed limit is 110 kmph.

12.2.2 Existing access road to site

Most freight related transport will enter the mine site via the Tanami Road. The existing intersection with the Tanami Road may need to be modified, if this is necessary approval will be sought from the Department of Transport with road design adhering to the Austroads – Road design and Guidelines (AGRD - applicable to Rural road design; AGRD02-06, AGRD03-1, AGRD04-09, AGRD04A-10, AGRD06-10, and others as necessary). The main access route may need to be adjusted to take people around the outside of the mine site rather than passing through due to occupational health and safety requirements. Before entering the mine site people will be directed to the site office. Heavy and light vehicle haul roads will be demarcated with appropriate signage. The proposed and existing roads are illustrated in Figure 12-2.

The main access route is not sealed, but is periodically graded and has drainage facilities, road signs and safety windrows (See 5.2.3 internal road networks for specifications).

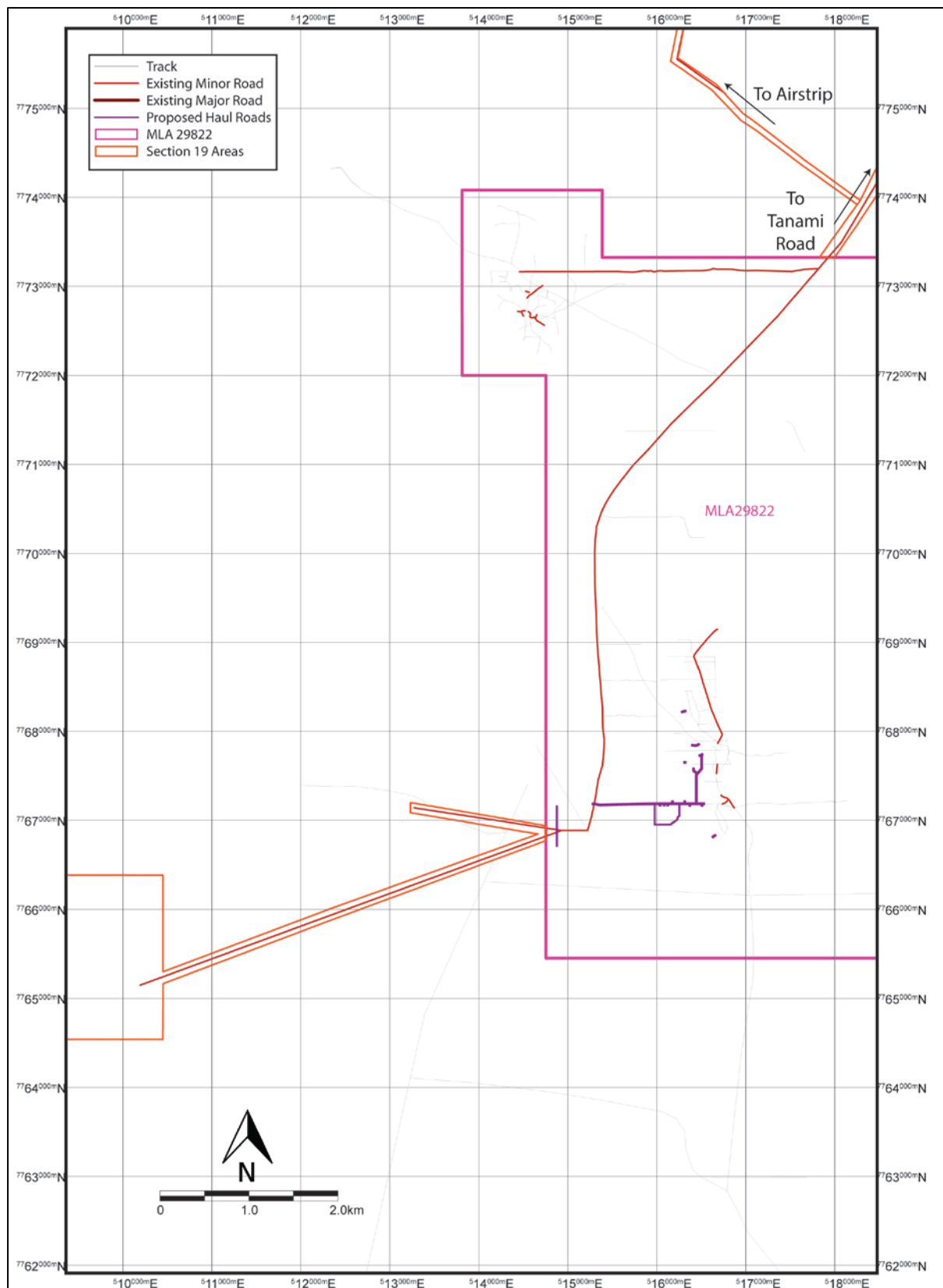


Figure 12-2. Existing and proposed roads

12.2.3 Internal road networks

ABM, at its own cost, will maintain all internal roads used by it for the purpose of the project including roads it constructs during operation. At closure, internal roads, if requested by the Traditional Owners, could potentially be transferred to the Traditional Owners. This would only occur once final agreement has been reached by all relevant parties.

12.3 Airstrip

The majority of the employees are Fly-In/Fly-Out (FIFO) 2:1 rostered on a 3 shift rotation; therefore staff and contractors will commute to site by air landing at the Bonanza Airstrip located to the NNE of the Mineral Lease. On occasions staff might be required to drive, primarily from Alice Springs, which requires the use of the Tanami road.

The Wilson Camp Aerodrome is a regenerated older Aeroplane Landing Area ALA from the 1980s. It has recently been regraded and re-established. The airstrip was recommissioned by ABM after an assessment by Aerodrome Management Services Pty Ltd (AMS) in 2012. The airstrip meets design guidelines provided by CASA as an Aeroplane Landing Area (ALA) and is constructed of compacted good quality lateritic gravel.

AMS found the ALA to be safe and serviceable and ready for use by aircraft with 9 passenger seats or less. Recommendations put forward by AMS have been adopted and are part of the management measures. Details of these management and reporting requirements are outlined below:

- Care should be taken with the surface on the taxiway and apron. It is fragile and may become soft quickly. It is recommended that vehicles not drive on it unless absolutely necessary. The hard tyres used by the 4 wheel drives are very aggressive to the surface where aircraft tyres tend to roll over the surface.
- An inspection of the airstrip should be made before the aircraft leaves its previous airport, e.g. Broome. Findings of the inspection should then be communicated to the airline. This is called positive reporting.
- Testing for a wet / soft surface is completed by driving on the airstrip with a four wheel drive vehicle. If the passing of a typical four wheel drive vehicle leaves tyre imprints of greater than 25mm depth, the airstrip is deemed wet / soft, and the airstrip is closed.
- AMS also recommends a one day training course for the reporting officers. This is not required under regulation; however it is advisable.

CASA was advised within 30 days of receipt of the report on plans to carry out the remedial works. In addition, ABM replied to CASA with regards to the work recommendations.

The facilities located at the airstrip comprise a lean-to with a toilet and leach drain. At present the fuel is stored in designated fuel storage area at the existing camp.

The airport is licensed under a 'private' rating, and users must submit a request to operate the airport 24 hours before the intended landing. Approved aviation fuel storage facilities at the project comprise solely AvGas for piston-engine planes, stored appropriately in 205L steel drums on bunded pallets; storage is aligned with AS1940-2004 Australian Standards (The storage and handling of flammable and combustible liquids) and CASA regulations.

The commercial airports currently used by ABM for FIFO employees are the Perth and Broome airports; generally, staff fly from Perth to Broome, via commercial airlines, then board a private charter to the Twin Bonanza Airstrip. Approximately, one flight a week is made to ABM's airstrip from Broome Airport. Historically, personnel have also commuted to site via the Granites Mine on the Granite's Mine charter flight and have driven to site via the Tanami Road.

12.3.1 Airstrip upgrade

It is likely that the airstrip will require upgrading (i.e. clearing of an additional 6 hectares within the green box) for the Twin Bonanza project, to have a capacity to fly in aircraft with greater than 9 seats. Under CASA regulations the aerodrome will be categorised as an ALA – Certain Other. It is a further CASA requirement that when an airport is used by aircraft greater than 9 seats it must meet aerodrome standards as provided in the CASA documentation "Manual of Standards (MOS) 139". It is expected that the upgrade will consist of lengthening the airstrip, widening both the runway and strip width to allow larger planes to land with a standalone fuel storage area. Additionally, trained Aerodrome Reporting Officers (AROs) and Annual Safety Inspections (ASI) would be required. Figure 12-3 details the proposed airstrip upgrades. When an upgrade is required, ABM will seek all relevant approvals from CASA and regulatory authorities.

A lease has been granted from the relevant Land Trust pursuant to Section 19 of ALR Act, to ensure long term access to the airstrip.

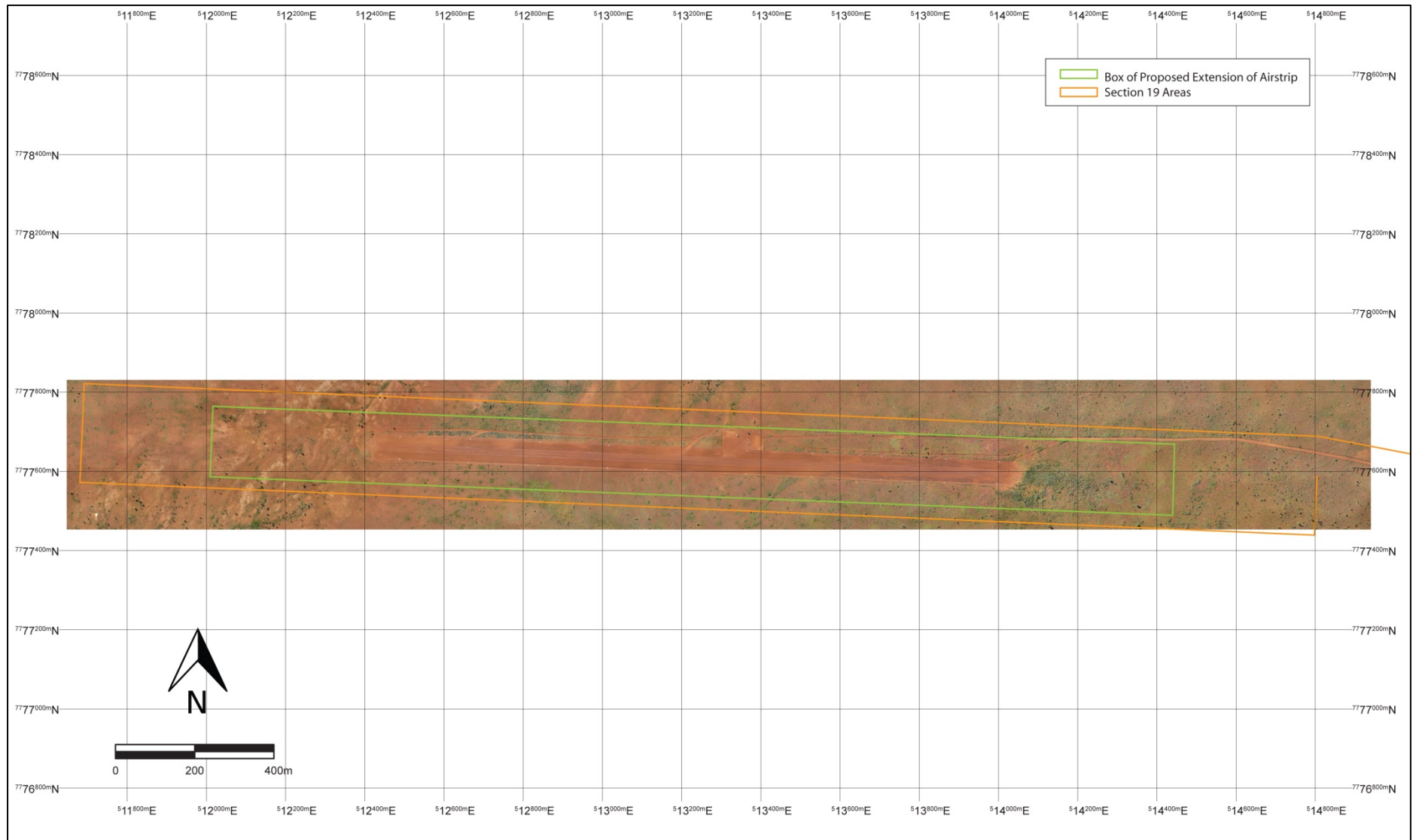


Figure 12-3. Proposed extension of airstrip – Twin Bonanza project

The current facilities, including a lean-to with the toilet and required leach drain, may also be upgraded to accommodate larger planes.

12.4 Proposal for other access facilities

There are no plans for additional access to site.

12.5 Proposal for new road infrastructure

12.5.1 Construction of roads

From the diagram shown as Figure 12-2, the haul roads are the only new additions that are proposed. The proposed haul roads will comply with current specifications as outlined in section 12.6.3.

The haul roads will be designed to allow the safe passage of the largest trucks on site, either as dedicated two-way roads, or single lane roads with sufficient passing space to accommodate expected traffic scenarios (Figure 12-4). Haul ramps will be designated either single lane or dual lane and will encompass an allowance for drains and safety bunds; for a dual access ramp utilising Komatsu 785 trucks or equivalent, a minimum road width of approximately 21m would be required and for single lane ramps utilising Komatsu 785 trucks or equivalent, a minimum road width of approximately 13m would be required. For all other roads, including the access road and internal roads, widths will not exceed 10m and where practical will be less than that.

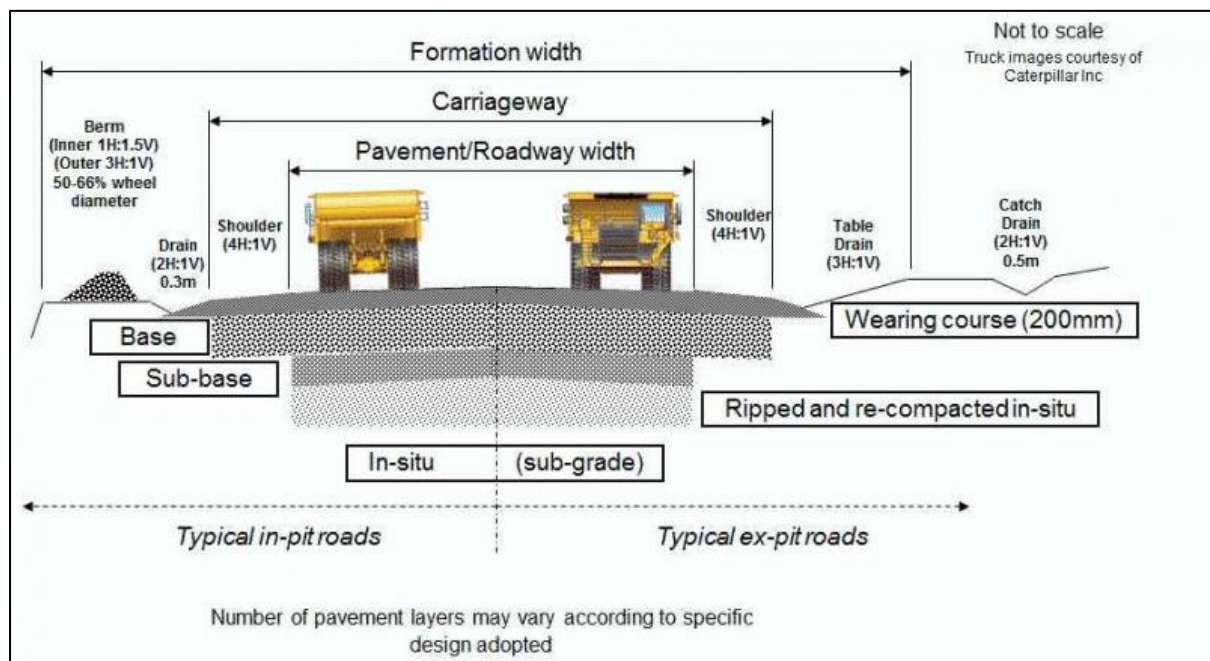


Figure 12-4. Schematic of dual haul road design.

12.5.2 Plant and machinery

The plant and machinery required for the proposed new road infrastructure is one Caterpillar 14H Grader which will conduct the majority of the required vegetation clearing, formation and maintenance of the road network, formation of drainage furrows and swales. In addition a truck and excavator will be required to source material for the construction of the road base.

12.5.3 Vegetation clearing methods

Vegetation is cleared initially and stored separately from the topsoil, to be used for rehabilitation at a later date. The clearing methodology is specified in ABM's Ground Disturbance Management Plan (GDMP- Appendix X) and outlined below:

1. Confirm the extent of clearing area has all required approvals:
 - a. clearing will not be undertaken if approvals are not granted.
2. Confirm clearing area and stockpile areas are delineated based on clearly marked out scale maps and/or set of co-ordinates consistent with approvals.
3. Land to be cleared is demarcated by cones/flagging/pegs.
4. Clearing to be supervised.
5. Check for the presence of bilby or mulgara:
 - a. if present avoid habitat if possible
 - b. If unable to avoid the area, ensure individuals are appropriately managed- see Biodiversity Management Plan -Appendix D.
6. Check for the presence of Desert Walnut Trees:
 - a. avoid if practicable
 - b. if unable to avoid provide details of the number of plants removed to the environmental manager for notification.
7. Check for the presence of Bloodwood Trees:
 - a. avoid if practicable
 - b. If unable to avoid provide details of the number of plants removed to the environmental manager for notification.
8. Check for the presence of mature trees >2m:
 - a. avoid if practicable
 - b. if unable to avoid provide details of the number of plants removed to the environmental manager for notification.

9. Clearing is progressive to avoid the potential for soil erosion and dust generation.
10. Stockpiling of cleared vegetation is to be within defined areas.
11. Stockpiling of salvaged topsoil (topsoil removal to a depth of 10cm) will be within defined areas.
12. Topsoil stockpiles do not exceed 2 metres in height.
13. Once clearing is completed a survey/GPS pickup is to be completed and the shape and coordinates provided to the environmental manager.

Vegetation and topsoil (top 10cm of soil profile) will be cleared and stockpiled separately to prevent composting in the interim before rehabilitation.

12.5.4 Construction crew accommodation

The construction crews will utilise existing accommodation.

12.5.5 Surface water and sources of water

Water for road construction and dust suppression will be extracted from the existing and proposed bores detailed in accordance to the Water Management Plan (see Chapter 7).

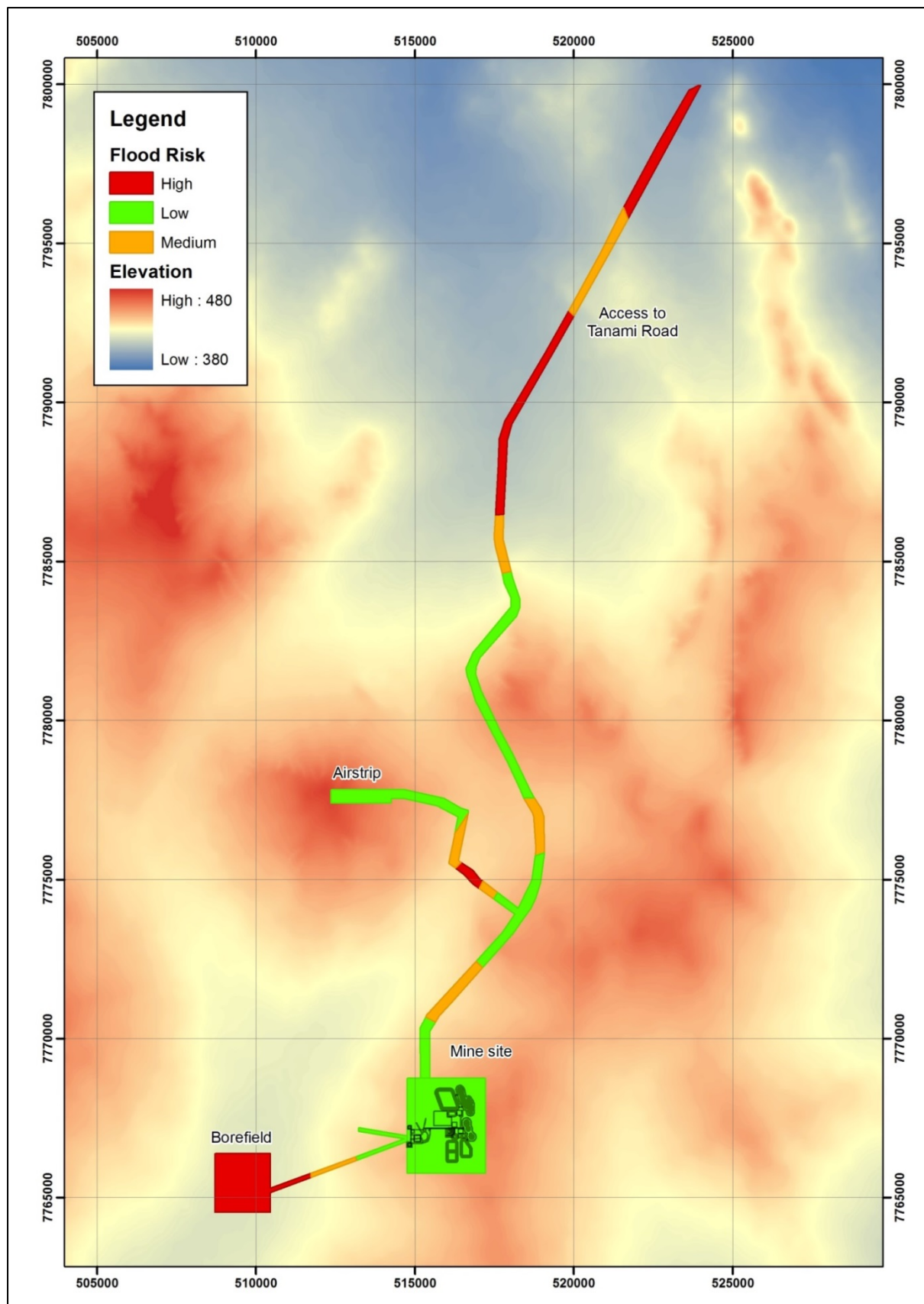


Figure 12-5. Assessed flood risk on main access track to Tanami Road (Soil Water Group, 2013).

12.5.6 Construction materials and provisions for transport infrastructure maintenance

ABM intends to locally source material for road formation from the mine waste rock, extracted from the pits. If deemed necessary, at a later date, and if waste rock volumes are not sufficient, ABM may source material from existing borrow pits presented in (Figure 3-2 Site infrastructure).

12.5.7 Methods including creek crossing techniques where relevant.

There are no defined creek crossings or incised creeks along the main Wilsons access track from the Tanami Highway. Flood modelling by Soil Water Group (2013) identifies two stretches of the track that are considered to be at a high risk of flooding during high rainfall events. These low parts of the topography are characterised by palaeochannels (Figure 12-5). In the event of a high rainfall palaeochannels typically sheet flood, covering large expanses of land in water, which rises quickly and evenly across the landscape but drains slowly (Figure 12-6. and Figure 12-7). Water velocities during these periods remain low. No purpose designed causeways or any other elevated road infrastructure are to be built across the palaeochannels as in such events the culverts and other infrastructure are likely to get inundated, create barriers to water flow and have the potential to liberate sediment. Therefore ABM proposes to use low crossings and minimise windrows across paleochannel areas. The roads will be well maintained and compacted to prevent erosion during and after inundation.

To reduce erosion, prevent destruction of the road surface and stranding of vehicles, vehicles will be restricted from using these stretches of track (Figure 12-5) during high rainfall events.



Figure 12-6. Photos of Palaeochannels in flood after February 2006 rains, just south of Rabbit Flat (EcOz, 2013).



Figure 12-7. Photos of inundated roads after the February 2006 rains, just south of Rabbit Flat (EcOz, 2013).

12.5.8 Timeframe for transport infrastructure construction

The timeframes for transport infrastructure construction and/or upgrades (as applicable) are outlined below:

- 2014 - construction
- Last half of 2014 – ramp up of operations
- 2015 onwards – peak project operations

It must be noted that these years represent indicative periods of traffic generation.

12.5.9 Dust and noise

The implemented measures to control dust and noise from operations are detailed in Appendix K: Air Quality Management Plan and Appendix Y - Noise Management Plan. Traffic generated noise is not anticipated to be a significant issue due to the absence of nearby residential receptors.

In relation to road safety and dust emissions during the trucking of ore and waste onsite from the pit to the ROM, water trucks will water the haul roads to ensure that dust creation is limited. ABM will not be transporting concentrate from site and there will be no requirement for dust suppression on large haulage vehicles outside of ABM's tenure.

Dust emissions for the project are further discussed in Chapter 8: Air quality and greenhouse gas emissions.

All equipment (both fixed and mobile) will comply with AS/NZS 1269.3:2005 - Occupational noise management in regard to design and operating noise levels. It is the duty of the supplier to ensure equipment is compliant with safe levels of noise and vibration and suppliers must provide documented proof of compliance, such as test results. Employees will be trained in the appropriate use and application of machinery to minimise noise emissions as far as practicable.

Monitoring and maintenance of onsite machinery will focus on checking for changes in noise levels – badly worn bearings and gears, poor lubrication, blunt blades, loose parts, unbalanced rotating parts and steam or air leaks all create noise that can be reduced with good maintenance. Engineering controls such as vibration mountings, impact absorbers, gaskets, seals, silencers, barriers and other equipment will be implemented where practicable. Regular inspection and maintenance will be conducted in accordance with the Code of Practice- Worksafe – Managing and preventing hearing loss at work.

Noise emissions from the project are further discussed in Appendix Y: Noise Management Plan.

12.6 Road use and potential impacts

12.6.1 External routes

During periods of the year the Tanami Road is subject to road closures caused by rain events from both the Northern Territory and Western Australian sides. Through these periods road conditions are monitored and the relevant administering agencies are consulted to prevent road usage or inadvertent damage in the road surface.

Heavy vehicles

The majority of the project's construction and operational inputs will come along the Tanami Road from Alice Springs (Table 12-1). Items leaving site such as recyclables and hydrocarbon contaminated wastes will either be backloaded for recycling or disposal at centres in the Northern Territory or Western Australia. Gold dore produced during operations will be securely transported for sale to a recognised gold buyer.

On rare occasions, particularly during the upgrade of the mill and movement of earth moving equipment, over dimension or heavy vehicles may travel along the Tanami Road. Haulage will vary depending on operation phases.

The majority of ABM's hauling requirements will be conducted by contractors. However ABM will have one truck for transporting small loads, primarily fuel and food supplies for the camp.

The following guidelines will be followed for the process of loading and unloading equipment

- i. Risk assessment.
- ii. Prior to loading / unloading a particular item of plant the float shall be parked in an area that enables safe, level, firm access for the loading / unloading operation. The area(s) shall be clear of any immediate operational activities.
- iii. If there is any doubt to the gradient of the area, then wheel chocking of the float and/or prime mover will be implemented.
- iv. The operator of the machine to be loaded/unloaded shall ensure that all implements are positioned such, that there will be no contact with the ground as the machine transitions from ground to float ramps or float damage when moving from ramps to flat bed or the reverse.
- v. Before the float moves off, the driver shall ensure that the machine security, (chaining, if deemed applicable) is sufficient for the entire relocation route.

Light vehicles

In addition to haul routes there may be times that ABM staff are required to travel from site along the Tanami Road to Alice Springs or Halls Creek in light vehicles (Table 12-1). ABM has a strict vehicle policy that restricts vehicle operations on public roads at night, unless in an emergency; therefore it is expected that the peak traffic time for these roads will be within the hours of daylight.

Transporting of hazardous or dangerous material

No vehicle, other than a vehicle licensed or complying with the license requirements of the *Dangerous Goods Act* (dependent upon the quantity and category of explosives carried at the time) shall be used for the transport of explosives and/or dangerous goods; in accordance with ABM's Hazardous Substance Management Plan.

Vehicles used for loading and transport of bulk materials shall not be operated unless the vehicle is roadworthy and complies with required legislation and standards.

Hazardous or dangerous materials that may be transported will include but are not limited to:

1. AvGas
2. diesel
3. oils – hydrocarbons
4. explosives- proposed to be Ammonium Nitrate
5. cyanide (for small scale concentrate leaching)

12.6.2 On-site traffic

Once operations commence, mining and processing will occur on a 24 hour basis.

Heavy vehicles

Proposed heavy vehicle traffic within the mining areas is outlined in Chapter 3: Table 3-10.

The majority of the heavy vehicles will be restricted to haul roads and pit operations, except for the coaster bus which will be utilised to transport staff from the accommodation to the mine site and to/from the airstrip. ABM proposes to use 2 excavators equivalent in size to a Hitachi excavator (EX1200-6) for loading and 4 dump trucks for haulage to and from the pit and ROM. A Caterpillar D9T Dozer and 1H4 Grader will be used for clean-up at the loading areas, clearing of new mine areas, road building, pushing and rehabilitation on the waste dumps and maintenance of haul roads and work areas, clearing of new mine areas, formation of drainage furrows and swales, respectively. Dust suppression will be controlled by a water cart and 1 front end loader will be utilised for loading ore from the ROM to the processing plant. An additional loader will be used for loading ore into the hopper for crushing.

Light vehicles

Light vehicles will be used for occasional staff transport along the Tanami Road, but will mainly be transporting staff around the mine site via internal roads within the designated mine area. Peak movement of light vehicles will coincide with the transition from day to night shift. Non four-wheel-drive (4WD) light vehicles shall not be used on unsealed mine access roads in wet weather conditions.

12.6.3 Additional transport infrastructure and design

The following details will be required for additional transport infrastructure works;

The internal roads and haulage network, including ramps are to be designed and constructed to conform to the Guidelines for Mine Haul Road Design 2001, Motor Traffic Act and Australian Standards. Other roads are to be designed for safe movement as directed by the site general manager and in line with ABM's Vehicle Management Plan.

Road signage along the unsealed roads will conform to the Motor Traffic Act and Australian Standards. Appropriate signs are to be installed at the following locations and as deemed necessary, by the site general manager. The locations are:

1. road intersections including haul roads
2. areas where speed limits change
3. major changes in the grade of roads

4. general road hazards
5. restricted areas
6. areas where animals are likely to cross (including the areas of bilby and mulgara activity).

A safety windrow is to be present on all roadways accessible to vehicles adjacent to vertical drops exceeding 1m. Haul roads between mine and processing facility will have established windrows designed and updated as operations are progressed. High wall windrows are to consist of a minimum of half the wheel height of the largest vehicle that may be in the area and constructed a sufficient distance from the edge so that loose material from the windrow cannot fall over the edge of the high wall.

Windrows on all dumps where vehicles are required to tip over the edge will be maintained at a minimum height of half the wheel height of the largest truck using the tip head. The windrows shall be constructed of competent material. Where an adequate windrow cannot be provided, trucks are to dump at least 5 metres short of the tip edge.

Speed limits

Speed limits are as posted, but maximum speed limits are:

- Entrance and exit of the production Area 30 kilometres per hour or as sign posted.
- Main haul roads and access roads 60 kilometres per hour or as sign posted.
- Workshop and production Area surrounds 10 kilometres per hour or as sign posted.
- Forklift operations 10 kilometres per hour.
- Within the maximum speed limits, vehicles must be driven at a safe speed to suit the weather, visibility, traffic and road conditions.

Flashing beacons and flag aerals

When in an operational area or driving around the workshop / production area all vehicles less than 3 metres in height must:

- Exhibit a reflective flag on a pole to a minimum height of 3 metres.
- At all times carry a flashing orange beacon. The beacon is to be used at all times when the vehicle is in operation.
- All rubber-tired earthmoving equipment except haul trucks and front-end loaders shall have an operational flashing beacon that must be used at all times when the vehicle is in operation.

12.6.4 Daily traffic generation and hours of operation

Refer to table 12-1 for levels of weekly vehicle activity, heavy and light, from Twin Bonanza to regional centres. It is not anticipated that daily traffic will occur, except under exceptional circumstances and very infrequently. These additional traffic movements are considered to be low and are not anticipated to impact on traffic flows at any stage of the project.