PROPOSED QUARRYING, CRUSHING & SCREENING OPERATIONS

LOT 150 (SN 792) CLYDESDALE RD, GRASS VALLEY (NORTHAM)

TRANSPORT IMPACT STATEMENT

Final 3-0

Prepared by i3 consultants WA for

Resource Group [WA] Pty Ltd

Project details

Project	Proposed Quarrying, Crushing & Screening Operations
Location	Lot 150 (SN 792) Clydesdale Rd, Grass Valley (Northam)
Project ID	19301
Client	Resource Group [WA] Pty Ltd
Description	A Transport Impact Statement for proposed quarrying, crushing and screening operations on Lot 150 Street Number 792 within the Shire of Northam locality of Grass Valley prepared in accordance with the WAPC 2016 Transport Impact Assessment Guidelines.

Document control

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Version F1-1 with signed WAPC checklist. Version F2-0 includes executive summary to respond to specific issues raised by the Shire of Northam. Version 3-0 contains MRWA comment and change of haulage route as recommended by MRWA.

This is not an approved document unless certified here.

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ABOUT THE AUTHOR

David Wilkins has over 35 years of practical experience in traffic engineering, road safety and transport planning in both the UK and Australia and is an RTA NSW Certified Level 3 Lead Auditor (RSA-08-0178) and Main Roads Western Australia (MRWA) accredited Senior Road Safety Auditor (SRSA 0101). In addition to this, David is an MRWA accredited Crash Investigation Team Leader and Roadworks Traffic Manager (MRWA-RTM-10-RTM20). David has undertaken 101 road safety audits in the last five years and 230 road safety audits since 2001 across the full range of stages from feasibility through to pre-opening, including roadworks, existing roads, schools and mine sites.

David's specialist skills are in the management and development of transport infrastructure and planning, particularly with respect to road safety engineering, roadworks traffic management, traffic engineering, crash investigation, road safety audits, alternative transport systems (TravelSmart, shared paths, cycle facilities), transport statements, transport assessments, parking demand management, local area traffic management, speed management, accessible environments and innovation.

David specialises in undertaking and preparing traffic impact assessments in accordance with either the WAPC document 'Transport Impact Assessment Guidelines' or Austroads 'Guide to Traffic Management Part 12: Traffic Impacts of Developments'. In the last 7 years, David has personally prepared over 170 traffic and transport impact reports in accordance with these guidelines.

IMPACT SUMMARY

The first final version (F1-0) of this TIS was submitted to the Shire of Northam for review and resulted in the following comment:

"generally satisfied with the document except that it could be more specific in regards to the following:

1. The impact of the existing and additional truck movements generated by the quarry on Clydesdale Rd (i.e. is it anticipated that traffic on Clydesdale Rd will continue to operate as per normal (as it currently does)?); and
2. What, in the opinion of the traffic engineer, impact the additional truck movements on Clydesdale Rd is likely to have on the amenity (character) of the locality?"

This TIS has assessed impacts based on the 2016 WAPC Guidelines definition that any development that generates less than 10 trips during its, or the road network's, peak hour is 'Low'. Those that generate between 10 and 100 are deemed to be 'moderate' and those that generate more than 100 are deemed to be 'High'. These definitions have also been accepted by the State Administrative Tribunal when assessing traffic impacts.

Hours of Operation will be from 07.00 hours to 17.00 hours, Monday to Saturday with road haulage trucks typically arriving from 6.30am. No extraction, crushing, screening or truck deliveries will occur on Sundays or Public Holidays.

On average eight (8) truck truck-loads per day are anticipated. However, during busy times this may climb to twenty-five (25) truck-loads per day for short periods. A 'truck load' results in 2 truck trips, i.e. 1 IN and 1 OUT. This equates to an average hourly truck trip volume of 2 and a maximum hourly truck trip volume of 5, i.e. a 'Low' impact.

Existing average daily heavy vehicle volumes on Clydesdale Rd is 12, based on traffic counts undertaken by the Shire of Northam in June and July this year. Despite this number of existing heavy vehicles, there have not been any reported crashes involving heavy vehicles anywhere on Clydesdale Road in the 5-year reporting period ending 31st December 2017. This indicates that Clydesdale Road currently operates safely, even with heavy vehicle use of between 20.8% and 24.2% of existing volumes. Based on this, Clydesdale Rd is expected to continue to operate as per normal.

Whilst the above assesses the impact in terms of safety and capacity, it does not consider the many other 'social' impacts that can be considered with respect to the amenity or character of the locality.

Figure 1 on the following page provides an overview of the main areas in which transport gives rise to negative impacts. It shows that transport can endanger nature and human health in many ways, notably through air pollution, noise and crashes. The TIS and Acoustic Assessment reports address noise and crashes.

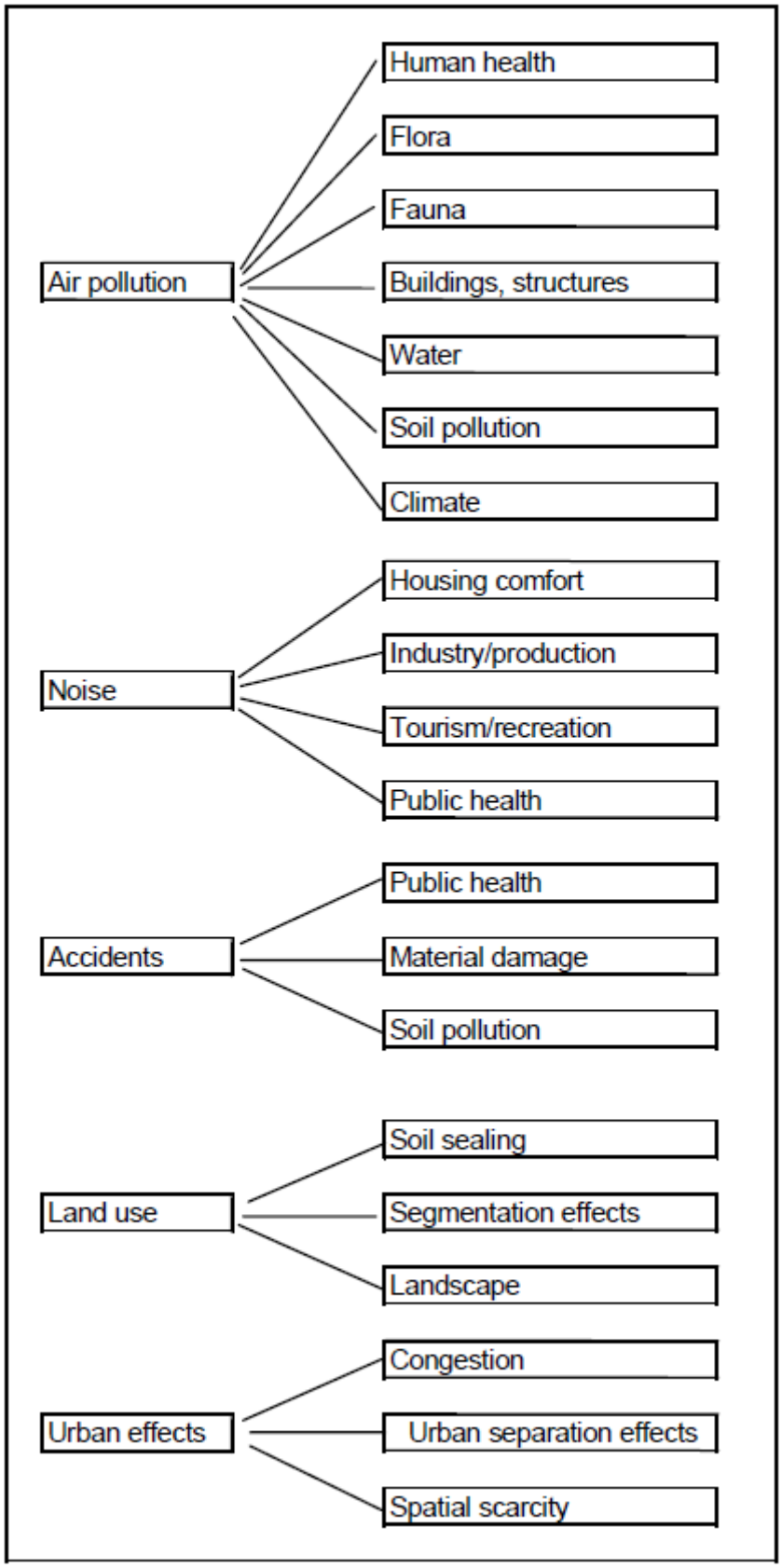


Figure 1 – Domains of negative impacts of transportation (Source WHO Charter on Transport, Environment and Health, June 1999)

The assessed scale of the proposed operation is low, i.e. an average of an additional 16 truck trips per day and is therefore not considered to have a noticeable impact on air pollution. To put this into perspective, Great Eastern Hwy runs parallel to Clydesdale Rd between 200 m and 600 m to the south and carries 1,118 heavy vehicles every day.

Main Roads WA Northam provided the following comments after assessment of the 2nd Final Version of the report (F2-0):

"*The intersection of Vivian and GEH is RAV rated for the proposed vehicle types. The intersection has the required sight distances and the existing layout includes widening on the eastbound approach of GEH to facilitate right turning vehicles from GEH and an acceleration lane/overtaking lane for left turning laden vehicles from Vivian onto GEH. The intersection has no recorded accidents in the last five years. Main Roads recommendation would be to use Vivian/GEH intersection as no further improvements would be required. If the proponent would like to pursue the use of Clydesdale/GEH intersection further information on the above issues will be required and the proponent will need to upgrade the intersection*".

Following receipt of the above comment, the proponent has requested that this TIS report is revised to reflect Main Roads WA recommendation regarding the haulage route via Vivian St/ GEH, i.e. via Grass Valley, as shown in Figure 2 below.

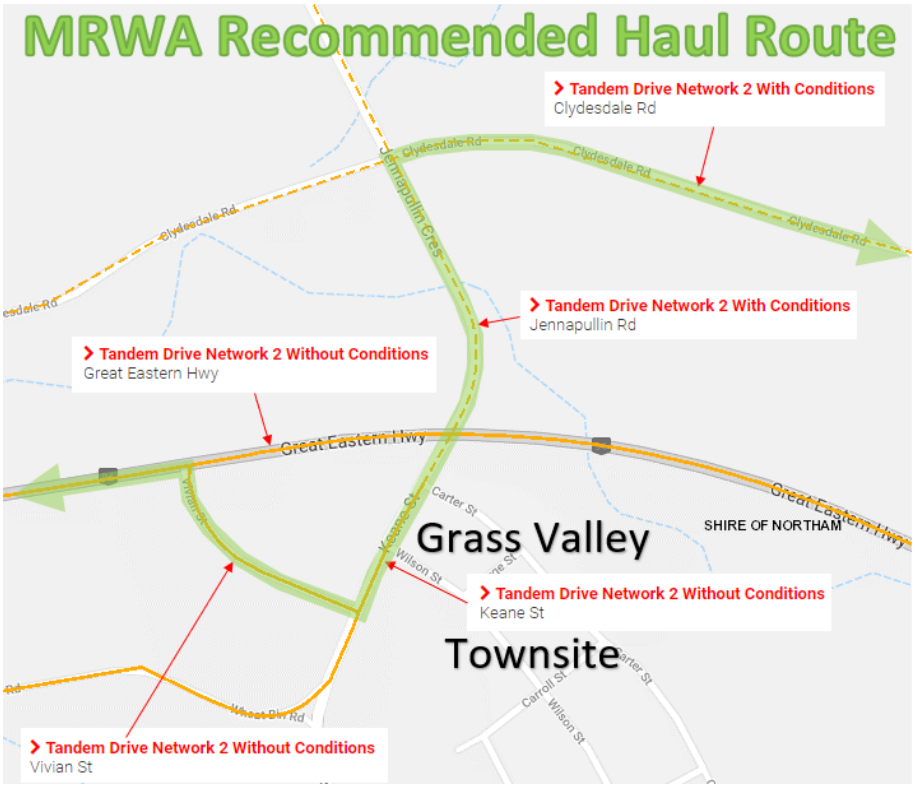


Figure 2 - Tandem Drive Network 2 routes and MRWA recommended Haul Route

In summary, the assessed impacts associated with truck movements to and from the proposed quarry are low and have been minimised through proactive measures such as avoiding school bus operating times as well as using larger vehicles to reduce the number of vehicular movements.

1 INTRODUCTION

This Transport Impact Statement report has been prepared in accordance with the WAPC publication Transport Impact Assessment Guidelines (1). These guidelines indicate that a Transport Impact Statement (TIS) is required for those developments that would be likely to generate moderate volumes of traffic and therefore would have a moderate overall impact on the surrounding land uses and transport networks.

A development that generates between 10 and 100 vehicle trips in the peak hour is classified as Moderate Impact and requires a Transport Impact Statement (TIS). A development that generates more than 100 additional vehicle trips in the peak hour is classified as High Impact and requires a Transport Impact Assessment.

Table 1 of Volume 4 of the WAPC Guidelines indicates the level of TIA required by land use and size and is reproduced as Table 1 below.

LAND USE	MODERATE IMPACT	HIGH IMPACT
	Transport Impact Statement required	Transport Impact Assessment required
	10 – 100 vehicle trips in the peak hour	> 100 vehicle trips in the peak hour
Residential	10–100 dwellings	>100 dwellings
Schools	10–100 students	>100 students
Entertainment venues, restaurants, etc.	100–1000 persons (seats) OR 200–2000 m² gross floor area	>1000 persons (seats) OR >2000 m² gross floor area
Fast food restaurants	50–500 m² gross floor area	>500 m² gross floor area
Food retail /Shopping centres with a significant food retail content	100–1000 m² gross floor area	>1000 m² gross floor area
Non-food retail	250–2500 m² gross floor area	>2500 m² gross floor area
Offices	500–5000 m² gross floor area	>5000 m² gross floor area
Service Station	1–7 refuelling positions	>7 refuelling positions
Industrial/Warehouse	1000–10,000 m² gross floor area	>10,000 m² gross floor area
Other Uses	Discuss with approving authority	Discuss with approving authority

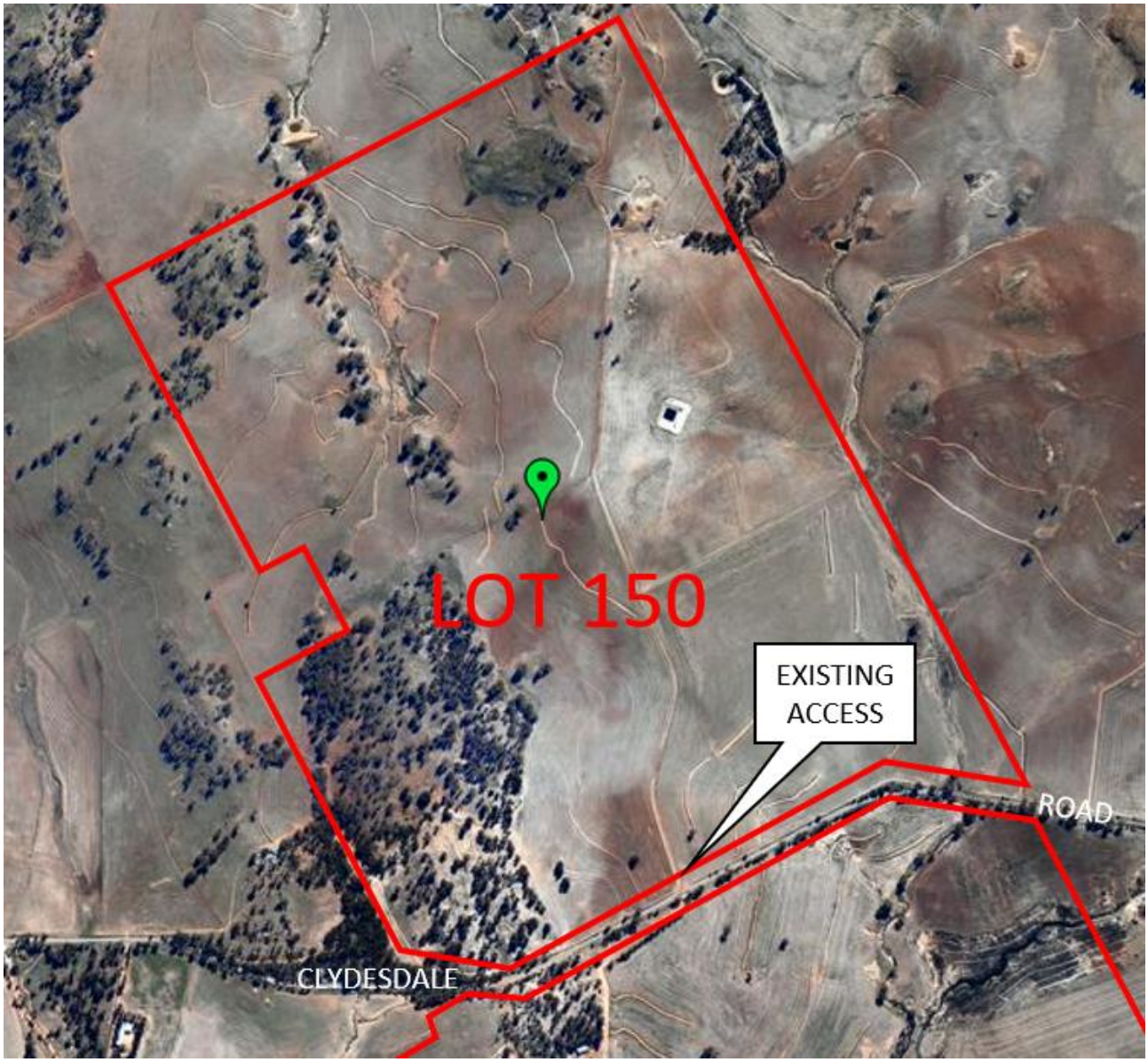
Table 1 – Level of TIA required by land use and size (Source Table 1 WAPC Guidelines Vol 4)

The proposed operation involves quarrying, crushing and screening of hard rock. This type of development is not an included land-use in Table 1 above and hence falls under 'Other Uses'. Discussion with the approving authority, i.e. the Shire of Northam, revealed that although vehicle trips in the peak hour are less than 10, that a Transport Impact Statement that addresses the following key issues is required:

- Suitability of Clydesdale Rd for the proposed types and volumes of heavy vehicles;
- Sight lines at intersections on Clydesdale Rd between and including GEH and the Quarry Access on the haul route; and
- Safety performance of the existing road and relevant intersections.

2 EXISTING SITE

The existing site is vacant farmland with an unsealed access off Clydesdale Rd approximately mid-block as shown in Photograph 1 below and Photograph 2 on the following page. The proposed quarrying, crushing and screening operations are limited to the northern portion of Lot 150, i.e. north of Clydesdale Rd.



Photograph 1 – Existing development: aerial view showing northern portion of Lot 150 and access location (June 2009)

Photograph 2 – Existing access to the subject site (July 2018)

3 PROPOSED OPERATIONS

It is proposed to extract, crush and screen approximately one hundred and fifty thousand tonnes (150,000) of hard rock per annum over the ten-year license period.

On average eight (8) truck truck-loads per day are anticipated. However, during busy times this may climb to twenty-five (25) truck-loads per day for short periods.

In the first year or two of operation it is likely that the volumes will be lower than applied for as the business establishes itself in the market place. Additionally, volumes will vary from year to year depending on the market volumes required at any given time. It is anticipated that at the expiry of the first license period a second ten-year license will be sought.

The quarry is proposed to operate from 7:00 am to 5:00 pm Monday to Friday and 7:00 am to 4:00 pm on Saturday. Road trucks are proposed to arrive on the quarry site approximately 6:30 am to 7:30 am via Clydesdale Road.

The quarry operation is proposed to have a production period of 3 - 4 months per year, and the rest as the quieter non-production sales period of 8 - 9 months per year.

At all times the excavation, crushing and screening of rock will comply with the Mines Safety and Inspection Act 1994 and Regulations 1995.

4 CONTEXT WITH SURROUNDS

4.1 TRANSPORT NETWORK

The location of the subject site in the context of the road transport network (i.e. Functional Road Hierarchy), nearest towns and Perth is shown in Figure 3 below.

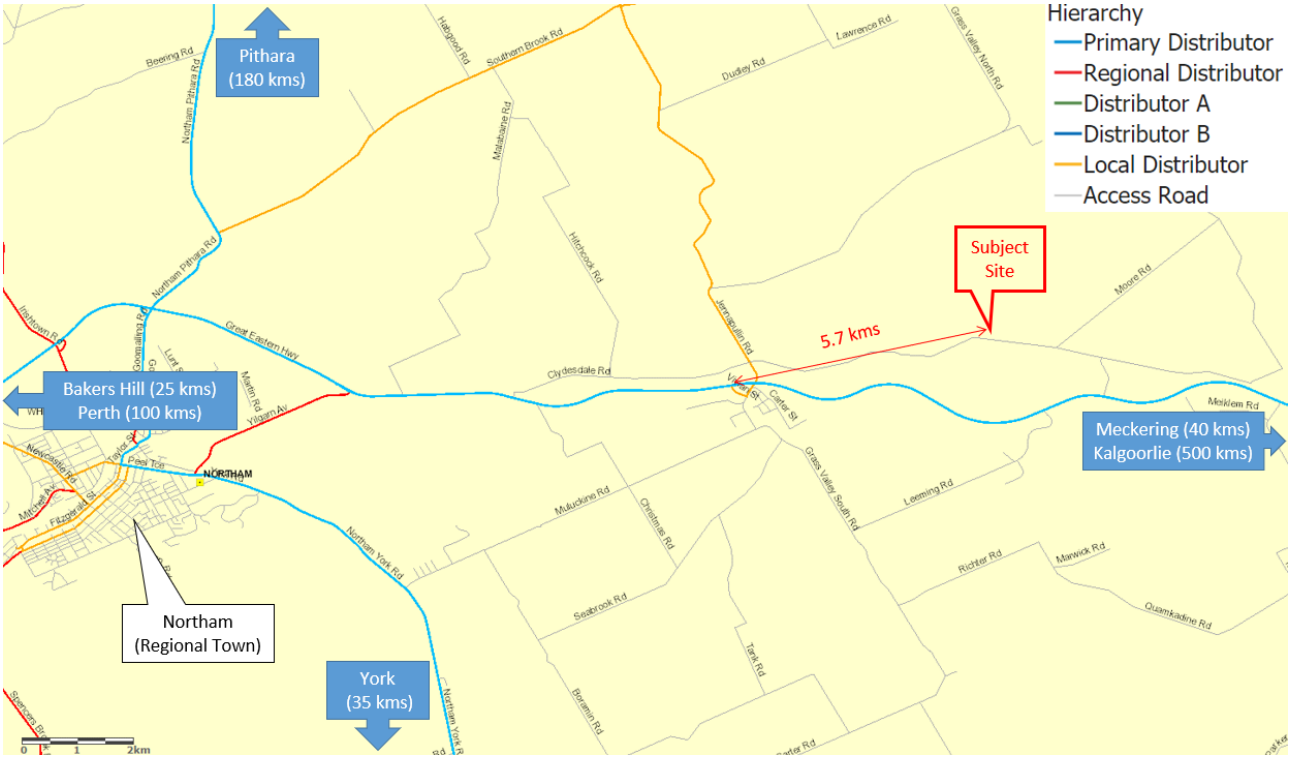


Figure 3 – Site context, road transport network (i.e. Functional Road Hierarchy), nearest towns and Perth

Figure 3 shows a distance of 5.7 kms between the subject site and the intersection of Vivian St with Great Eastern Highway. This is based on the MRWA recommended haulage route.

4.2 FUNCTIONAL ROAD HIERARCHY

The road classifications described in this TIS report and shown in Figure 3 on the previous page are defined in the Main Roads Functional Road Hierarchy as follows:

Primary Distributor (Great Eastern Hwy, Northam-Pithara Rd, Goomalling Rd Peel Tce, Northam-York Rd)
Managed by Main Roads WA

These provide for major regional and inter-regional traffic movement and carry large volumes of generally fast-moving traffic. Some are strategic freight routes, and all are State roads.

Regional Distributor (Yilgarn Ave, Katrine Rd, Mitchell Ave, Spencers Brook Rd)
Managed by Local Government

These carry traffic between regional industrial, commercial and urban areas and generally connect to Primary Distributors. These are likely to carry larger volumes of generally fast-moving traffic than Local Distributors and be heavy truck routes.

Local Distributor (Jennapullin Cr, Keane St, Vivian St and others) *Managed by Local Government*
Carry traffic within a cell and link District/Regional Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of Regional/District Distributors only carries traffic belonging to or serving the area. In Built Up Areas, these roads should accommodate buses, but discourage trucks.

Access Roads (Clydesdale Rd and others) *Managed by Local Government*

Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. In Built Up Areas, these roads are bicycle and pedestrian friendly.

4.3 KEY ROADS AND INTERSECTIONS

4.3.1 Clydesdale Rd

MRWA Road Number: 421159 | Length: 13.98kms | Classification: Access Road | Speed Limit: State Limit

Clydesdale Road is the frontage road to the subject site and provides direct vehicular access to it via a single access driveway as shown in Photograph 2 on page 10. The proponent has indicated that "Vehicle access to the quarry will be via an existing farm access road adjoining Clydesdale Rd at right angles. This access will be widened and sealed to prevent the carrying of rocks etc, onto the road. Appropriate signage will be erected in both directions warning of trucks entering."

Clydesdale Rd links the subject site to Great Eastern Hwy at both its western end, either directly or via Grass Valley Townsite (via Jennapullin Cr, Keane St and Vivian St), and its eastern end via Watson Rd. It comprises of a 6 m wide seal on a 7 m wide formed single carriageway within a 24.94 m wide road reserve.

The road is subject to the default rural speed limit of 110 km/h for its full length with advisory speed limits of 80 km/h for two sections with multiple bends.

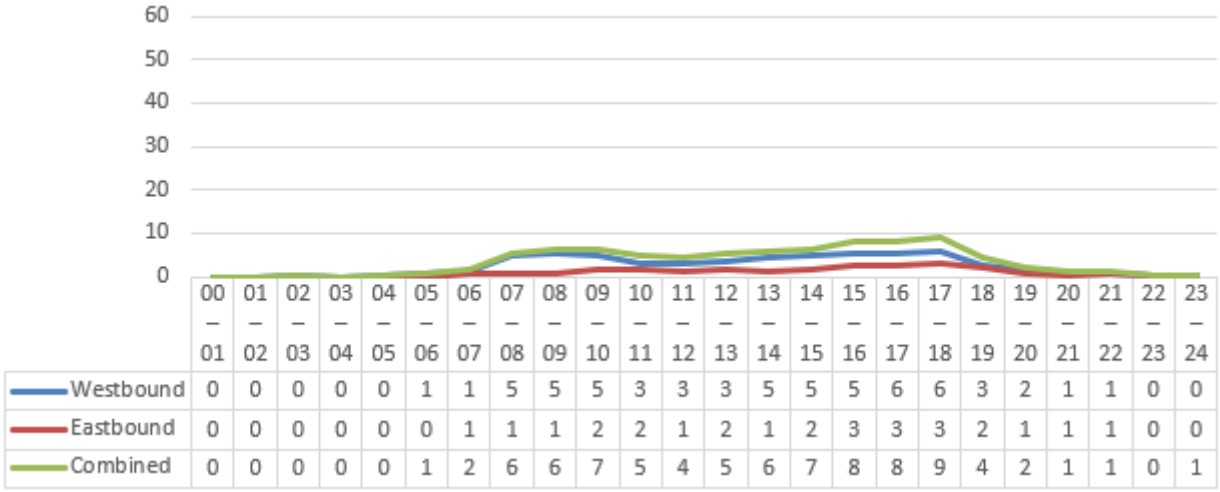
The layout of Clydesdale Road through straight and curved sections is best described through the driver's view photographs provided as Photograph 3 below and Photograph 4 and Photograph 5 on the following page.

Photograph 3 – Typical layout of Clydesdale Road through straight sections (July 2018)

Photograph 4 – Typical layout of Clydesdale Rd on approach to 80 km/h advisory speed bends (July 2018)

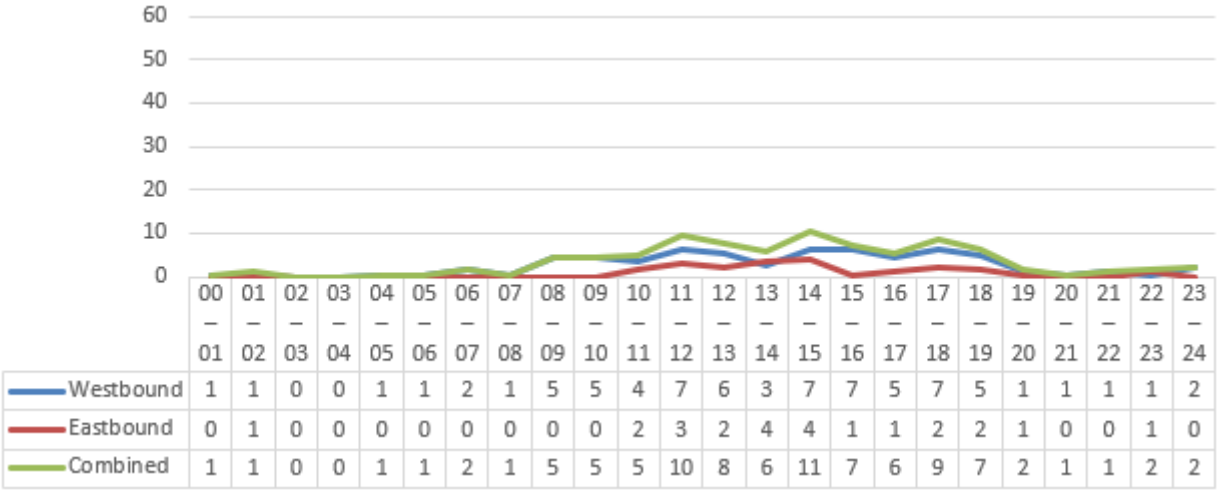
Photograph 5 – Typical layout of Clydesdale Road through 80 km/h advisory speed bends (July 2018)

The latest available traffic volume data for Clydesdale Road is dated 19 June to 6 July 2018 and shows that the Average Daily Traffic is 83 vehicles Monday to Friday, 86 Saturdays and 82 Sundays, i.e. consistently below 100 vehicles per day. Peak hour volumes are around 10 with around 7 in any one direction. Hourly Monday-Friday and Saturday volumes are shown in Figure 4 and Figure 5 on the following page respectively.



	00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	21–22	22–23	23–24
Westbound	0	0	0	0	0	1	1	5	5	5	3	3	3	5	5	5	6	6	3	2	1	1	0	0
Eastbound	0	0	0	0	0	0	1	1	1	2	2	1	2	1	2	3	3	3	2	1	1	1	0	0
Combined	0	0	0	0	0	1	2	6	6	7	5	4	5	6	7	8	8	9	4	2	1	1	0	1

Figure 4 – Mon-Fri hourly traffic volume data for Clydesdale Rd June/ July 2018



	00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	21–22	22–23	23–24
Westbound	1	1	0	0	1	1	2	1	5	5	4	7	6	3	7	7	5	7	5	1	1	1	1	2
Eastbound	0	1	0	0	0	0	0	0	0	0	2	3	2	4	4	1	1	2	2	1	0	0	1	0
Combined	1	1	0	0	1	1	2	1	5	5	5	10	8	6	11	7	6	9	7	2	1	1	2	2

Figure 5 – Mon-Fri hourly traffic volume data for Clydesdale Rd June/ July 2018

Figure 4 and Figure 5 show that current traffic volumes on Francisco Rd are well below the assessed typical mid-block capacity of 900 vehicles in each direction per hour for a dual lane single carriageway, as indicated in Table 5.1 (Typical mid-block capacities for urban roads with interrupted flow) in Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis. (2) The volumes are also significantly less than the maximum desirable volumes for an Access Road of 3,000 vehicles per day.

The speed data indicates a mean speed of 80.6 km/h and an 85%ile speed[1] of 98.3 km/h. Heavy vehicles make up between 21% and 24 % of recorded traffic volumes on Clydesdale Road.

[1] The "85%ile" or "85th percentile" speed is a major parameter used by traffic engineers and transport planners. Many standards (e.g. AS1742.3 (1)) and traffic engineering textbooks define the 85%ile speed as "The speed at or below which 85% of all vehicles are observed to travel under free-flowing conditions past a nominated point." Note the term "free flowing" in the definition.

4.3.2 Great Eastern Highway

MRWA Road Number: H005 | Classification: Primary Distributor | Speed Limit: 110 and 90 km/h

Great Eastern Highway is the closest Primary Distributor road to the subject site and acts as the main haulage route between the subject site (via Clydesdale Rd) and the Perth Metropolitan area. It consists of sealed 9.6 m wide carriageway with a 3.6 m wide lane in each direction and 1.2 m wide seal shoulders. It is subject to a 110 km/h speed limit reducing to 90 km/h through major intersections (not including Clydesdale Rd).

Photograph 6 – Typical layout of Great Eastern Hwy near Grass Valley (March 2014)

Photograph 7 – Looking east on Great Eastern Hwy on approach to Clydesdale Rd (July 2018)

The latest available annualised traffic volume data for Great Eastern Hwy is dated 2015/16 and shows that the Average Monday to Friday Daily Traffic was 2,234 east of the subject site (Meckering) and 5,200 west of the subject site (west of Northam). Peak hour volumes are around 180 east of the site and around 450 west of the site.

4.3.3 Clydesdale Rd/ Jennapullin Rd

The Clydesdale Rd/ Jennapullin Rd intersection is a Give-Way line and sign controlled 4-way crossroad intersection with priority given to Clydesdale Rd as shown in Photograph 8 and Photograph 9 below and Photograph 10 and Photograph 11 on the following page.

Photograph 8 – Annotated aerial photograph of Clydesdale Rd/ Jennapullin Rd intersection (June 2009)

Photograph 9 – Clydesdale Rd westbound approach to Jennapullin Cr intersection (July 2018)

Photograph 10 – Jennapullin Cr northbound approach to Clydesdale Cr intersection July 2018)

Photograph 11 – Clydesdale Rd westbound approach to Jennapullin Rd intersection (July 2018)

There were no observed sight distance issues during the site inspection. Refer **Section 9** for crash history and assessment.

4.3.4 Vivian St/ Great Eastern Hwy

Main Roads WA has stated that "The intersection of Vivian and GEH is RAV rated for the proposed vehicle types. The intersection has the required sight distances and the existing layout includes widening on the eastbound approach of GEH to facilitate right turning vehicles from GEH and an acceleration lane/overtaking lane for left turning laden vehicles from Vivian onto GEH. The intersection has no recorded accidents in the last five years.

Main Roads recommendation would be to use Vivian/GEH intersection as no further improvements would be required."

The layout of this intersection is shown in Photograph 12 below.

Photograph 12 – Aerial photograph of Vivian St/ Great Eastern Hwy intersection (March 2014)

5 HAULAGE ROUTE, VOLUMES, VEHICLE TYPE AND HOURS

The proponent has stated the following with respect to the proposed Haulage Route and truck movements:

"Crushed material will be transported by single and double trailer trucks (typical volume 26 & 52 tonnes respectively) west along Clydesdale for circa 8.4 kilometres before turning right into the Great Eastern Highway and then onto the Perth Metropolitan Area. (Note that this route has changed to that recommended by Main Roads WA).

Hours of Operation will be from 07.00 hours to 17.00 hours, Monday to Saturday with road haulage trucks typically arriving from 6.30am. No extraction, crushing, screening or truck deliveries will occur on Sundays or Public Holidays.

On average eight (8) truck truck-loads per day are anticipated. However, during busy times this may climb to twenty-five (25) truck-loads per day for short periods."

The haulage route is along a Main Roads WA designated 'Tandem Drive Network 2 route' as shown in Figure 8 on the following page.

The Main Roads WA Vehicle Description and Configurations for the Tandem Drive Network 2 Routes are also shown in Figure 8 on the following page. The 'Conditions' for Clydesdale Road are that these vehicles must operate at a maximum speed of 60 km/h.

Based on the proponent's description, the largest vehicle expected to be used for the haul task is the B-Double, as shown in Figure 6 below.

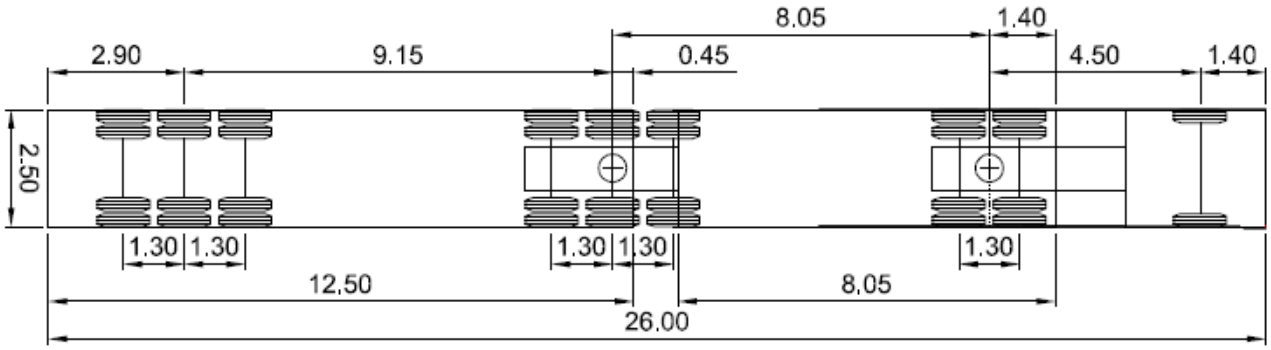
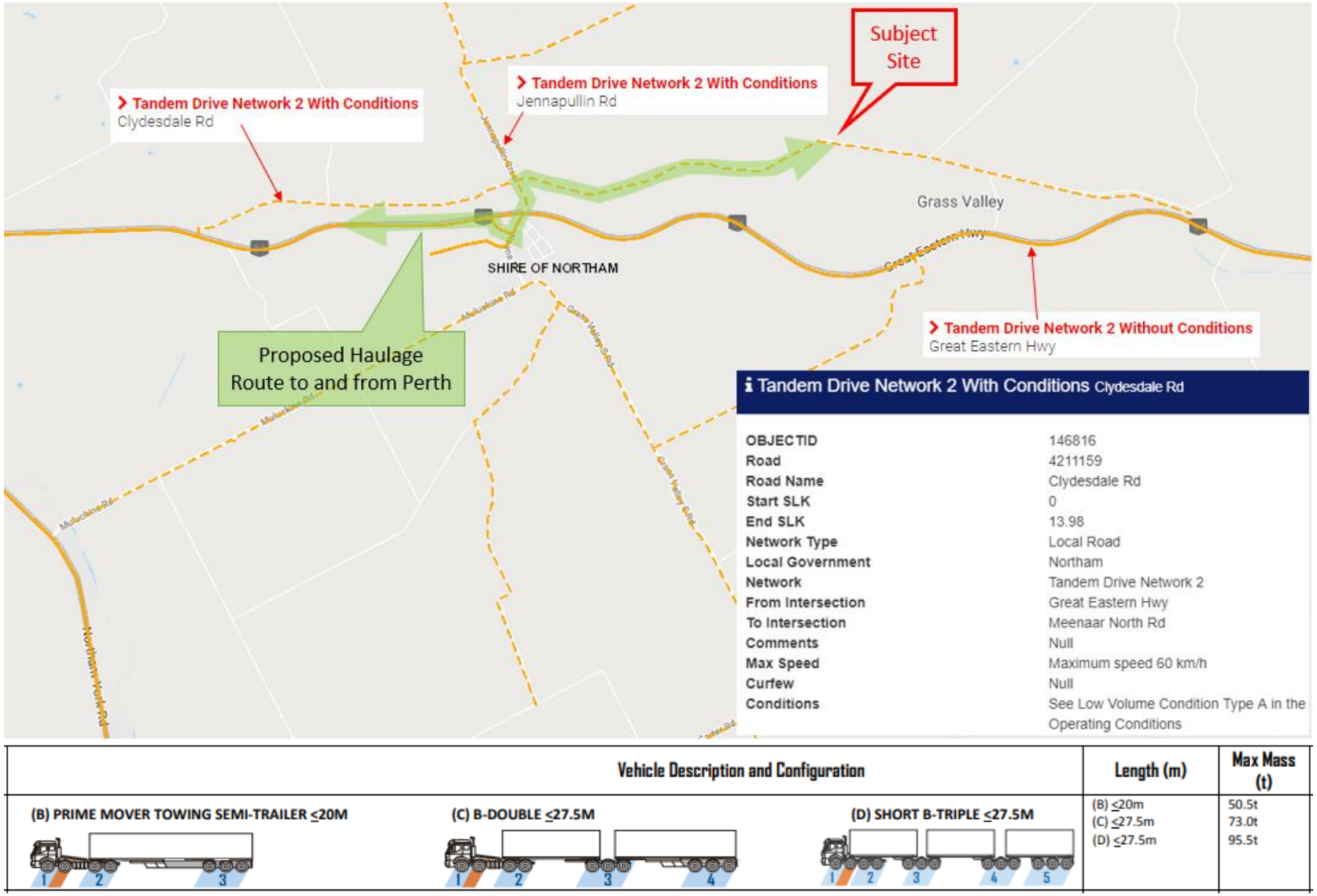


Figure 6 – B-Double design vehicle dimensions (Austroads)



Vehicle Description and Configuration	Length (m)	Max Mass (t)
(B) PRIME MOVER TOWING SEMI-TRAILER ≤20M	(B) ≤20m	50.5t
(C) B-DOUBLE ≤27.5M	(C) ≤27.5m	73.0t
(D) SHORT B-TRIPLE ≤27.5M	(D) ≤27.5m	95.5t

Figure 7 Figure 8 – Haulage Route and Tandem Drive Network 2 routes and conditions

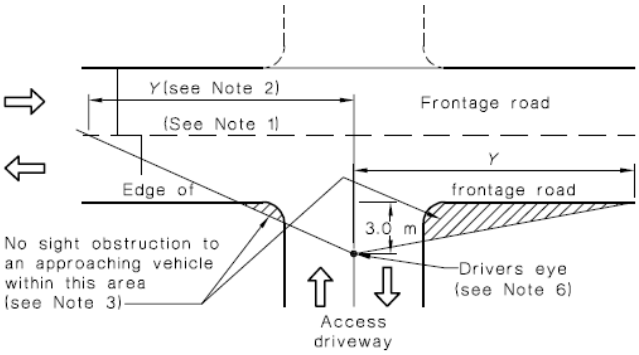
6 SITE ACCESS

Clydesdale Road is the frontage road to the subject site and provides direct vehicular access to it via a single access driveway as shown in Photograph 2 on page 10. The proponent has indicated that "Vehicle access to the quarry will be via an existing farm access road adjoining Clydesdale Rd at right angles. This access will be widened and sealed to prevent the carrying of rocks etc, onto the road. Appropriate signage will be erected in both directions warning of trucks entering."

The sight distance requirement for commercial vehicle traffic entering a public roadway from an access driveway, is specified in Australian Standard AS 2890.2 (3) as follows:

"Sight distance to oncoming traffic on the public roadway Sight distance requirements to enable a commercial vehicle to find a safe gap in oncoming traffic when leaving an access driveway are specified in Figure 3.3."

Figure 3.3 in AS 2890.2 is reproduced as Figure 9 below.



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road (Note 5) m	
	5 s gap	8 s gap
40	55	89
50	69	111
60	83	133
70	97	156
80	111	178
90	125	200
100	139	222
110	153	244

NOTES:

1 Centre-line or centre of roadway (undivided road), or right hand edge of right hand through lane (divided road).

2 A check to the left is not required at a divided road where the median is wide enough to shelter a vehicle leaving the driveway.

3 Parking on this side of the frontage road may need to be restricted on either side of the driveway so that the sight distance required by the above table to an approaching vehicle is not obstructed.

4 This is the posted or general speed limit unless the 85th percentile speed is significantly higher.

5 These distances are equivalent to minimum gap sight distance (MGSD) for an exiting vehicle. The minimum requirement is a 5 second gap. A right turn exit into a six lane road may require up to an 8 second gap, unless the median is wide enough to shelter a vehicle leaving the driveway.

6 When checking sight distance the height of the object (approaching vehicle) is to be taken as 1.15 m above the road surface. The driver's eye height is to be taken as any height in the range 1.15 m to 2.5 m, to cater for both car and commercial vehicle drivers.

Figure 9 – Sight distance requirements at commercial access driveway exits (Source Fig 3.3 AS 2890.2)

An assessment of the sight distance requirement in accordance with Figure 9 on the previous page is provided as Figure 10 below.

Figure 10 – Assessment of 244 m sight distance (110 km/h 8 second gap)

Figure 10 shows that the horizontal sight distance requirement is met based on the higher 8 second gap required for trucks entering the road. An assessment of this requirement on-site revealed that the vertical requirement is also met although there is an existing bush/ tree that has the potential to reduce readability of the presence of a truck about to enter the road for westbound drivers on Clydesdale Rd, as shown in Photograph 13 below.

Photograph 13 – Westbound Clydesdale Rd driver's view to access driveway on right

It is recommended that Trucks (Entering) signs (AS 1742.1 (4): W5-22) are installed on each approach to the access driveway between 80 and 120 m in advance. Consideration should also be given to trimming or removing the tree shown in Photograph 13 on the previous page. Clause 4.11.2.5 of Australian Standard AS 1742.2 (5) indicates that:

4.11.2.5 *Trucks (crossing or entering) (W5-22, T2-25)*

The Trucks (Crossing or Entering) sign (W5-22) shall be used where it is necessary to warn of the frequent movement of trucks to or from an adjoining property. If the truck movements are occasional or seasonal, the sign T2-25, displayed as a temporary sign, shall be used instead.

W5-22

T2-25

7 PUBLIC TRANSPORT ACCESS

The nature and remote rural location of the development does not require or warrant public transport services. Refer **Section 9** for comment regarding school bus services.

8 PEDESTRIAN AND CYCLE ACCESS

The nature and remote rural location of the development does not require or warrant pedestrian and cyclist access facilities.

9 SAFETY ISSUES

A review of the five-year crash record for the period ending 31st December 2017 has revealed that there have not been any reported crashes on Clydesdale Rd within 4 kms of the subject site access. In addition to this, there have not been any reported crashes involving heavy vehicles on Clydesdale Rd during this time, despite it carrying between 21% and 24% of heavy vehicles. Crash plot diagrams for these are shown in Figure 11 below. It should be noted that each marker denotes a crash location and may represent a single crash or several crashes at the indicated location.

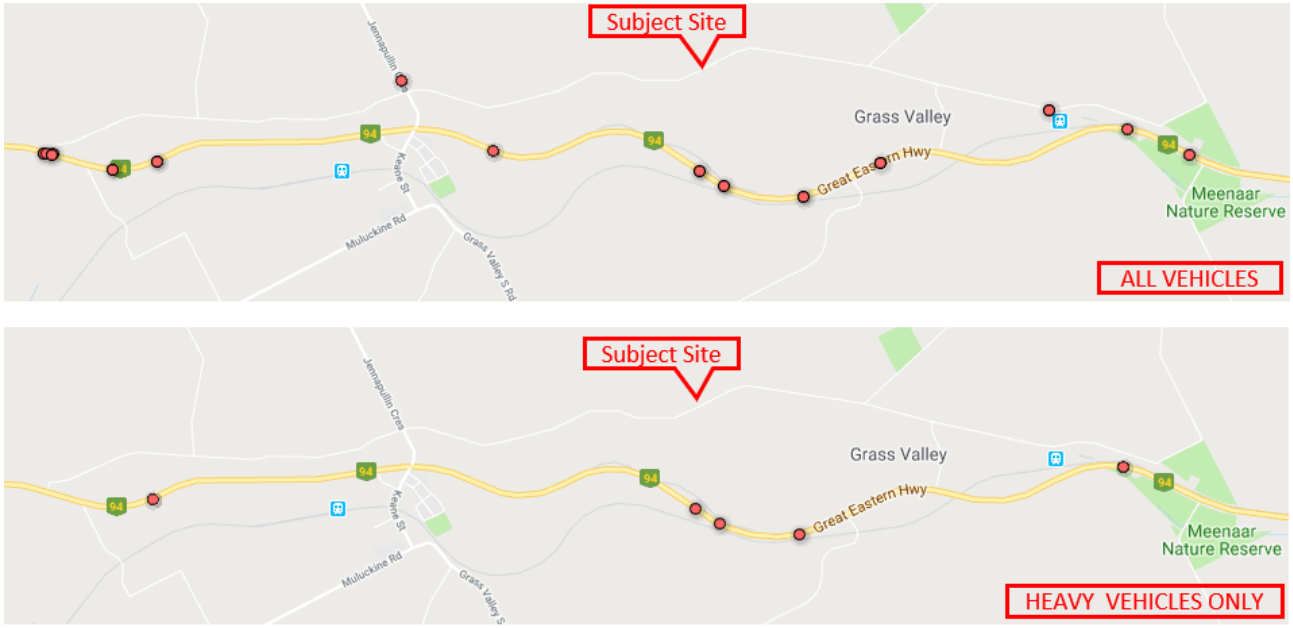


Figure 11 – Crash location plot map: 5 years to December 2017

Sight lines at all intersections and access driveways along Clydesdale Rd between and including the subject site access driveway and Great Eastern Hwy have been checked by the author on-site and are generally good. Some private access driveways have restricted sight lines due to curves and/ or vegetation, but the crash record indicates that drivers are taking sufficient care to address this.

It should be noted that Clydesdale Road is the old alignment of Great Eastern Hwy and once operated as a major highway in its current layout. It is also a designated heavy vehicle route.

During the site visit is was noted that there are school bus warning signs indicating that school buses use this road to pick-up/ drop-off students and possibly to turn around. The proponent has indicated that they do not intend to generate truck traffic during the school bus operating times.

REFERENCES

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3. **Standards Australia.** *AS 2890.2 - 2002 Parking facilities Part 2: Off-street commercial vehicle facilities.* Second edition. Sydney : Standards Australia International Ltd, 2002. p. 49. Vol. 2, Originated as AS 2890.2-1989. ISBN 0 7337 4870 8.

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7. **Austroads.** *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2017).* [ed.] Peter Aumann and Mike Whitehead. Third. Sydney : Austraods Ltd, 2017. p. 142. Vol. 4A. ISBN 978-1-925451-73-3.

APPENDIX A WAPC TRANSPORT IMPACT STATEMENT CHECKLIST

Checklist for a transport impact statement for individual development

- Tick the provided column for items for which information is provided.
- Enter N/A in the provided column if the item is not appropriate and enter reason in comment column.
- Provide brief comments on any relevant issues.
- Provide brief description of any proposed transport improvements, for example, new bus routes or signalisation of an existing intersection.

ITEM	PROVIDED	COMMENTS/PROPOSALS
Proposed development		
existing land uses	✓	Section 2
proposed land use	✓	Section 3
context with surrounds	✓	Section 4
Vehicular access and parking		
access arrangements	✓	Sections 5 & 6
public, private, disabled parking set down/pick up	na	Remote/ rural quarry operation
Service vehicles (non-residential)		
access arrangements	✓	Sections 5 & 6
on/off-site loading facilities		Refer Development Application for on-site details
Service vehicles (residential)	na	
rubbish collection and emergency vehicle access		
Hours of operation (non-residential only)	✓	Section 3
Traffic volumes		
daily or peak traffic volumes	✓	Section 4.3
type of vehicles (for example, cars, trucks)	✓	
Traffic management on frontage streets	na	Remote/ rural quarry operation
Public transport access	na	Remote/ rural quarry operation
nearest bus/train routes		
nearest bus stops/train stations		
pedestrian/cycle links to bus stops/ train station		

ITEM	PROVIDED	COMMENTS/PROPOSALS
Pedestrian access/ facilities	na	Remote/ rural quarry operation
existing pedestrian facilities within the development (if any)		
proposed pedestrian facilities within development		
existing pedestrian facilities on surrounding roads		
proposals to improve pedestrian access		
Cycle access/facilities	na	Remote/ rural quarry operation
existing cycle facilities within the development (if any)		
proposed cycle facilities within development		
existing cycle facilities on surrounding roads		
proposals to improve cycle access		
Site specific issues	NA	
Safety issues	✓	Section 9
identify issues	na	No safety concerns
remedial measures	na	

Proponent's name Greg Kennedy

Company Resource Group [WA] Pty Ltd **Date** 10/08/18

Transport assessor's name David Wilkins **Company** i3 consultants WA **Date** 10/08/18