BIG ISLAND MINING PTY LTD

ABN 12 112 787 470

Dargues Reef Gold Project

TRAFFIC Assessment

Prepared by

Transport and Urban Planning

JULY 2010

Specialist Consultant Studies Compendium

Volume 2, Part 6

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ABN 12 112 787 470

TRAFFIC Assessment

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July 2010

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FIGURES[1][2]

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[1] It is noted that the Project Site boundary presented in these figures varies slightly from that illustrated in the *Environmental Assessment*. This has no influence on the assessment or conclusions made in this report.
[2] Colour versions of all figures are available on the Project CD.

EXECUTIVE SUMMARY

This report documents the assessment of traffic impacts of the Dargues Reef Gold Project ("the Project"), an underground gold mining project located on the western slopes of the Great Dividing Range to the southeast of Canberra. The Project is expected to have a total life of between five (5) and nine (9) years with maximum production (~500 000t) reached in Year 3 (assuming maximum production is achieved).

The Project Site is located off Majors Creek Road, north of the village of Majors Creek, approximately 14.8km (by road) south of Braidwood.

As part of the Project, a new intersection would be constructed to RTA standards. The new intersection would be located near the northern boundary of the Project Site and incorporate BAR and BAL treatments for turning vehicles, to and from Majors Creek Road.

The road network which forms the transport route between the Kings Highway, Braidwood and the Project Site includes Wallace Street, Coghill Street, Captains Flat Road, Araluen Road and Majors Creek Road. These roads carry relatively low traffic volumes on an average weekday, ranging between 337 vehicles per day (vpd) in Majors Creek Road and 1 221 vpd in Wallace Street.

Heavy vehicles represent between 7% and 12% of the total traffic using these roads. Traffic conditions on these roads, including at the intersections along this route, are good and consistent with a Level of Service A operation with minimal vehicle delays.

Future traffic growth, over the next 5 to 10 years on the road network between Braidwood and the Project Site is expected to be relatively small resulting in no real change to the existing good traffic conditions.

At maximum production in Year 3 or 4 of the Project, the production of gold concentrate is expected to generate 38 vehicle trips per day (19 trips in each direction) on the road network south of Braidwood, including 14 heavy vehicle movements, 4 bus movements and the remainder being light vehicles. During the peak hour associated with staff/employee start and finish times, the traffic generation of the Project would be 10 vehicles, most of which would be light vehicles.

The additional traffic associated with the Project would not change the level of service of the existing roads and intersections and these would continue to operate at good level of service (Level of Service A operation), representative of good traffic conditions in terms of vehicle delay.

Over most of the road network, the increase in total traffic volumes due to the Project would range between 3.1% and 5.6%. On Majors Creek Road, the increase in total traffic volume would be greater (11.3%), however, it is noted that Majors Creek Road carries relatively low traffic volumes (337 vpd on a weekday) which accounts for the larger proportional increase on this road.

As a result of the Project, the proportion of heavy vehicles using the road network would increase by 1% on most sections of the road network when compared to the existing 2010 traffic volumes and would remain in the order of 11% to 13%. The largest increase occurs in Majors Creek Road where the proportion of heavy vehicles would increase from 7% to 12%.

On the wider State road network the impacts of a maximum of 14 heavy vehicle movements per day in Year 3 using the Kings Highway between Canberra and Braidwood would be minimal and traffic and road conditions on this section of the Kings Highway would remain largely unchanged.

It is feasible that a portion of these heavy vehicle movements (up to 8 heavy vehicles) may use the Kings Highway between Braidwood and Batemans Bay (in lieu of travelling towards Canberra) to access the Princes Highway route to travel north towards Port Kembla and Sydney. Should this occur, the impacts of this small number of heavy vehicles would also be relatively minor.

There is a need to provide for some upgrades of Majors Creek Road to address existing deficiencies and to ensure road safety is maintained. These works include the provision of a centre line along the full length of Majors Creek Road, isolated widening on some curves and crests along the route, as well as improved signage and crash protection at 2 culverts and a bridge along the route.

It is considered appropriate that the Proponent makes an appropriate contribution towards these upgrade works, as well as provide a contribution towards road maintenance for pavement damage by heavy vehicles in accordance with Council's Section 94 Contributions Plan.

The Proponent should also include the following initiatives as part of a statement of commitments for the Project to ensure community concerns regarding transport/traffic issues are addressed and any adverse impacts are minimised.

- Schedule, as far as practicable, all heavy vehicles movements to and from the Project Site during the Operational Phase between 7.00am to 10.00pm, and avoid the times when school buses operate on the road network.
- Enforce a maximum speed of 80km/hr for all heavy vehicles travelling on the road network between the Project Site and Braidwood. (NB: existing speed limit is 100km/h)
- Introduce a Code of Conduct for all drivers operating heavy vehicles that travel to and from the Project Site, to ensure safe driving practices are maintained at all times and the nominated maximum speed of 80km/h for heavy vehicles travelling to and from the Project Site is adhered to.

During the Site Establishment (Construction) Phase the traffic generation is expected to average between 32 and 34 traffic movements per day, including 6 to 8 heavy vehicle movements. This number does not include the heavy vehicle trips and workforce trips associated with the construction of the new intersection between the Project Site Entrance and Majors Creek Road. Following approval of the Project, the Proponent would prepare a Traffic Management Plan to manage the traffic impacts associated with the construction of the Project Site Intersection during the Site Establishment Phase.

1. INTRODUCTION

1.1 BACKGROUND

This report has been prepared by Transport & Urban Planning for R.W. Corkery & Co. Pty Limited on behalf of Big Island Mining Pty Ltd (BIML). The purpose of this study is to assess the likely traffic impacts of the proposed Dargues Reef Gold Project (hereafter referred to as the Project), located in the Southern Tableland region of New South Wales. The Project Site is located to the north of the village of Majors Creek and approximately 14.8 kilometres (by road) south of Braidwood. **Figure 1** presents the location of the Project Site on the western slopes of the Great Dividing Range, approximately 60km southeast of Canberra. **Figure 2** provides the Project's local setting, to the north of Majors Creek and approximately 13km (as the crow flies) south of Braidwood.

BIML propose to mine the Dargues Reef ore body using traditional underground mining techniques. The Project would require the development of a box cut to provide access to the mine, as well as surface facilities for processing the ore into gold concentrate. The ore processing circuit would include crushing, grinding, gravity and flotation circuits. The proposed processing operations would not require the use of cyanide to extract the gold from the ore.

Vehicle access to the Project Site would be from Majors Creek Road.

Once operational the Project would employ approximately forty eight (48) people and operate for five (5) years, if full production is achieved. Allowing for a slower rate of mining, site decommissioning and rehabilitation operations, the total life of the Project would be up to nine (9) years.

1.2 AUTHORITY REQUIREMENTS

As part of the preparation of the Traffic Impact Assessment for the Project, consideration was given to the requirements of the Director-General (of the Department of Planning) ("the Director-General's requirements"), as well as the key issues identified by the NSW Roads and Traffic Authority and Palerang Shire Council for inclusion in the Traffic Impact Assessment provided by these authorities to the Direct-General (of the Department of Planning).

Director-General's Requirements

The Director-General indicated that the assessment should include a detailed description of the measures that would be implemented during construction and operation to minimise impacts on Majors Creek Road and Araluen Road.

Roads and Traffic Authority

The Roads and Traffic Authority indicated the following information should be addressed in the *Environmental Assessment*.

- Details regarding the expected number and type of vehicles to access the site and their distribution onto the road network.

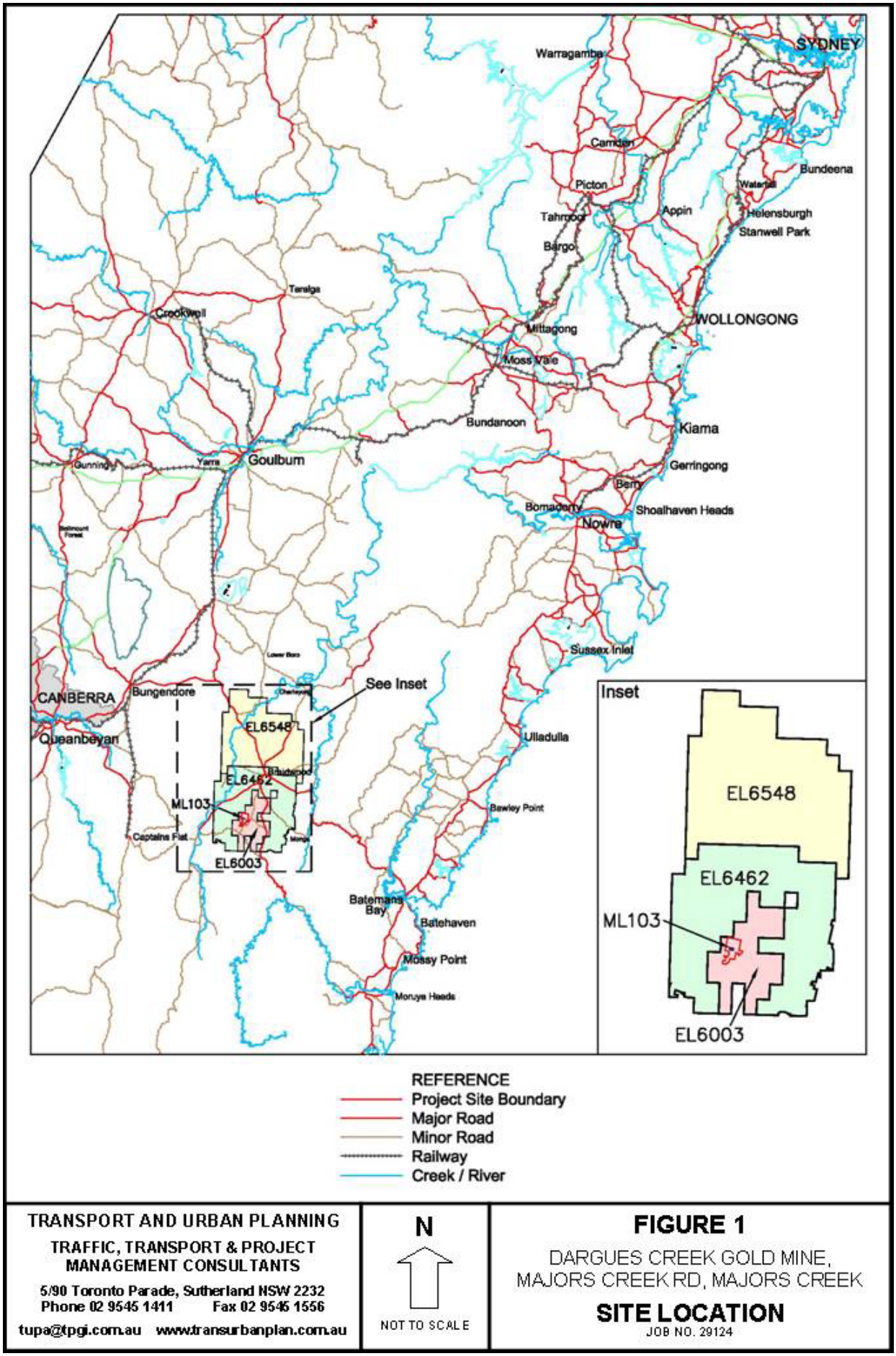
SYDNEY
Warragamba
Camden
Picton
Tahmoor
Bargo
Appin
Bundeena
Waterfall
Helensburgh
Stanwell Park
WOLLONGONG
Tenalga
Crookwell
Mittagong
Moss Vale
Bundanoon
Kiama
Gerringong
Berry
Bomaderry
Nowra
Shoalhaven Heads
Sussex Inlet
Ulladulla
Bawley Point
Batemans Bay
Batehaven
Mossy Point
Moruya Heads
Goulburn
Yarra
Gunning
CANBERRA
Bungendore
Queanbeyan
See Inset
EL6548
EL6462
ML103
EL6003
Captains Flat
Inset
EL6548
EL6462
ML103
EL6003
REFERENCE
Project Site Boundary
Major Road
Minor Road
Railway
Creek / River
TRANSPORT AND URBAN PLANNING
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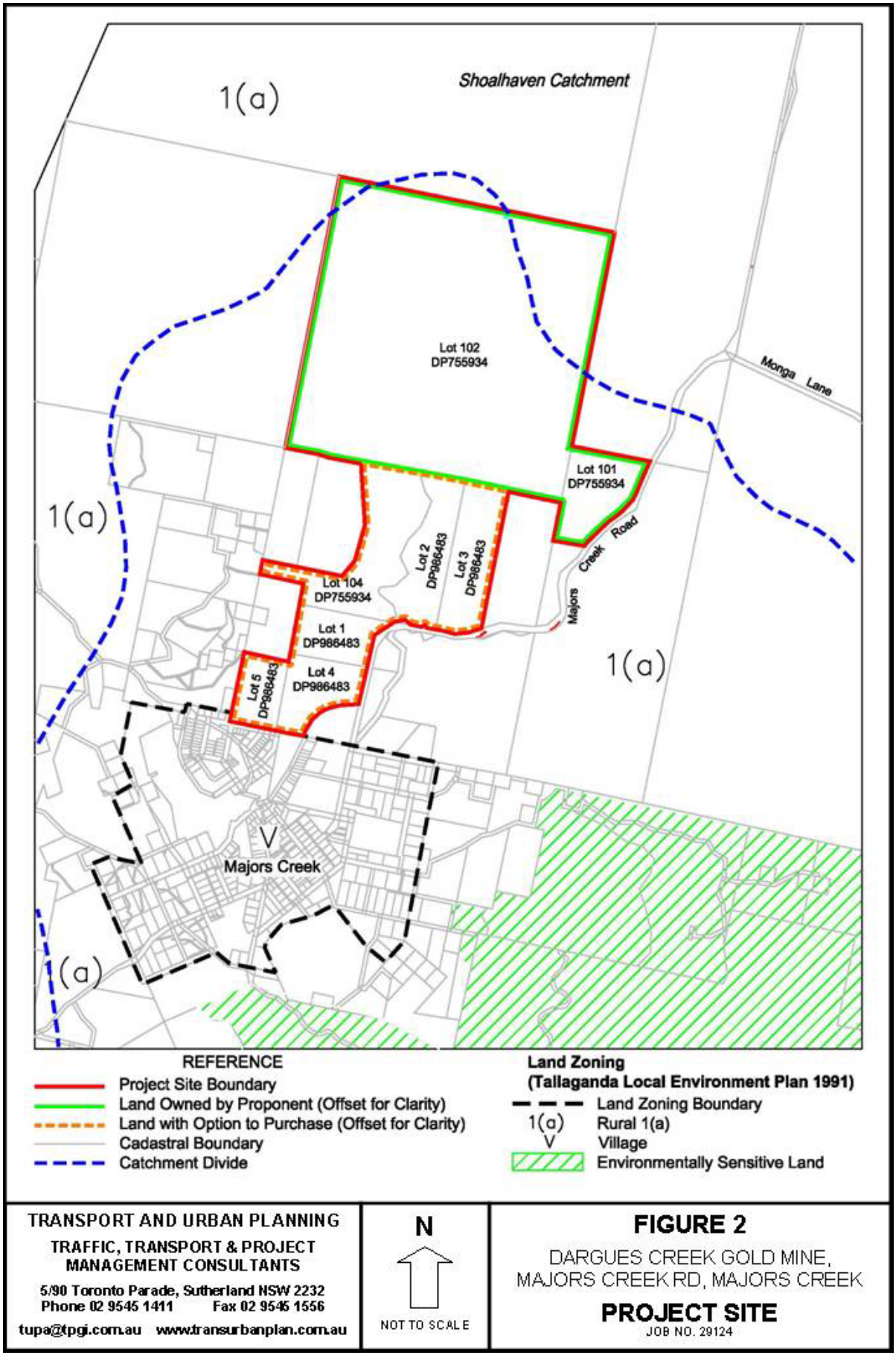
FIGURE 1
DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK
SITE LOCATION
JOB NO. 29124


Shoalhaven Catchment
1(a)
Lot 102
DP755934
Lot 101
DP755934
Monga Lane
Majors Creek Road
Lot 2
DP986483
Lot 3
DP986483
Lot 104
DP755934
Lot 1
DP986483
Lot 4
DP986483
Lot 5
DP986483
V
Majors Creek
REFERENCE
Project Site Boundary
Land Owned by Proponent (Offset for Clarity)
Land with Option to Purchase (Offset for Clarity)
Cadastral Boundary
Catchment Divide
Land Zoning
(Tallaganda Local Environment Plan 1991)
Land Zoning Boundary
1(a) Rural 1(a)
V Village
Environmentally Sensitive Land
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N
NOT TO SCALE
FIGURE 2
DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK
PROJECT SITE
JOB NO. 29124

- If the traffic volumes are significant, intersection modelling using SIDRA should be undertaken for the junction of Araluen Road with the Kings Highway for:
  - AM and PM peak volumes and holiday peak volumes; and
  - existing traffic volumes with and without development and 10 year projected volumes with an without the development.
- The identification of suitable infrastructure required to alleviate any traffic impacts associated with the development.
- Consideration of the environmental impacts of any proposed road works.

Palerang Shire Council

Palerang Shire Council indicated the following matters should be addressed with respect to road access.

- Address pavement damage, road safety and traffic noise issues associated with road transportation.
- Identify the number of vehicle movements for both light and heavy vehicles and identify the proposed haulage routes including the route(s) after they reach the Kings Highway at Braidwood.
- Majors Creek Road has a relatively narrow carriageway with relatively thin pavement. Conflicts with haulage trucks will occur on the more pronounced crests and over a narrow culvert at about mid section. Some widening and or better delineation/guardrail are requested to address the narrow culvert.
- The proposed intersection of the mine access road will need to be constructed to RTA standards and an additional acceleration lane is requested for loaded trucks leaving the site up hill (i.e. northbound direction).
- The intersection of Majors Creek Road/Araluen Road should be upgraded with an RTA BAR (right turn) treatment to make a safer intersection for the increase in traffic turning towards the mine.
- Potential damage/wear and tear on other Council roads and/or MR92 (Nerriga Road) needs to be addressed in the EIS, with some assessment of the expected damage to pavements on the haulage routes and proposed actions to address these.
- Council proposes a planning agreement where impacts are identified and an amount agreed and is paid up front for each year, so that the damage can be repaired when it occurs.
- Council also requests that the hours of road haulage be restricted to daylight hours to avoid traffic noise at night, especially through Braidwood.

Addressing the Authority Requirements

Tables 1.1 and **1.2** detail where the issues / requirements raised by the authorities are examined in the Traffic Assessment Report.

Table 1.1
Director-General's Requirements
(Department of Planning – 23 April 2010)

Paraphrased Requirement	Relevant EA Section(s)
TRAFFIC	
Including a detailed description of the measures that would be implemented during construction and operation to minimise impacts on Majors Creek Road and Araluen Road;	4.1 – 4.6

Table 1.2
Coverage of Environmental Issues

Government Agency	Paraphrased Requirement	Relevant EA Section(s)
	TRAFFIC	
Roads & Traffic Authority (25/03/10)	Details regarding the expected number and type of vehicles to access the site and their distribution onto the road network are requested. Predicted traffic volumes are to be adequately justified. Depending on the volume of vehicles expected, a Traffic Impact Study may be required. As a guide Table 2.1 of the RTA Guide to Traffic Generating Developments outlines the key issues that may be considered in preparing a Traffic Impact Study.	4.1
	If the traffic volume are significant, intersection modelling using SIDRA should be undertaken for the junction of Araluen Road with the Kings Highway considering the following: • AM and PM peaks volumes and holiday peak volumes. • Existing traffic volumes with and without development and 10 year projected volumes with and without the development.	Modelling not required Not applicable
	The applicant should identify suitable infrastructure required to ameliorate any traffic impacts and safety impacts associated with the development.	4.2 – 4.6
	The RTA strongly recommends that the developer considers the environmental impacts of any proposed road works as part of the Statement of Environmental Effects. If these impacts are not considered, then the RTA would require the applicant to provide a separate environmental impact assessment, a 'Review of Environmental Factors' prior to commencing any works that were conditioned as requirements of the development.	Not applicable
Council (06/04/10)	There is a need to address pavement damage, road safety and traffic noise issues that will arise from transport of resources to site and the haulage operations from site.	4.2 – 4.6
	The EIS needs to indicate the number of vehicle movements for both light and heavy vehicles, and identify the proposed haulage route.	4.1
	The EIS should indicate the route(s) of the haulage trucks after they reach the Kings Highway at Braidwood.	4.1

Table 1.2
Coverage of Environmental Issues (cont'd)

Government Agency	Paraphrased Requirement	Relevant EA Section(s)
TRAFFIC (cont'd)		
Council (06/04/10)	Majors Creek Road has a relatively narrow carriageway. Conflicts with haulage trucks will occur especially on the more pronounced crests and over a narrow culvert at about mid section. Some widening and line marking over the crests would ameliorate the problem. Widening and/or better delineation/guardrail are requested to address the narrow culvert.	4.3
	The proposed intersection of the mine access road off Majors Creek Road will need to be constructed to RTA standards and an additional acceleration lane is requested for loaded trucks leaving the site up hill.	4.2
	The intersection of Majors Creek Road with Araluen Road should be upgraded with an RTA BAR treatment to make a safer intersection for the increase in traffic turning towards the mine.	4.3
	Potential damage/wear and tear on other Council roads and/or MR92 (Nerriga Road) needs to be addressed in the EIS with some assessment of the expected damage to pavements on the haulage routes and the proposed actions to address these.	4.1 and 4.3
	Council proposes a planning agreement where impacts are identified and an amount is agreed and is paid up front for each year, so that Council can repair the damage when it occurs without bearing the expense of these repairs.	4.3
	Further, it is requested that the hours of haulage operations be restricted to daylight hours to avoid traffic noise at night, especially through Braidwood.	4.5

1.3 STRUCTURE OF THIS REPORT

As noted in Section 1.1, this report has been prepared to assess the traffic impacts associated with the Project, to support an *Environmental Assessment* being prepared by R.W. Corkery & Co. Pty Limited.

The assessment has been undertaken in accordance with the requirements of Roads and Traffic Authority's Guide to Traffic Generating Developments, October 2002 and the Roads and Traffic Authority's Road Design Guide.

Other technical standards / publications referenced in this assessment include:

- Austroads Guide to Traffic Engineering Parts 1-15 (as appropriate);
- Roads and Traffic Authority's Traffic Volume Data; and

- Roads and Traffic Authority's Delineation.
- The remaining sections of this report address the following:
- Section 2 – describes the project;
- Section 3 – examines the existing traffic conditions on the road network;
- Section 4 – evaluates the traffic impacts of the project; and
- Section 5 – presents conclusions

2. THE PROJECT

2.1 THE PROJECT SITE

The Project Site is located on the western side of Majors Creek Road approximately 2.0 kilometres north of Majors Creek town and 14.8 kilometres south of Braidwood (see **Figures 1** and **2**).

2.2 PROJECT OVERVIEW

The Project would include the following components (**Figure 3**).

- Extraction of waste rock and ore material from the Dargues Reef deposit using underground sublevel open stope mining methods with a suitable crown pillar to prevent surface subsidence.
- Construction and use of surface infrastructure required for the underground mine, including a box cut, portal and decline, magazines, fuel store, ventilation rise and power and water supply.
- Construction and use of a processing plant and office area which would include an integrated Run-of-Mine (ROM) pad/temporary waste rock emplacement, crushing and grinding, gravity separation and floatation circuits, Proponent and mining contractor site offices, workshop, laydown area, ablutions facilities, stores, car parking, and associated infrastructure.
- Construction and use of a tailings storage facility.
- Construction and use of a water management system, including construction and use of eight dams and associated water reticulation system, to enable the harvesting and supply of water for mining-related operations. It is noted that the proposed water harvesting operations would be consistent with the Proponent's harvestable right.
- Construction and use of a site access road and intersection to allow site access from Majors Creek Road.
- Transportation of sulphide concentrate from the Project Site to the Proponent's customers via public roads surrounding the Project Site using covered semi-trailers.
- Construction and use of ancillary infrastructure, including soil stockpiles, core yards, internal roads and tracks and surface water management structures.
- Construction and rehabilitation of a final landform that would be geotechnically stable and suitable for a final land use of nature conservation and/or agriculture.

2.3 PROPOSED VEHICLE ACCESS

A new intersection with Majors Creek Road would be constructed to provide vehicle access to the Project Site, by the Proponent. This would be a sealed intersection based on an RTA basic (BA) right turn (R) and left turn (L) rural intersection type (BAR and BAL). The location is shown on **Figure 3**.

2.4 INTERNAL ROAD

The Proponent would construct an internal road from Majors Creek Road on the Project Site to link to the proposed mining and processing operations of the Project Site. The proposed internal road would be a 6.0 metre wide gravel road, with 1.0 metre wide shoulders. **Figure 3** shows the proposed alignment.

2.5 HOURS OF OPERATION AND PROJECT LIFE

2.5.1 Hours of Operation

Table 2.1 presents the proposed hours for each of the relevant components of the Project.

Table 2.1
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation
Vegetation clearing and topsoil stripping	7 days a week, during each campaign	Daylight Hours
Construction operations – Box cut	7 days a week	Daylight Hours
Construction operations – remainder	7 days a week	24 hours per day
Underground mining operations	7 days a week	24 hours per day
Maintenance operations	7 days a week	24 hours per day
Processing operations	7 days a week	24 hours per day
Transportation Operations	7 days a week	7.00am to 10.00pm[1]
Rehabilitation operations	7 days a week	7.00am to 10.00pm
Note 1: Limited occurrences of deliveries to the Project Site occurring outside these hours of operation may occur.		
Source: Big Island Mining Pty Ltd		

As noted in **Table 2.1**, transportation associated with the delivery of consumables used by the Project Site and the despatch of the gold concentrate product would generally occur between 7.00am and 10.00pm. The movement of heavy vehicles would also be scheduled to avoid school bus times on the local road network.

\\SERVER\RWC\752\75204\Cad\752EA_Traffic 3.DWG

TN
MN

See Detail Right

Site Access Road

Tailings Storage Facility

Tailings Storage Facility Access Road

Ventilation Rise

Spring Creek

Existing Site Access Track (to be decommissioned)

Majors Creek Road

Detail

Proponent & Mining Contractor Offices
Concentrate Storage
Gold Room
Floatation Tanks
Raw Water
Reagent & Other Storage
Concentrator
Crushing & Grinding Circuit
Processing Plant Office Area
+ 692
Water Supply Tanks
ROM Pad
+ 705
Sub-station
Settling Dam
Temporary Waste Rock Emplacement
Fuel Bay
Core Yard
Lay Down Yard
Workshop
Box Cut

SCALE 1:4 000

50 0 50 100 150 200 m

See Detail Left

REFERENCE

- Project Site Boundary
- Contour (m AHD)(Interval = 5m)
- Contour (m AHD)(Interval = 10m)
- + 692 Spot height (m AHD)
- Creek / Drainage Line
- Sealed Road
- Unsealed Road
- Existing Dam/Water Storage
- Proposed Settling Dam
- Proposed Harvestable Rights Dam (Indicative Location)
- Catchment Boundary
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Pipeline (Indicative)
- Proposed Road/Track (Sealed/Unsealed)
- Fence (note: fences not co-incident with cadastral boundaries)

SCALE 1:8 000

100 0 100 200 300 400 m

Base Map Source: Geo-spectrum (Australia) Pty Ltd

Figure 3
PROJECT SITE LAYOUT

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2.5.2 Project Life

The Proponent anticipates that, at maximum production levels, mining operations would require approximately five (5) years to complete. However, in the event that the proposed rate of mining is lower than anticipated, additional time may be required. In addition, following completion of mining operations, site decommissioning and rehabilitation operations may take up to two (2) years. As a result, the proposed Project life could increase to up to nine (9) years.

2.6 TRAFFIC GENERATION AND TRANSPORT ROUTES

2.6.1 Site Establishment Stage

Construction activities on the Project Site associated with the establishment of roads and hardstand areas, construction of processing plant and site infrastructure and initial development of the box cut and Tailings Storage Facility (referred to hereafter as the site establishment stage) is expected to be approximately 5 months. The proposed intersection with Majors Creek Road would be constructed during the site establishment stage.

The principal transport route would be from Braidwood (Kings Highway) via Wallace Street, Coghill Street, Captains Flat Road, Araluen Road and Majors Creek Road to the Project Site (See **Figure 4**). All heavy vehicles coming to the Project Site are expected to use this route, as would the majority of the light vehicles.

The average number of vehicles that would access the Project Site per day during the site establishment stage, excluding the construction of the intersection in Majors Creek Road, would be in the order of 16 to 17 vehicles (i.e. 32 to 34 movements). This would include 12 light vehicles (24 movements) and 3 to 4 heavy vehicles (6 to 8 heavy vehicle movements).

The types of heavy vehicles coming to the Project Site during this period would include low loaders (delivery equipment etc.), semi trailers, truck and dog trailers and other smaller trucks including concrete agitator vehicles. There would be some days over the 5 month period when higher numbers of vehicles would access the Project Site, associated with a specific activity.

Some of the heavy vehicles are expected to come from Canberra/Queanbeyan area, via the Kings Highway with the rest, i.e. light vehicles and some heavy vehicles are expected to be drawn from the local and regional area around Braidwood. A small number of light vehicles may arrive from the south from the Majors Creek town.

2.6.2 Operational Phase

The Proponent is proposing to use a small (20 seater) bus to transport shift mine workers to and from the Project Site each day. Two (2) shifts are proposed which would involve up to four (4) bus movements, i.e. 2 arrivals and 2 departures, each day.

There would also be up to eight (8) managers and office staff arriving and departing the Project Site on weekdays in light vehicles (16 movements) plus 1 to 2 visitors (2 to 4 movements).

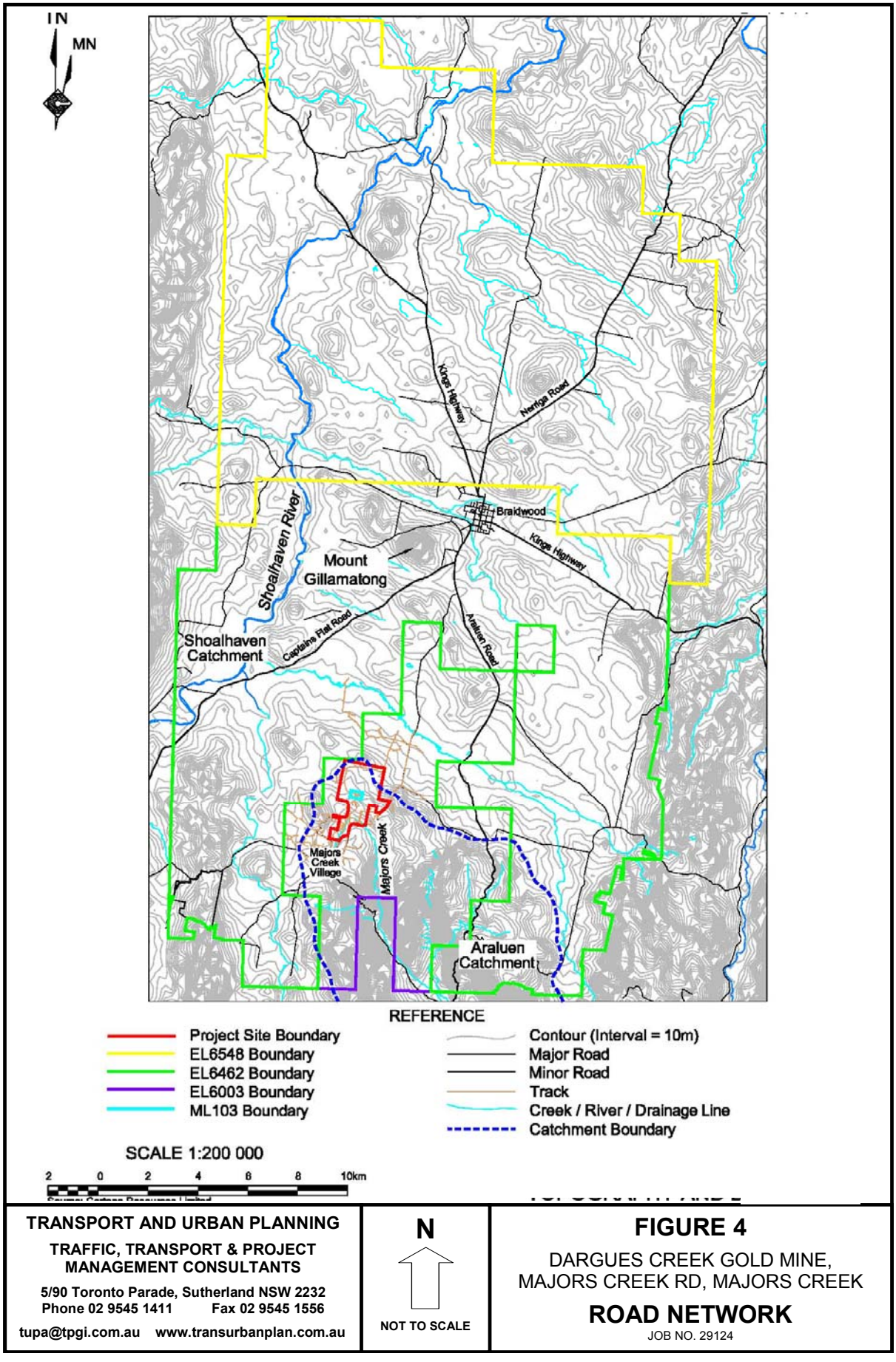

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FIGURE 4

DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK

ROAD NETWORK

JOB NO. 29124

Heavy vehicles arriving and departing the Project Site would include delivery vehicles for consumables which would typically be large rigid trucks and 19 metre semi-trailers, as well as product (concentrate) trucks which would be 19 metre semi-trailers. Based on the projected production schedule of the Project, the total number of heavy vehicles would be:

- four (4) trucks, i.e. 8 movements, per day in year 1;
- Increasing to seven (7) trucks, i.e. 14 movements, per day in year 3 or 4.

The workforce is expected to be drawn from the local and regional area and the Proponent would pick up / drop off the shift workers at a central location in Braidwood.

The delivery vehicles to the Project Site are expected to arrive/depart from the Canberra / Queanbeyan area using the Kings Highway.

The concentrate trucks are expected to transport the concentrate to port at Wollongong, Sydney or Newcastle. The destination of the gold concentrate product is still to be determined and will depend on the location and preference of the customer(s) established. This notwithstanding, all vehicles travelling to the Project Site from Braidwood would use Wallace Street, Coghill Street, Captains Flat Road, Araluen Road and Majors Creek Road.

3. EXISTING TRAFFIC CONDITIONS

3.1 PRINCIPAL ROAD NETWORK

The principal road network (see **Figure 4**) that would provide access to the Project Site includes:

- Majors Creek Road;
- Araluen Road / Captains Flat Road; and
- Coghill Street / Wallace Street

Captains Flat Road, Coghill Street and Wallace Street (to Lascelles Street) form part of a regional road. Araluen Road and Majors Creek Road are local Council roads. Palerang Shire Council's road hierarchy map indicates that all of the above roads form part of the main road network within the local government area.

Regional roads are public roads of secondary importance within the state-wide context. Regional roads comprise both classified roads that are not State roads and some important but not classified council roads. Councils exercise roads authority powers, have financial asset management responsibility and determine road works priorities for regional roads. Local roads are any unclassified public road for which Councils are the road authority and which are not either State or Regional roads. Councils exercise roads authority powers and have financial responsibility for local roads.

3.2 STANDARDS FOR RURAL ROADS

The RTA's Road Design Guide provides guidance on required lane and shoulder widths for 2 lane roads based on Annual Average Daily Traffic (AADT) volumes. These standards relate to RTA type roads, which have a highway or arterial type function, such as State and Regional Roads. The standards are also applicable to major local roads. The minimum lane widths are as follows:

- AADT 150 to 500 vehicles per day (vpd): 3.0 metre lane width (i.e 6.0 metre road width for 2 lanes)
- AADT 500 to 2 000 vpd: 3.0 to 3.5 metre lane width (i.e 6.0 – 7.0 metre road width for 2 lanes)
- AADT > 2 000 vpd: 3.5 metre lane width (i.e 7.0 metre road width for 2 lanes)

Recommended shoulder widths where there is no provision for cyclists are as follows:

- AADT < 500 vpd: 1.0 – 1.5 metres
- AADT 500 to 1 000 vpd: 1.0 to 2.0 metres
- AADT > 1 000 vpd: 2.0 to 3.0 metres

Shoulder sealing of 0.5 metres from the edge of the travel lane is recommended when the AADT is less than 2 000 vpd and 1.0 metres when the AADT is greater than 2 000 vpd. It should be noted that most council/local rural roads including regional roads, do not have sealed shoulders and typically use gravel shoulders.

Rural roads typically have speed limits of 80 to 100 km/hr.

3.3 LEVEL OF SERVICE

Level of Service is used as a performance standard for roads (and intersections). Level of Service is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays and freedom to manoeuvre. There are six Levels of Service for roads. The following descriptions are for roads with interrupted traffic streams, such as rural roads.

- Level of Service A. This, the top level, is a condition of free flow.
- Level of Service B. This level is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream.
- Level of Service C. This service level is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre in the traffic stream.
- Level of Service D. This level is close to the limit of stable flow but is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream.

- Level of Service E. This level occurs when traffic volumes are at or close to capacity and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream.
- Level of Service F. This service level is in the zone of forced flow. With it the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs and queuing and delays result. In short the traffic demand exceeds the capacity of the road or lane.

The desirable Level of Service for rural roads is Level of Service C or above (ie. A, B or C).

3.4 STANDARDS FOR TOWN ROADS IN RURAL AREAS

There is no particular road width standard for town roads in rural areas. These roads have lower speed limits of 60km/hr or less.

Travel lane widths on two way, two lane town roads are typically 3.0 to 3.5 metres wide depending on AADT traffic volumes. Shoulder areas which can be used for parking or as a pull off area can be 2.0 to 3.0 metres wide or wider and may or may not be sealed. Kerb and gutter may or may not be provided depending on a range of factors.

3.5 DESCRIPTION OF ROADS AND INTERSECTIONS

3.5.1 Majors Creek Road

Majors Creek Road is a two (2) lane rural road that connects the town of Majors Creek to Araluen Road. Majors Creek Road is a sealed road between George Street at Majors Creek and Araluen Road, a distance of approximately 11.85 kilometres.

The section immediately north of George Street at Majors Creek passes through hilly terrain for approximately 1.5 kilometres. The terrain changes south of the Project Site and the road alignment improves between this point and Araluen Road. Majors Creek Road typically has a sealed pavement generally 5.8 metres wide with gravel/grass shoulders 1.0 to 1.5 metres wide. Traffic management includes white guideposts and reflectors and sections of centreline marking (generally where overtaking is not permitted) and advisory signs. The speed limit is 100km/hr. There are several minor intersections between the Project Site and Araluen Road. These intersections are T junctions and have basic BAR (without any widening on the road shoulder) and BAL treatments in Majors Creek Road for right and left turning vehicles. Sight distance at these intersections is generally satisfactory. These minor roads are gravel roads.

Majors Creek Road forms a T junction intersection with Araluen Road. Sight distance in Araluen Road at the intersection is good in both directions and easily exceeds the requirements for safe intersection sight distance for the 100km/hr speed limit, which is 225 metres. Basic BAL and BAR treatments for left and right turn vehicles are provided in Araluen Road at the intersection, as well as directional signage. However, the shoulder formation width on the eastern side of Araluen Road for the southbound direction is not consistent with RTA standards for a BAR treatment. Majors Creek Road is subject to give way / priority control at the intersection.

Majors Creek Road is a school bus route. There are a number of locations along Majors Creek Road where the existing traffic management does not meet current standards.

3.5.2 Araluen Road / Captains Flat Road

Araluen Road / Captains Flat Road between Majors Creek Road and Coghill Street is approximately 2.93 kilometres in length and is also a school bus route.

Araluen Road is 6.2 metres wide with a sealed pavement and gravel/grass shoulders 1.5 to 2.0 metres wide. Traffic management include white guide posts and reflectors, centreline road marking and advisory signs.

The speed limit in Araluen Road to south of Captains Flat Road intersection is 100km/hr, where it reduces to 80km/hr. The western leg of Captains Flat Road intersects Araluen Road / Captains Flat Road (northern leg) 1.29 kilometres north of Majors Creek Road.

The section of Captains Flat Road north of Araluen Road (a regional road) travels to the outskirts of Braidwood with an 80km/hr speed limit where it reduces to 60km/hr near Saleyard Lane. It generally has a 7.0 metre sealed pavement with gravel shoulders of variable widths, centreline markings and guideposts with reflectors.

Intersections located in Araluen Road / Captains Flat Road between Majors Creek Road and Coghill Street include:

- Captains Flat Road – T junction;
- Hawthorn Lane – minor T junction;
- Saleyard Lane – minor T junction;
- Cowper Street – minor T junction;
- Gillamatong Lane – minor T junction; and
- Coghill Street / Bombay Street – T junction (Bombay Street).

The intersections at Captains Flat Road and Coghill Street / Bombay Street are the principal intersections and include directional signage.

Captains Flat Road / Araluen Road intersection has give way / priority control on the western leg of Captains Flat Road and basic BAL and BAR treatments for the left and right turn movements. Sight distance at the intersection is generally satisfactory, although restricted to the south due to a crest in Araluen Road. Notwithstanding this, the sight distance meets safe intersection sight distance for the posted 80km/hr speed limit which is 160 metres.

Captains Flat Road / Coghill Street form the priority road at Bombay Street. The intersection is channelised with give way / priority control on Bombay Street. Sight distance at the intersection is good and meets the requirements for safe intersection sight distance for the posted speed limit of 60km/hr which is 105 metres. Street lighting is provided at the intersection as well as directional signage.

3.5.3 Coghill Street / Wallace Street

Coghill and Wallace Streets are town roads within the Braidwood township with 50km/hr speed limits. Both streets form part of a regional road that connects to Kings Highway at Lascelles Street and form part of the school bus route to Captains Flat Road, Araluen Road and Majors Creek Road.

Coghill Street between Bombay Street and Wallace Street provides a sealed road pavement for two (2) lanes of traffic and wide shoulders, east of Ryrie Street.

Ryrie Street forms a T junction intersection with Coghill Street just east of Bombay Street. Sight distance at the intersection is satisfactory.

Coghill Street forms a cross junction intersection with Wallace Street. Give way / priority control is provided on Coghill Street (both approaches). Sight distance at the intersection is good and directional signage and street lighting is provided at the intersection.

Wallace Street between Coghill Street and Lascelles Street has a relatively wide sealed road pavement for two (2) lanes of traffic plus angle parking in the northern section.

Wallace Street meets the Kings Highway at Lascelles Street and the route to north (Wallace Street) travels to Canberra and the route to the east (Lascelles Street) travels to Batemans Bay.

Give way / priority control is provided on Wallace Street (both legs) at Lascelles Street. Sight distance at the intersection is good and directional signage and street lights are provided at the intersection.

3.6 EXISTING TRAFFIC CONDITIONS ON THE ROAD NETWORK

3.6.1 Traffic Volumes

Traffic volumes using the road network between the Project Site at Majors Creek and Braidwood were collected as part of this assessment. This included daily volume and classification counts, as well as hourly traffic volumes, using the roads.

3.6.2 Daily Traffic Volumes

The volume and classification counts were undertaken on the road network between 12 and 19 February 2010.

Tables 3.1 and **3.2** and **Figure 5** shows the traffic volumes on the roads for an average weekday (5 day average) and per day (7 day average / AADT), including the number and proportion of heavy vehicles.

Reference to **Tables 3.1** and **3.2** reveals the following:

- Majors Creek Road carries two way traffic volumes of 320 and 337 vehicles respectively on an average day (7 day average / AADT) and average weekday (5 day average). Heavy vehicles represent 5% and 7% of total traffic respectively on these days.
- Araluen Road carries two way traffic volumes of 655 and 695 vehicles on an average day (7 day average / AADT) and average weekday (5 day average). Heavy vehicles represent 10% and 12% of the total volumes on these days.
- Captains Flat Road carries two way traffic volumes of 1 020 and 1 087 vehicles on an average day (7 day average / AADT) and average weekday (5 day average). Heavy vehicles represent 8% and 10% of the total volumes on these days.

- Coghill Street carries two way traffic volumes of 982 and 1 091 vehicles on an average day (7 day average / AADT) and average weekday (5 day average). Heavy vehicles represent 9% and 11% of the total volumes on these days.
- Wallace Street carries two way traffic volumes of 1 128 and 1 221 vehicles respectively on an average day (7 day average / AADT) and average weekday (5 day average). Heavy vehicles represent 10% and 11% of total vehicles on these days.

Table 3.1
Daily Traffic Volumes on Road Network

Road	5 Day Average (Weekday)			7 Day Average (AADT)		
	North/East	South/West	Total (two way)	North	South	Total (two way)
Majors Creek Road	165	172	337	158	162	320
Araluen Road	343	352	695	324	331	655
Captains Flat Road	537	550	1087	509	511	1020
Coghill Street	461	630	1091	424	558	982
Wallace Street	558	663	1221	519	609	1128
Source: Traffic Counts 12 to 19 February 2010						

Table 3.2
Two Way Daily Traffic Volumes Including Heavy Vehicles

Road	5 Day Average (Weekday)			7 Day Average (AADT)		
	Light Vehicles %	Heavy Vehicles %	Total	Light Vehicles %	Heavy Vehicles %	Total
Majors Creek Road	314	23	337	303	17	320
	93%	7%	100%	95%	5%	100%
Araluen Road	619	76	695	592	63	655
	88%	12%	100%	90%	10%	100%
Captains Flat Road	984	103	1087	941	79	1020
	90%	10%	100%	92%	8%	100%
Coghill Street	973	118	1091	897	85	982
	89%	11%	100%	91%	9%	100%
Wallace Street	1081	140	1221	1018	110	1128
	89%	11%	100%	90%	10%	100%
Light Vehicles - Austroads 1 and 2 vehicle classification - Austroads 3 to 12 vehicle classification Source: Traffic Counts 12 to 19 February 2010						

It should be noted that exploration works being undertaken on the Project Site by the Proponent, generated around 20 light vehicle movements per day (i.e. 10 vehicles in each direction between Majors Creek and Braidwood) during this period. There were no heavy vehicles accessing the Project Site during the count period.

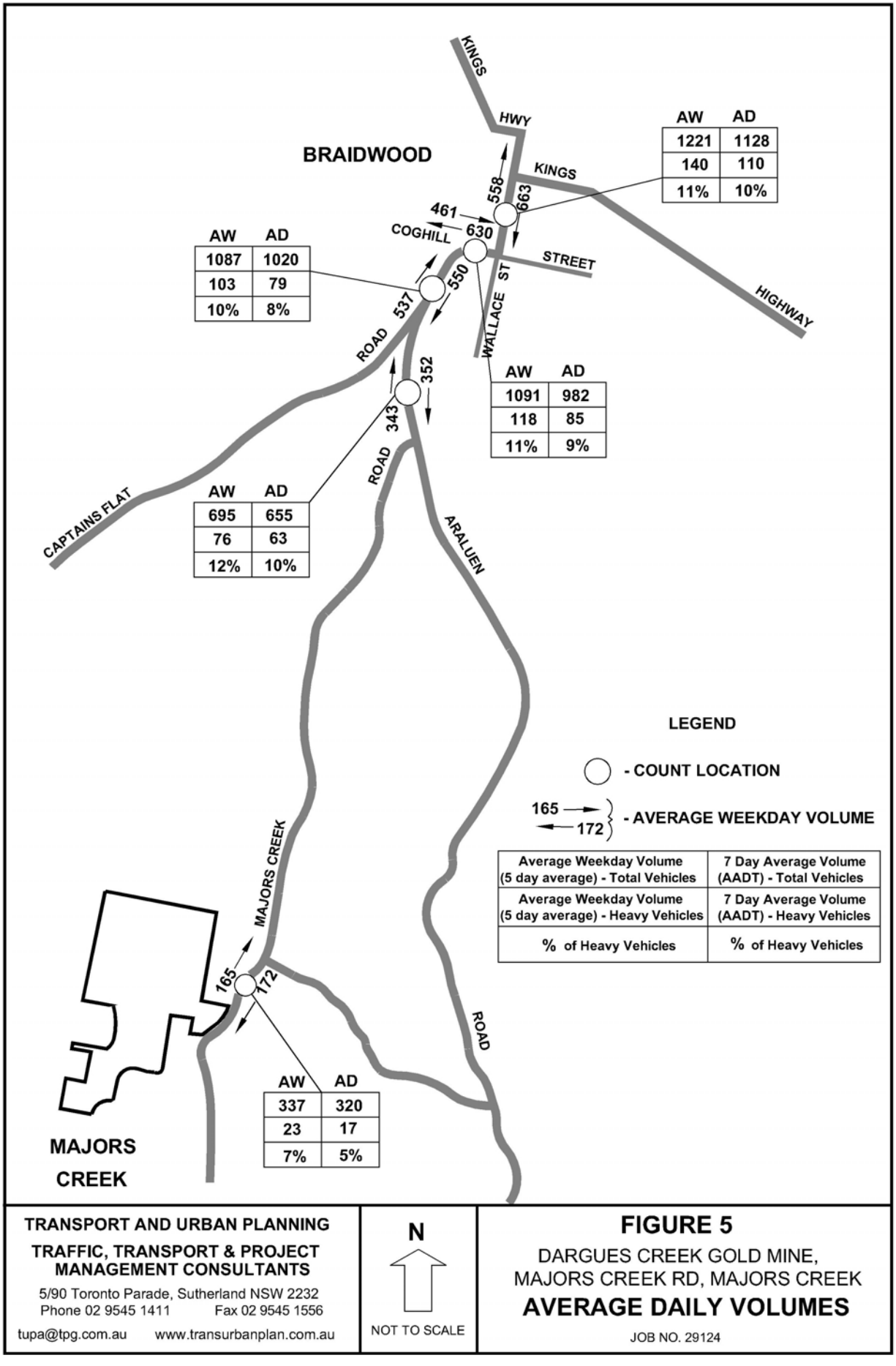

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FIGURE 5

DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK

AVERAGE DAILY VOLUMES

JOB NO. 29124

The breakdown of the types of heavy vehicles using the road network on the average weekday as recorded in the traffic counts is as follows:

- Majors Creek Road – 21 rigid trucks/buses and 2 articulated trucks;
- Araluen Road – 67 rigid trucks/buses and 9 articulated trucks;
- Captains Flat Road – 86 rigid trucks/buses and 17 articulated trucks;
- Coghill Street – 97 rigid trucks/buses and 21 articulated trucks; and
- Wallace Street – 113 rigid trucks/buses and 27 articulated trucks.

Rigid trucks (class 3, 4 and 5) typically have 2 to 4 axles and articulated vehicles (class 5 to 9) can have between 3 and 6 axles. B Doubles (class 10) typically have 8 axles.

3.6.3 Hourly Traffic Volumes and Traffic Conditions

Table 3.3 shows the maximum two way hourly traffic volumes for various periods during the average weekday as recorded in the traffic counts between 12 and 19 February 2010.

Table 3.3
Maximum Hourly Two Way Traffic Volumes Using Road Network on Average Weekday

Road	Time Period				
	6am-9am	9am-3pm	3pm-7pm	7pm-10pm	10pm-6am
Majors Creek Road	28	24	34	12	7
Araluen Road	67	52	66	13	8
Captains Flat Road	97	79	100	35	13
Coghill Road	73	81	105	36	13
Wallace Street	88	93	115	43	14
Source: Traffic Counts 12 to 19 February 2010					

For the rural road sections of the road network the maximum two way hourly volumes range between:

- 7 and 34 vehicles per hour (vph) in Majors Creek Road;
- 8 and 67vph in Araluen Road; and
- 13 and 100vph in Captains Flat Road.

Maximum two way hourly traffic volumes using the town roads are:

- 13 and 105vph in Coghill Street; and
- 14 and 115vph in Wallace Street.

Figure 6 shows the maximum AM and PM peak hour volumes by direction on the road network.

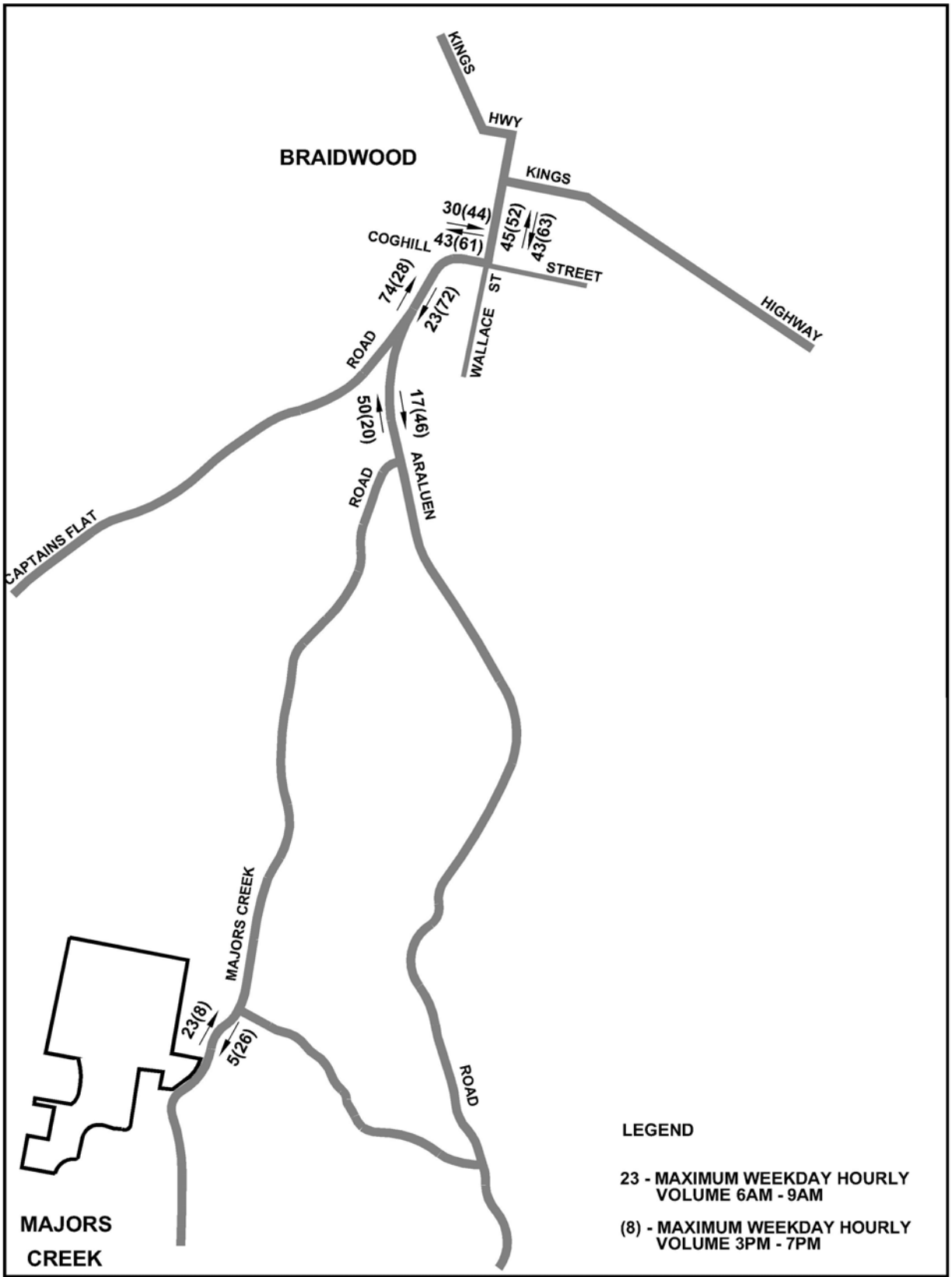

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FIGURE 6
DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK
WEEKDAY AM AND PM PEAK HOUR VOLUMES
JOB NO. 29124

Noting that Majors Creek Road, Araluen Road and Captains Flat Road are rural roads that pass through a mixture of level and rolling terrain, *Table 4.5* of the RTA's *Guide to Traffic Generating Developments* defines maximum (peak) hour Levels of Service Volume Thresholds for 2 lane rural roads. For rural roads with rolling terrain and where heavy vehicles comprise 10 to 15% of the total volumes, Level of Service A occurs when two way traffic volumes are less than 310 to 360vph. For rural roads with level terrain and the same proportion of heavy vehicles, Level of Service A occurs when two way traffic volumes are less than 530 to 560 vph.

Reference to **Table 3.3** shows the maximum two way hourly traffic volumes on the rural roads (Majors Creek Road, Araluen Road and Captains Flat Road) range between 34 and 100 vph. This indicates that existing conditions on these roads are representative of a Level of Service A operation, which represents good traffic conditions.

Similarly, maximum hourly two way traffic volumes on Coghill and Wallace Streets (town roads) at 105 vph and 115 vph are relatively low and representative of good traffic conditions (Level of Service A).

3.6.4 Traffic Volumes – Holiday Periods

While no traffic data is available for the road network around Braidwood during holiday periods, it is considered unlikely that the roads connecting Majors Creek to Braidwood would experience significantly higher traffic volumes, than in non-holiday periods.

The Kings Highway route between Canberra and Batemans Bay is likely to experience higher traffic volumes during the January school holiday period, particularly over the Christmas-New Year holiday period. However this period is not usually considered to be a normal work period, as many businesses are closed, or operate on reduced staffing during this period.

3.6.5 Future Traffic Growth on Road Network

The RTA's *Traffic Volume Data* provides some information on historical traffic volumes using the main road network in the Braidwood area. The latest published volumes are for the year 2003 and 2006. Traffic volumes have fluctuated with traffic growth in the Kings Highway east of Braidwood averaging around 1.3% per year over an 18 year period to 2006. North of Braidwood, outside the town, the traffic growth in the Kings Highway is lower and averaging about 0.7% per year over a 15 year period ending in 2003.

There is limited historical count data available on the road network between Braidwood and Majors Creek. The RTA's *Traffic Volume Counts* indicate that Captains Flat Road immediately south of Braidwood experienced modest growth of an additional 40 passenger car equivalents per day each year for the 9 year period between 1994 and 2003. This growth was from a relatively low AADT volume of 902 passenger car equivalents per day in 1994.

Future traffic growth on the road network between Braidwood and Majors Creek is expected to be small in real terms in the next 5 to 10 years, with very little traffic growth likely to occur on Majors Creek Road and small incremental traffic volume increases on the other roads such as Araluen Road, Captains Flat Road, Coghill Street and Wallace Street.

On the wider road network such as the Kings Highway, traffic growth is expected to be similar to historical growth trends and average between 0.7 and 1.3% per year.

Any increase in the traffic volumes using the road network in the next 5 to10 years is not considered likely to change the current level of service that operates on the road network.

3.7 ROAD SAFETY

Three (3) year accident statistics from April 2006 to March 2009, the road network between Lascelles Street, Braidwood and the Project Site were obtained from the RTA.

There were a total of four (4) accidents during this period including 2 injury accidents and one (1) fatality on the road network. This included;

- A non injury accident at the intersection of Wallace Street/Kings Highway (Lascelles Street);
- 2 run off the road accidents in Araluen Road on a curve, north of Majors Creek Road. One (1) of these accidents was a fatality and the other, an injury accident; and
- One (1) run off the road injury accident in Majors Creek Road, 8kms south of Araluen Road.

One (1) of the run off road accidents involved a truck and the remainder of the accidents involved cars. The fatal accident involved a car and occurred in the early hours on a Sunday (i.e. Saturday night). The run off the road accident in Majors Creek Road occurred on a Saturday evening at 6.30pm.

None of the above accidents occurred in fog and all the accidents occurred in dry conditions.

There does not appear to be any particular pattern with regard to the accidents, although excessive/inappropriate speed for the road conditions, may be one factor involved in the 3 run off road accidents.

3.8 BUS ROUTES

Murrays Coaches run a daily bus service between Batemans Bay and Canberra via Braidwood. These buses use the Kings Highway through Braidwood at 8.55am and 4.05pm.

There are 5 school bus services that use sections of the road network between Braidwood and the Project Site. These buses operate between 7.00am and 8.30am and 3.00pm and 5.00pm on school days.

There are also several school bus routes that use sections of the Kings Highway between Braidwood and Bungendore, Goulburn and Nerriga.

3.9 LOCAL WEATHER CONDITIONS

It is understood that the area around Majors Creek experiences low level cloud and fog on occasions throughout the year.

It is noted that Majors Creek Road has sections where a centreline is provided, typically where there are crests and curves where overtaking is not permitted. There are also other longer sections of the road, where no centreline is provided.

The other roads on the route to Braidwood, namely Araluen Road / Captains Flat Road / Coghill Street and Wallace Street all have centreline markings, along their full length.

Centreline road marking generally assists drivers when conditions are foggy.

4. ASSESSMENT OF TRAFFIC IMPACTS OF THE PROJECT

4.1 ASSESSMENT OF TRAFFIC IMPACTS ASSOCIATED WITH OPERATIONAL PHASE

4.1.1 Traffic Impacts

The traffic generation of the Project during the operational stage is anticipated to be as follows.

- Four (4) small bus movements per day (2 in / 2 out) taking the mine workers to and from the mine.
- Twenty (20) light vehicle trips per weekday (10 in / 10 out), associated with the (mine's) managers and office workers (16 trips), as well as visitor trips (4 trips).
- Eight (8) heavy vehicle movements per weekday (4 in / 4 out) in Year 1 increasing to 14 heavy vehicle movements per weekday (7 in / 7 out) in Year 3 or 4 associated delivering consumables to the mine and transporting the concentrate from the Project Site to port.

The peak hour for vehicles arriving and departing the mine will generally occur in the 6.00am to 9.00am period when the managers, office workers and other mine workers arrive at the mine. Based on a shift time change and the managers and office workers arriving in the same one (1) hour period, the traffic generation would be 10 vehicles per hour including 2 bus movements. The majority of this traffic will arrive and depart to the north via Braidwood. A small number of trips associated with workers may also arrive from and depart to the south.

The 3.00pm to 7.00pm period may also be a relatively busy time with the managers, office personnel and workers leaving the Project Site.

With limited exception, the heavy vehicle movements associated with the Project would occur between 7.00am and 10.00pm, arriving and departing via Braidwood. The Proponent would organise all the scheduled heavy vehicle movements to occur outside the hours of 7.00am to 8.30am and 3.00pm to 5.00pm on school days, between Braidwood and Majors Creek to avoid conflict with the school bus services.

The largest traffic impacts associated with the Project will occur on weekdays, when the Project would generate the highest volume of traffic.

On a typical weekday in Year 3 or 4, when the Project is at full production, the Project would increase two way traffic on the road networks between Majors Creek and Braidwood by 38 vehicles per day (i.e. 19 northbound and 19 southbound).

This will include 18 heavy vehicle movements (9 each way) consisting of 14 truck movements (7 each way) and 4 bus movements (2 each way). The impact of these additional traffic movements on the road network in terms of road and intersection capacity will be relatively small.

Table 4.1 and **Figure 7** show the traffic volume increases on the various road sections between the site at Majors Creek and Braidwood on a weekday when the Project is at full production (Year 3 or 4).

Table 4.1
Increases in Weekday Traffic Volumes on the Road Network Due to the Project

Road	Existing Weekday Volumes			Project Volumes			Total Volumes With Project			Increase Due to Project
	Light Vehicles %	Heavy Vehicles %	Total Vehicles	Light Vehicles %	Heavy Vehicles[1] %	Total Vehicles	Light Vehicles %	Heavy Vehicles %	Total Vehicles	Total Vehicles
Majors Creek Road	314 93%	23 7%	337 100%	+20	+14 + 4	+38	334 88%	41 12%	375 100%	11.3%
Araluen Road	619 88%	76 12%	695 100%	+20	+14 + 4	+38	639 87%	94 13%	733 100%	5.6%
Captains Flat Road	984 90%	103 10%	1 087 100%	+20	+14 + 4	+38	1 004 89%	121 11%	1 125 100%	3.5%
Coghill Street	973 89%	118 11%	1 091 100%	+20	+14 + 4	+38	993 88%	136 12%	1 129 100%	3.5%
Wallace Street	1 081 89%	140 11%	1 221 100%	+20	+14 + 4	+38	1 101 88%	158 12%	1 259 100%	3.1%

Light Vehicles - Austroads 1 and 2 vehicle classification
Heavy Vehicles - Austroads 3 – 12 vehicle classification
[1] 4 Bus movements for staff trips included as heavy vehicles

Through reference to **Table 4.1** the following assessments are made.

- Over most of the road network, the increase in total traffic volumes due to the Project would range between 3.1% and 5.6%. On Majors Creek Road, the increase in total traffic volume would be greater (11.3%), however, it is noted that Majors Creek Road carries relatively low traffic volumes (337vpd on a weekday) which accounts for the larger proportional increase on this road.
- The proportion of heavy vehicles using the road network increases by 1% on most sections of the road network, when compared to the existing 2010 traffic volumes, due to the Project and would remain in the order of 11 to 12%.
- The largest increase occurs in Majors Creek Road where the proportion of heavy vehicles will increase from 7% to 12%.

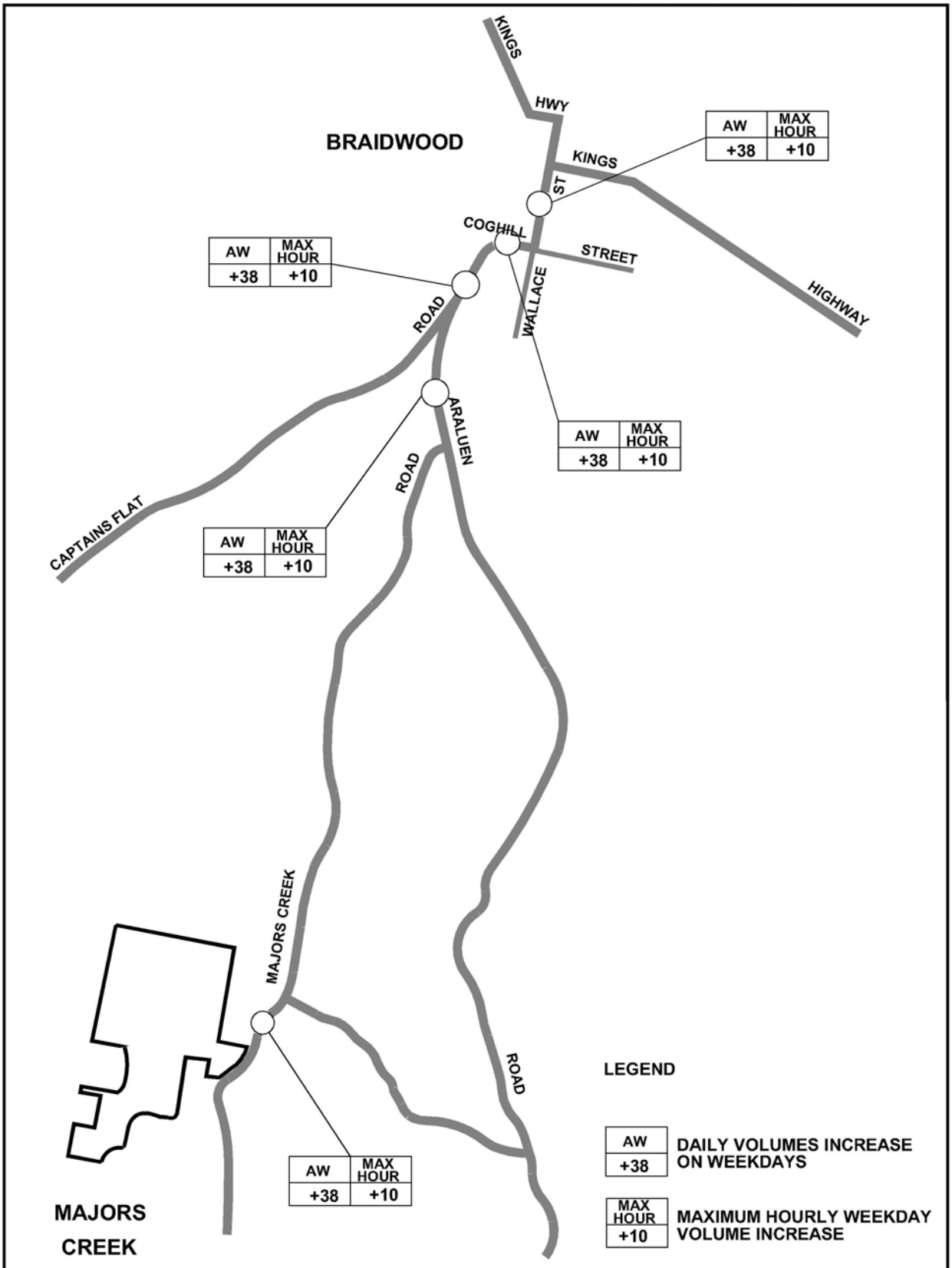

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FIGURE 7
DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK
TRAFFIC VOLUME INCREASE DUE TO PROJECT IN OPERATIONAL PHASE
JOB NO. 29124

Table 4.2 and **Figure 7** show the traffic volume increase on the road network, due to the Project, in the busiest one (1) hour on a weekday which would typically occur between 6.00am and 9.00am and/or between 3.00pm and 7.00pm.

Table 4.2
Maximum Hourly Two Way Traffic Volumes on the Road Network with the Project

Road	Existing Maximum Hourly Volumes		Additional Maximum Hourly Volumes from Project	Total Volumes with Project	
	6am-9am	3pm-7pm		6am-9am	3pm-7pm
Majors Creek Road	28	34	+10	38	44
Araluen Road	67	66	+10	77	77
Captains Flat Road	97	100	+10	107	110
Coghill Road	73	105	+10	83	115
Wallace Street	88	115	+10	98	125

Reference to **Table 4.2** shows that the Project-related increase in the maximum one hour period of 10 vph on the road network between Majors Creek and Braidwood is small in real terms and would have a very minor impact on existing traffic conditions on these roads.

Two way traffic volumes on the rural road section of the road network, i.e. Majors Creek Road, Araluen Road and Captains Flat Road, are estimated to range between 38 to 110 vph which are consistent with a Level of Service A operation, i.e. good traffic conditions.

Similarly, maximum hourly two way traffic volumes on Coghill and Wallace Streets (town roads) estimated at 115 vph and 125 vph are still relatively low and representative of good traffic conditions (Level of Service A).

There would be no measurable impact on any of the intersections between Braidwood and the Project Site in terms of capacity and/or Level of Service. The maximum increase in traffic volumes on an average weekday due to the Project would be 19 vehicles per day travelling in each direction between Majors Creek and Braidwood. The maximum hourly volume increase due to the Project would be 10 vph. These increases in traffic volumes are relatively small and, as noted above, would not have any measurable impact on intersection capacity and or vehicle delay.

4.1.2 Other Impacts

While the number of heavy vehicles generated by the Project would be relatively small (8 heavy vehicle truck movements per day in Year 1 increasing to 14 heavy vehicle truck movements per day in Year 3 or 4), the heavy vehicles would contribute to pavement deterioration on the parts of the local road network. In particular the longer articulated vehicles, i.e. 19 metre semi-trailers, may accelerate damage to road edges on the narrower roads such as Majors Creek Road.

Wallace Street/Coghill Street/Captains Flat Road/Araluen Road generally have sealed pavements between 6.2 metres to 7.0 metres wide and satisfy RTA Road Design Guidelines regarding pavement width for the future traffic volumes that will use these roads with the Project in place.

Majors Creek Road, which has a sealed pavement of 5.8 metres wide, is likely to experience some damage to the edge of the sealed pavement particularly on curves and bends, from the increased number of articulated vehicles travelling to and from the Project Site.

Palerang Shire Council's *Section 94 Contributions Plan No. 3 – Road works* identifies that contributions are required for Extractive Industry Developments and a formula for calculating the required contributions is provided in the plan.

These contributions can be used to maintain/widen the road edges in Majors Creek Road, as well as for the maintenance of other sections of the road network.

4.1.3 Impacts on the Wider Road Network

The Project would result in 8 heavy vehicle movements per day in Year 1 increasing to 14 heavy vehicle movements per day in Year 3 or 4 using the state road network of Kings Highway. It is feasible, depending on whether the product concentrate is exported, that up to 8 heavy vehicle movements per day will use the Kings Highway to Batemans Bay.

The impact of these heavy vehicles on the state road network will be minimal in terms of traffic impacts and pavement impacts. All state roads are expected to carry heavy vehicles and are constructed accordingly with stronger pavements.

Daily traffic volumes (AADT) using the Kings Highway, north and east of Braidwood in 2003 and 2006 were 4 496 and 3 244 vehicles per day, respectively. As noted above, the additional heavy vehicles associated with the Project would have minimal impacts on traffic conditions in the Kings Highway and on other parts of the state road network.

4.2 PROPOSED TRAFFIC MANAGEMENT IN MAJORS CREEK ROAD THE PROJECT SITE'S VEHICLE ENTRANCE

As noted in Section 2.3, a new intersection would be constructed in Majors Creek Road approximately 42 metres from the Project Site's northern boundary to provide vehicle access to the Project Site.

The intersection would be designed and constructed to RTA standards for a Basic Rural intersection incorporating BAL and BAR treatments for the left turn and right turn into the Project Site. The intersection would be able to accommodate articulated vehicles turning right into and left out of the Project Site. The proposed access road on the Project Site would have a sealed 7.0 metre wide pavement with sealed shoulder for a length of 50 metres into the Project Site before it becomes a gravel road. Suitable environmental controls would be provided near the entrance to prevent soil waste, etc. from being carried into Majors Creek Road.

The intersection would have adequate sight distance in Majors Creek Road to meet safe intersection sight distance requirements for the posted speed limit and the recorded 85th percentile vehicle speed at this location which are 100 km/hr and 97 km/hr respectively. Allowing for the 5% upgrade south to north in Majors Creek Road the required sight distance at the intersection is 215 metres to / from the south and 235 metres to / from the north. The available sight distance at the proposed location exceeds these requirements, although there would be a requirement for ongoing maintenance to ensure that long grasses and bushes that grow in the road shoulder and clear zone area in southern approach of Majors Creek Road are regularly cleared.

Figure 8 shows the proposed layout. The BAL and BAR treatments for the left and right turning vehicles at the intersection are based on RTA's warrants for Rural Turn Lanes (as defined by the RTA *Road Design Guide*) and the traffic volumes that would use the intersection.

The maximum number of vehicles that would turn right and or left into the Project Site in any one hour would be in the order of 10 vehicles and 2 vehicles respectively. This would occur in the weekday mornings between 6.00am and 9.00am. Traffic volumes using Majors Creek Road, as determined from the traffic counts undertaken in 12 to 19 February 2010, are a maximum of 23 vph travelling northbound and 9 vph travelling southbound, during these periods, as shown in **Table 4.3**. The volumes that will use the intersection are relatively low and based on the RTA warrants for Rural Turn Lanes, Basic BAR and BAL treatments are appropriate for the right and left turn movements, at the intersection. **Appendix 1** shows the warrants for Rural Turn Lanes as presented in the RTA *Road Design Guide*.

The number of heavy vehicles generated by the Project, together with the existing northbound traffic volumes using Majors Creek Road, are not sufficient to warrant the provision of a left turn acceleration lane for heavy vehicles leaving the Project Site.

The number of left turn heavy vehicles will number 7 per day in Year 3 or 4 (i.e. less than one (1) heavy vehicle per hour). The northbound through movement using Majors Creek Road numbers between 7 and 23 vph between 6.00am and 10.00pm on weekdays (see **Table 4.3**).

As noted above, these volumes do not warrant a left turn acceleration lane in northbound direction in Majors Creek Road at the Project Site's entrance.

4.3 OTHER SUGGESTED UPGRADES TO THE ROAD NETWORK

The following additional works to upgrade the road network should be considered to ensure that existing deficiencies on the road network are addressed and the potential impacts of the additional traffic associated with the Project are minimised.

1. Provide centreline road marking in Majors Creek Road along its full length between the Araluen Road and the new intersection to the Project Site. This will assist drivers using Majors Creek Road to drive on the left of the centreline at all times, especially at those times of low cloud / fog, and will assist in maintaining road safety. Centrelines can be marked on roads where the road pavement is a minimum of 5.5 metres wide.

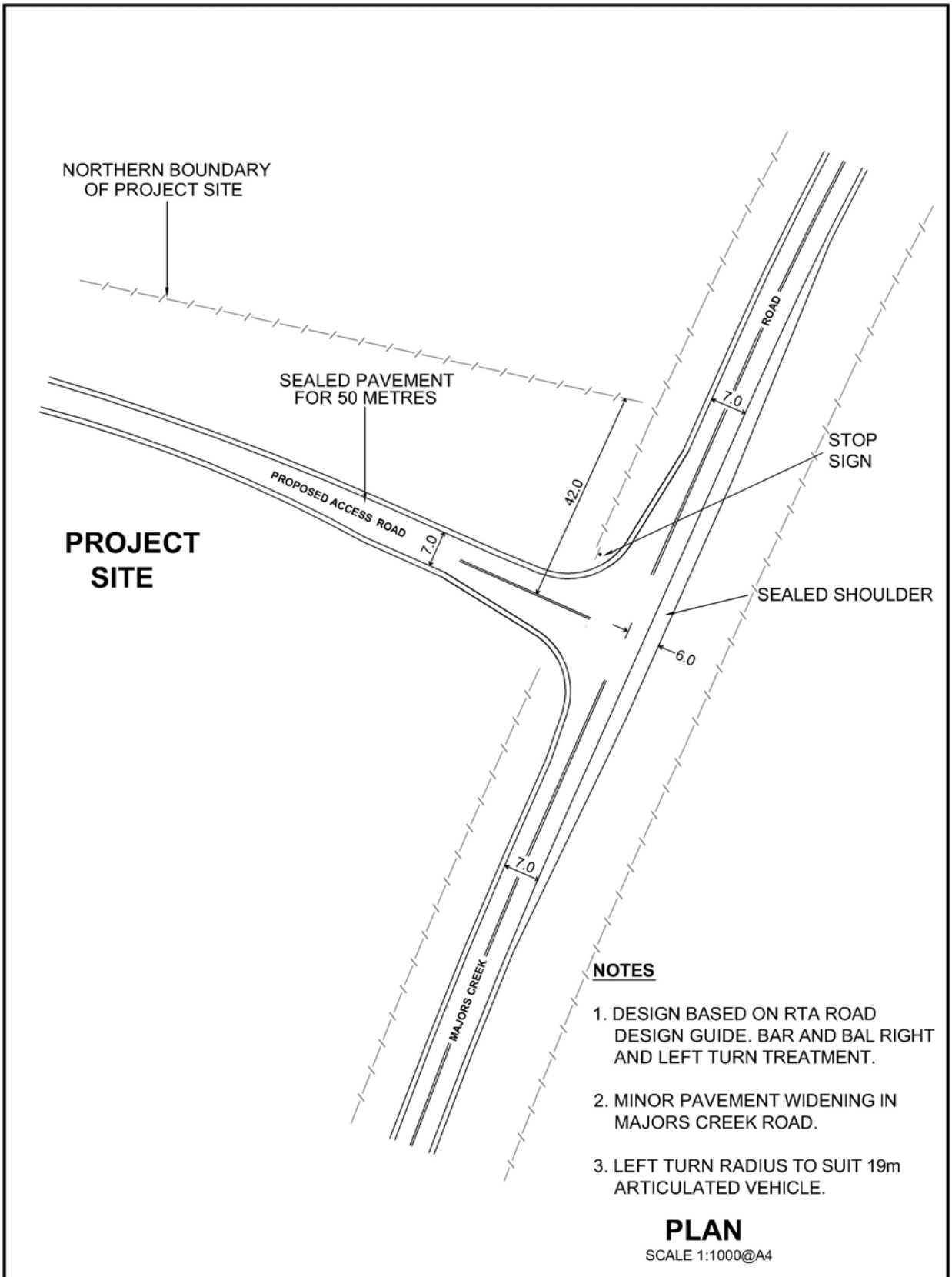
NORTHERN BOUNDARY OF PROJECT SITE
SEALED PAVEMENT FOR 50 METRES
PROPOSED ACCESS ROAD
7.0
42.0
PROJECT SITE
ROAD
7.0
STOP SIGN
SEALED SHOULDER
6.0
7.0
MAJORS CREEK
NOTES
1. DESIGN BASED ON RTA ROAD DESIGN GUIDE. BAR AND BAL RIGHT AND LEFT TURN TREATMENT.
2. MINOR PAVEMENT WIDENING IN MAJORS CREEK ROAD.
3. LEFT TURN RADIUS TO SUIT 19m ARTICULATED VEHICLE.
PLAN
SCALE 1:1000@A4
TRANSPORT AND URBAN PLANNING
TRAFFIC, TRANSPORT & PROJECT MANAGEMENT CONSULTANTS
5/90 Toronto Parade, Sutherland NSW 2232
Phone 02 9545 1411 Fax 02 9545 1556
tupa@tpg.com.au www.transurbanplan.com.au
N
NOT TO SCALE
FIGURE 8
DARGUES CREEK GOLD MINE,
MAJORS CREEK RD, MAJORS CREEK
CONCEPT DESIGN FOR PROPOSED ACCESS
JOB NO. 29124

Table 4.3
Hourly Directional Traffic Volumes using Majors Creek Road (Adjacent the Project Site) on Average Weekday

Time	Northbound Traffic Volume	Southbound Traffic Volume
Midnight – 1.00am	0	1
1.00am-2.00am	0	0
2.00am-3.00am	0	0
3.00am-4.00am	0	0
4.00am-5.00am	1	0
5.00am-6.00am	4	3
6.00am-7.00am	15	2
7.00am-8.00am	16	9
8.00am-9.00am	23	5
9.00am-10.00am	15	9
10.00am-11.00am	11	11
11.00am-Midday	7	9
Midday-1.00pm	8	8
1.00pm-2.00pm	8	12
2.00pm-3.00pm	11	9
3.00pm-4.00pm	7	15
4.00pm-5.00pm	11	19
5.00pm-6.00pm	8	26
6.00pm-7.00pm	10	12
7.00pm-8.00pm	5	7
8.00pm-9.00pm	2	7
9.00pm-10.00pm	1	4
10.00pm-11.00pm	1	3
11.00pm-Midnight	1	1

2. Provide isolated pavement widening on curves and crests at the following chainages, as measured from Araluen Road.
   - Reverse curve at 2.4km and 2.7km.
   - Curve at 3.25km.
   - Crest at 3.8km.
   - Curve at 4.3km.
   - Curve at 4.5km.
   - Curve and crest near Morgans Lane at 5.3km and 5.5km.
   - Crest at 6.9km.
   - Crest at 7.75km.
   - Crest at 8.2km.
3. Provide signage/delineation and appropriate crash protection such as guardrail at the culverts at chainages 4.4km and 4.9km, as well as at the bridge structure over Honeysuckle Creek.

4. Investigate the need to widen the shoulder formation in Araluen Road on the eastern side at Majors Creek Road intersection to achieve a BAR right turn treatment to RTA Standards. The existing shoulder formation at the intersection is narrower than the RTA Standard and would not permit southbound through vehicles to pass (on the road shoulder) a stationery right turn vehicle, waiting to turn right into Majors Creek Road. Although the traffic volumes using the intersection are relatively low, there would be a small increase in right turning vehicles of 10vph in the busiest one hour, due to the Project. The shoulder widening would improve potential road safety for all existing and future vehicles that would use the intersection and upgrade the intersection to current RTA Standards. **Table 4.4** shows the existing and future volumes using the intersection with the Project in place. Based on the additional volumes generated by the Project (5.1%), any contribution by the Proponent towards this upgrade based on a proportional share should be relatively small.

The Proponent would need to negotiate an appropriate contribution with Palerang Shire Council towards the costs of the above road improvements (Items 1 to 3), and a timeframe for implementation, if the suggested road improvements are adopted by the road authorities. Most of the above works should be completed within the first year of the operational phase commencing.

The Proponent should also provide for an ongoing contribution towards road maintenance to address pavement damage to the local council road network, from the heavy vehicles generated by the Project. This contribution should be calculated in accordance with Council's *Section 94 Contributions Plan No 3 – Road works*.

4.4 ROAD SAFETY

The Project would increase the number of heavy vehicles using the road network between Braidwood and the Project Site. As noted previously, the increase in heavy vehicles in real terms is quite small and in the order of 8 heavy vehicle truck movements per day in Year 1 increasing to 14 heavy vehicle truck movements per day in Year 3 or 4. Other light vehicles and staff bus movements using the road network associated with the Project are also quite small in real terms, being a maximum of 24 movements per day.

Whilst there is unlikely to be any deterioration in road safety, due to the Project, nonetheless the Proponent wants to ensure that safety, including road safety, is an integral part of the Project and will undertake the following initiatives to ensure road safety principles are maintained.

- Schedule all regular heavy vehicle movements associated with the Project during its operational phase, to avoid the hours that school buses operate on the local road network; and
- Introduce a Code of Conduct for all drivers operating heavy vehicles that travel to and from the Project Site. Among other things the Code of Conduct would stipulate safe driving practices must be maintained at all times and would nominate a maximum vehicle speed on Majors Creek Road of 80km/h for heavy vehicles travelling to and from the Project Site. (NB: exiting speed limit is 100km/h). The code would also include specific requirements for practices to be adopted during periods of fog, such use of headlights / fog lights and adopting vehicle speeds appropriate to the conditions as required.

Table 4.4
Comparison of Additional Project Right Turn Volumes to Traffic Volumes Using Araluen Road at Majors Creek Road Intersection on Average Weekday

Time	Southbound Traffic Volume			Northbound Traffic Volume
	Through	Right	Total	
Midnight – 1.00am	0	1	1	0
1.00am-2.00am	0	0	0	0
2.00am-3.00am	0	0	0	0
3.00am-4.00am	0	0	0	1
4.00am-5.00am	0	0	0	0
5.00am-6.00am	1	3	4	2
6.00am-7.00am	4	2	6	9
7.00am-8.00am	8	9	17	14
8.00am-9.00am	12	5	17	27
9.00am-10.00am	11	9	20	17
10.00am-11.00am	9	11	18	13
11.00am-Midday	10	9	19	12
Midday-1.00pm	9	8	17	10
1.00pm-2.00pm	14	12	26	12
2.00pm-3.00pm	13	9	22	9
3.00pm-4.00pm	19	15	34	15
4.00pm-5.00pm	18	19	37	12
5.00pm-6.00pm	21	26	47	12
6.00pm-7.00pm	17	12	29	7
7.00pm-8.00pm	8	7	15	3
8.00pm-9.00pm	2	7	9	2
9.00pm-10.00pm	2	4	6	1
10.00pm-11.00pm	3	3	6	0
11.00pm-Midnight	1	1	2	0
Daily Total	**182**	**172**	**352**	**178**
Project Right Turn Volumes - per day - maximum hour (once per day)	 - -	 19 10	 - -	
Future Weekday Total with Project Right Turn Volumes	182	191	371	178
Project's Right Turn Volumes Proportion (%) of Total Southbound Traffic Volumes	5.1%			

4.5 BUS ROUTES AND HEAVY VEHICLE MOVEMENTS

As noted in Section 4.4 (and previously), the Proponent would schedule the heavy vehicles associated with the delivery of consumables to the Project Site and the transport of gold concentrate product for export/further processing to avoid school bus times using the local road network between Braidwood and Majors Creek. School bus times are typically 7.00am to 8.30am and 3.00pm to 5.00pm on school days.

This should eliminate any potential conflicts and community concerns with trucks associated with the Project using the road network at the times that the school buses operate on the local road network.

In addition, where possible, all scheduled regular heavy movements associated with the operational phase of the Project would be scheduled to occur between 7.00am and 10.00pm on weekdays (avoiding the school bus times) to minimise noise impacts through Braidwood.

4.6 ASSESSMENT OF TRAFFIC IMPACTS ASSOCIATED WITH SITE ESTABLISHMENT (CONSTRUCTION) PHASE

The average traffic generation of the Project during the site establishment (construction) phase is estimated to average:

- 24 light vehicle trips per weekday (12 in / 12 out) associated with the construction workforce; and
- 6 to 8 heavy vehicle movements per weekday (3 to 4 in / 3 to 4 out) associated with the delivery of equipment and materials.

It is expected that all the heavy vehicle movements would access the Project Site from the north via Braidwood, as would the majority of the construction workforce. A small number of the workforce trips (estimated as up to 4 vehicles per day) may arrive from and depart to the south (i.e. to/from Majors Creek town).

The additional traffic volumes using the road network on weekdays, which is in the order of 32 to 34 vehicle trips (16 to 17 trips in each direction) and includes 6 to 8 heavy vehicle movements (3 to 4 heavy vehicles in each direction), is similar to the traffic generation for the operational phase and would result in similar impacts.

The above traffic volumes do not include the heavy vehicle and workforce trips associated with the construction of the new intersection for the Project Site on Majors Creek Road.

Following approval of the Project, the Proponent would prepare a Traffic Management Plan to manage the traffic impacts associated with the construction of the new intersection for the Project Site on Majors Creek Road. The Traffic Management Plan would include traffic control plans and nominate areas for the parking of heavy vehicles/equipment and other vehicles used by the workforce, during the construction of the intersection. In addition the Traffic Management Plan would provide details of the traffic controls required for the site access during the Site Establishment Phase. The other suggested upgrades to the road network, if adopted would be subject to separate Traffic Management Plans prepared by the construction contractor / authority.

5. CONCLUSIONS

This report documents the assessment of traffic impacts of the Dargues Reef Gold Project at Majors Creek.

As part of the Project, a new intersection would be constructed to RTA standards incorporating BAR and BAL treatments for turning vehicles, in Majors Creek Road, to provide vehicle access to the Project site, north of the town of Majors Creek.
At full production (in Year 3 or 4 of the Operational Phase), the Project is expected to generate 38 vehicle trips per day (19 trips in each direction) on the road network south of Braidwood. Of the 38 vehicle movements each day, it is expected that 14 would be heavy vehicles and a further 4 would be bus movements. During the peak hour associated with staff/employee start and finish times, the traffic generation of the Project would be 10 vehicles per hour, most of which would be light vehicles.

The road network which forms the transport route between Braidwood and the Project Site includes: Kings Highway; Wallace Street; Coghill Street; Captains Flat Road; Araluen Road; and Majors Creek Road.

The additional traffic associated with the Project in the Operational Phase would not change the level of service of the existing roads and intersections and these would continue to operate at good level of service (Level of Service A), representative of good traffic conditions in terms of vehicle delay.

There would be a need to provide some road upgrades in Majors Creek Road to address existing deficiencies and to ensure road safety is maintained. These works include the provision of a centreline along the full length of Majors Creek Road, isolated widening on some curves and crests along the route, as well as improved signage and crash protection at 2 culverts and a bridge along the route.

The Proponent would need to make an appropriate contribution towards these upgrade works, as well as provide a contribution towards road maintenance for pavement damage by heavy vehicles in accordance with Council's Section 94 Contributions Plan.

The Proponent would also include the following initiatives as part of the Project to ensure community concerns regarding transport/traffic issues are addressed and any adverse impacts are minimised.

- Schedule all planned heavy vehicles movements to and from the Project Site in the Operational Phase to occur between 7.00am to 10.00pm and avoid the times when school buses operate on the road network.
- Introduce a Code of Conduct for all drivers operating heavy vehicles that travel to and from the Project site, to ensure safe driving practices are maintained at all times.

During the Site Establishment (Construction) Phase the traffic generation is expected to be up to 32 to 34 traffic movements per day, including 6 to 8 heavy vehicle movements. This number does not include the heavy vehicle trips and workforce trips associated with the construction of the new intersection for the Project Site on Majors Creek Road. Following approval of the Project, the Proponent would prepare a Traffic Management Plan to manage the traffic impacts associated with the construction of the new intersection, as well as the Site Establishment Phase.

6. REFERENCES

Guide to *Traffic Engineering* – Parts 1-15 – Austroads

Guide to *Traffic Generating Developments* October 2002 – Roads and Traffic Authority of New South Wales

Road Design Guide – Roads and Traffic Authority of New South Wales

Traffic Volume Data for Southern Region 2000, 2003, 2006 – Roads and Traffic Authority of New South Wales

Delineation – Roads and Traffic Authority of New South Wales

APPENDIX 1

ROADS AND TRAFFIC AUTHORITY WARRANT FOR RURAL TURN LANES AND INTERSECTION TYPE WITH BAR AND BAL LAYOUT

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4.5.4 Output

The output of this process of considering the layout options for the site will be a number of intersection layouts, and forms of control, that are clearly ***inappropriate***. The remaining options and forms of control are then carried forward into the evaluation process. This process is detailed in **Section 4.6.**

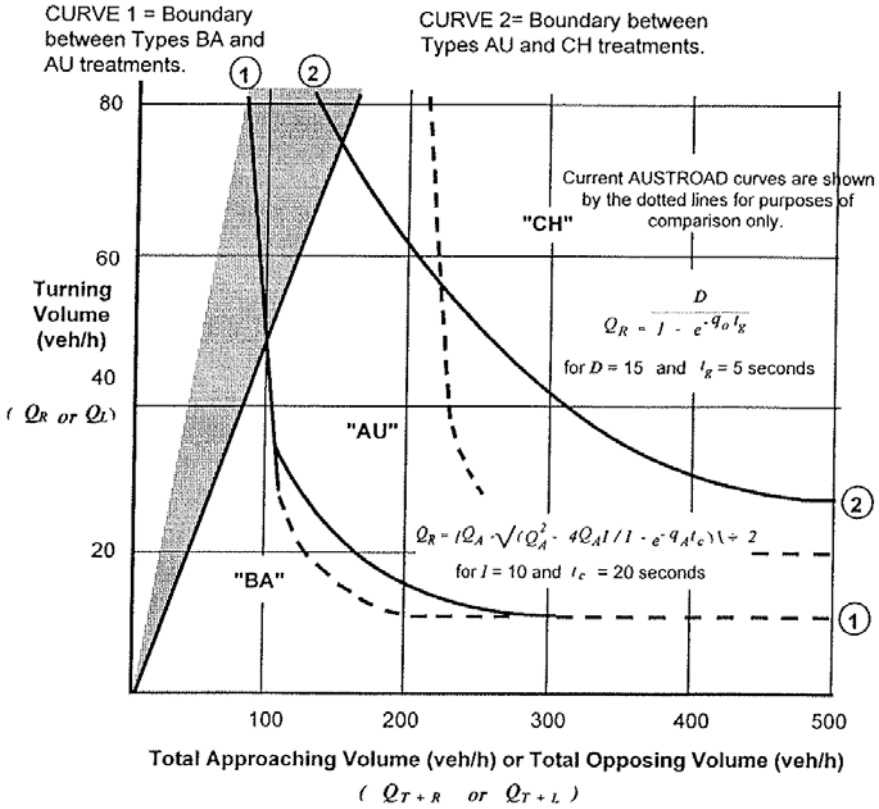
In the absence of any other information, **Table 4.5.3** can assist in identifying layout options, and forms of control, which are not suited to a site.

At RURAL sites McKerral, Leong & Dominis (ref 11) considered the probability of interference to a through vehicle by a turning vehicle slowing down, or stopping in front. This is shown in **Figure 4.5.12** below.

Curve 1 shows the relationship where 10 vehicles are required to slow each hour (l=10) and the conflict time (t_c) is 20 seconds. In the formula, Q_A is the total approach volume (veh/hr), Q_R (or Q_L) the turning volume (ie. Q_A) (veh/hr), and q_A the total approach volume given as veh/sec.

Curve 2 shows where 15 veh/h must stand waiting for a gap (t_g) of 5 secs. Here q_0 is the volume of opposing traffic in veh/sec., and tg is the gap necessary to turn (assumed as 5 secs.

It must be stressed that **Figure 4.5.12** is only a guide and the final choice should take into account strategic aspects such as planning for more consistency in driver expectations along key routes.



NOTES:

1. *Where peak hour volumes are not available, assume the design peak hour volume equals 15% of the AADT. for 500 hours each year; use 5% of AADT for the rest of the year. See Section 1.4. for further details.*
2. *Use graph "AU" to select need for an auxiliary lane. Use "CH" to determine if a sheltered right turn is required. On high speed roads with substantial volumes of heavy vehicles, the use of Type "AU " and "CH" is preferred for safety reasons.*
3. *Use of Types "AU" and "CH" is preferred on high speed and/or heavy vehicle routes to enhance safety.*

▒ *In this region more than 50% of the approaching traffic turns. Hence consideration needs to be given to possible realignment of the intersection to suit the major traffic movement.*

Figure 4.5.12 - Warrants for Rural Turn Lanes

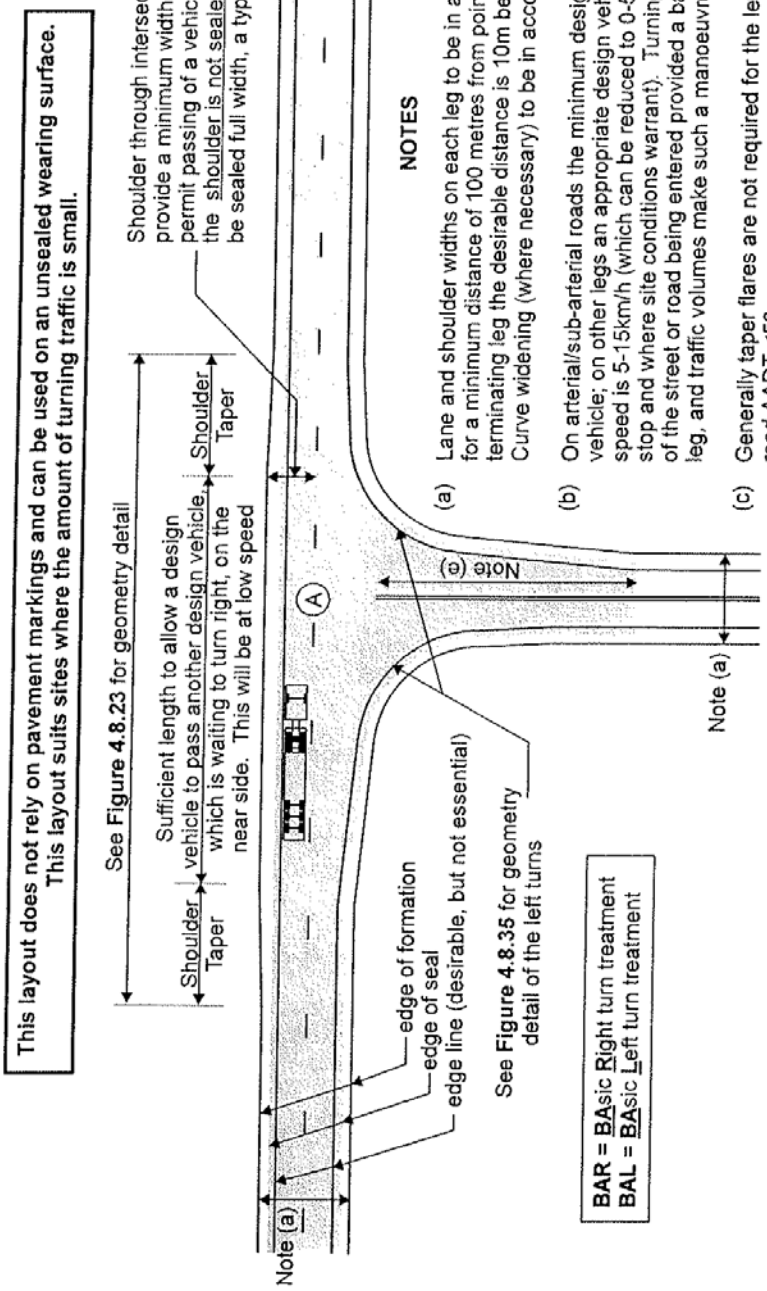


Figure 4.5.2 - Type BAR and BAL Layout Combined to show a Basic Rural Intersection Treatment on both a Through and a Terminating Leg