

13 Transport

13.1 Introduction

The Caval Ridge Mine Project has been divided into two distinctive phases for the purposes of this traffic assessment to account for the different traffic demand characteristics of both the construction and operation phases. During the project construction and operation site access is proposed from the Peak Downs Highway.

It is anticipated that the traffic associated with the project will impact upon the operation of nearby intersections and road links. In addition, heavy vehicle traffic associated with project is likely to necessitate additional pavement maintenance on the Peak Downs Highway.

When travelling to/from the project site the majority of vehicles will utilise the following roads:

- Peak Downs Highway
- Winchester Road (Saraji – Dysart Road)
- Moranbah Access Road.

A Traffic and Transport Impact Assessment (Appendix N), in accordance with Department of Transport and Main Roads (DTMR) *Guidelines for Assessment of Road Impacts of Developments*, details the mine's traffic impact on the state and council controlled road network.

13.2 Existing Conditions

13.2.1 Road Networks

13.2.1.1 Peak Downs Highway

The Peak Downs Highway is a state controlled road which extends approximately 276 km from Mackay to Clermont (Figure 13.1). It functions as a major link within the boundaries of Isaac Regional Council (IRC) providing the primary link between a number of townships and mines within Central Queensland and the regional hub of Mackay. The posted speed limit varies between 60 km/h and 100 km/h. A detailed description of the various sections of the highway is provided in Appendix N.

13.2.1.2 Moranbah Access Road

Moranbah Access Road runs from the Peak Downs Highway to its intersection with Mills Avenue in Moranbah and is the sole access route between Moranbah and the highway. Moranbah Access Road comprises a two lane road undivided, sealed form with sealed shoulders. There are no overtaking lanes on this road. The speed limit is generally 100 km/h decreasing to 60 km/h in proximity to Moranbah.

13.2.1.3 School Bus Routes

There are currently two school bus routes which utilise Peak Downs Highway to provide transport to the schools in Moranbah from Clermont and Coppabella. There are no school bus stops along the project site frontage. It is anticipated that the traffic associated with the project will not significantly impact the existing school routes as school start and end times do not correspond with the proposed shift start and end times and goods deliveries are expected to be spread throughout the day.

13.2.2 Road Crash History

Crash data (2001 – 2006) for the Peak Downs Highway was obtained from Queensland Transport. summarises the reported crashes by severity.

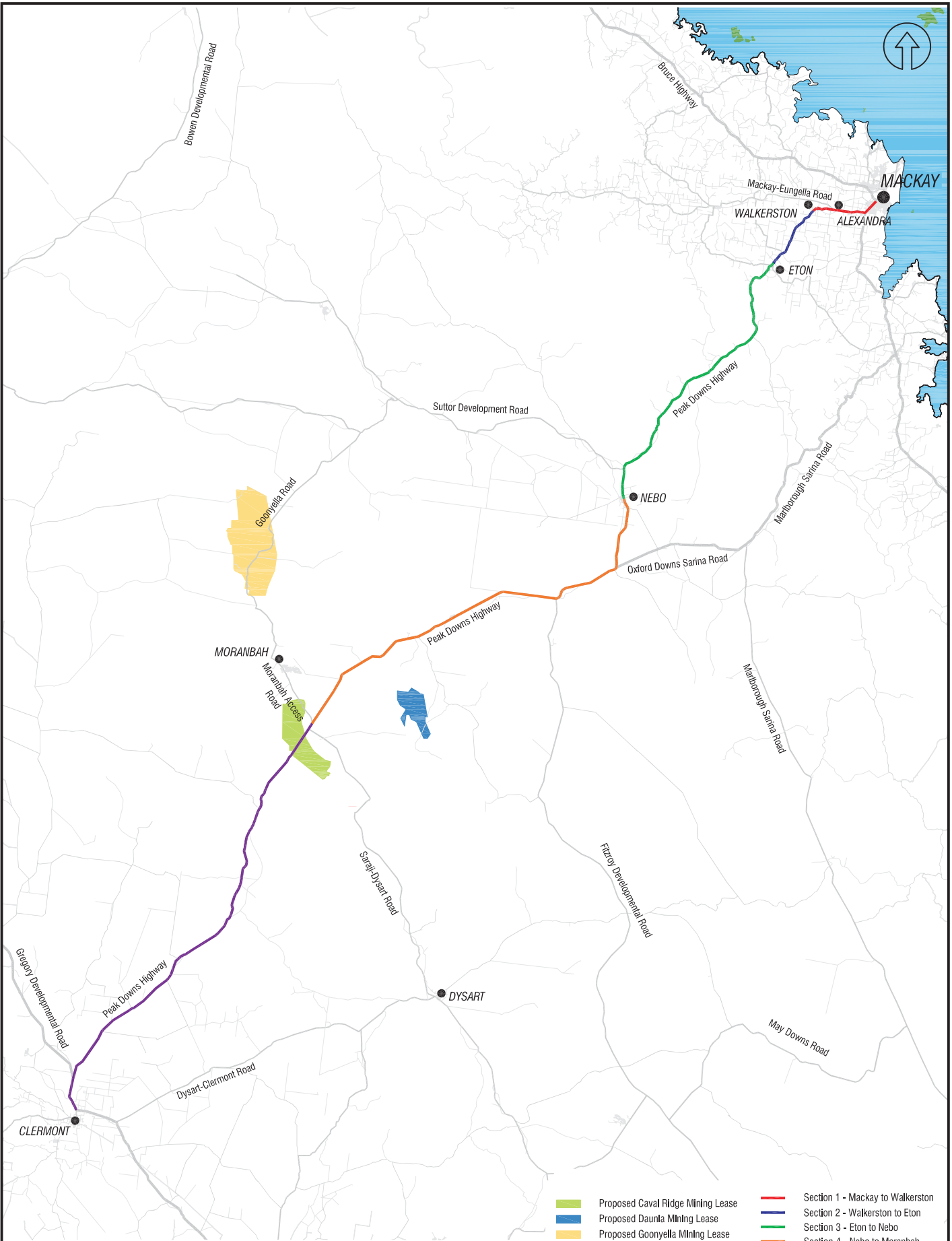
Table 13.1 Summary of Peak Downs Highway Crash Statistics (2001-2006)

Crash Severity	Number of Crashes	%
Fatal	8	5
Hospitalisation	45	27
Medical treatment	30	18
Minor injury	29	17
Property damage	54	33
TOTAL	166	100

Analysis indicates that 64% of crashes involved a single vehicle and that 84% of crashes occurred at mid-block locations. The high proportion of these two crash types indicates that driver fatigue may have been a significant contributing factor to the observed crashes, although this trend is consistent with a rural road environment.



No pronounced weekly patterns were observed in the crash data therefore the crash history cannot be readily attributed to mine roster start and end days. Analysis indicates that 22% of crashes occurred at unlit locations during the night.

The DTMR formerly Department of Main Roads (DMR) officers have raised concern regarding driver fatigue particularly relating to personal driving to Mackay after completing a 12-hour shift. An inspection of the Peak Downs Highway revealed that a number of fatigue measures have already been implemented including audible delineation, Driver Reviver awareness signage and regular rest areas. Further efforts to combat driver fatigue should be considered from a staff management perspective, for example, the potential to provide a bus service to Mackay.



- Proposed Caval Ridge Mining Lease
- Proposed Daunta Mining Lease
- Proposed Goonyella Mining Lease
- Section 1 - Mackay to Walkerston
- Section 2 - Walkerston to Eton
- Section 3 - Eton to Nebo
- Section 4 - Nebo to Moranbah
- Section 5 - Moranbah - Clermont

Source: Cardno Eppell Olsen, 2008.

<p>Client</p> 	<p>Project</p> <p style="text-align: center;">CAVAL RIDGE PROJECT ENVIRONMENTAL IMPACT STATEMENT</p>	<p>Title</p> <p style="text-align: center;">ROAD SECTIONS</p>								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Drawn: VH</td> <td style="width: 33%;">Approved: RS</td> <td style="width: 33%;">Date: 08-05-2009</td> </tr> <tr> <td>Job No.: 4262 6158</td> <td colspan="2">File No. 42626158-g-590.cdr</td> </tr> </table>	Drawn: VH	Approved: RS	Date: 08-05-2009	Job No.: 4262 6158	File No. 42626158-g-590.cdr		<p>Figure: 13.1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Rev. A</td> <td style="width: 20%;">A4</td> </tr> </table>	Rev. A	A4
Drawn: VH	Approved: RS	Date: 08-05-2009								
Job No.: 4262 6158	File No. 42626158-g-590.cdr									
Rev. A	A4									

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13.2.3 Scheduled Road Improvement Projects

Scheduled works on the Peak Downs Highway between Clermont and Nebo include isolated pavement reconstruction, rehabilitation and seal widening as well as driver fatigue measures (Roads Implementation Program 2008-09 to 2012-13 (RIP)). No upgrading works are detailed in the RIP for the study intersections as defined in the Transport Report (Appendix N, Section 3.5).

DTMR is currently investigating potential upgrading works at the Peak Downs Highway/Moranbah Access Road intersection to mitigate the impact of another project. DTMR was unable to provide advice as to the extent of likely upgrading works. The upgrading works of the Caval Ridge project and the project referred to above should be co-ordinated.

13.3 Background Traffic

13.3.1 Existing Traffic Volumes

Existing intersection movement volumes were sourced from traffic surveys undertaken in July 2008. Average Annual Daily Traffic (AADT) traffic volumes have been identified from 2007 count data supplied by the Department of Main Roads Mackay/Whitsunday and Fitzroy Regions. Average Daily Traffic (ADT) traffic volumes were estimated from 2008 manual counts (13/14 hour observation period) factored based on 2003 ADT data provided by IRC.

The traffic survey data indicates that the morning and afternoon network peak periods generally occur the hour ending 7.15 am and 6.15 pm respectively. This is consistent with mine shift start and end times and reflects the influence of mining activity on traffic patterns in the area.

13.3.2 Historic Traffic Growth

The historic growth on key surrounding roads has varied widely dependent on proximity to Mackay and the observation period with generally higher growth observed in recent years. The following range of growth has been observed or can be inferred:

- Peak Downs Highway 3% p.a. to 17% p.a.
- Marlborough-Sarina Road 2% p.a. to 18% p.a.
- Moranbah Access Road 11% p.a.

13.3.3 Background Traffic Growth

During EIS pre-lodgement discussions, DMR officers advised that the following traffic growth rates were assumed when estimating future background traffic volumes:

- Mine access to Eton 10% p.a. compound
- Eton to Walkerston 5% p.a. compound
- Walkerston to Alexandria 5% p.a. compound.

It is considered extremely unlikely that the DTMR projected growth rates would continue beyond 2021. The use of such rates results in the doubling of existing traffic demands every seven years, or a 31-fold increase in current demands by 2043. DMR officers acknowledged during discussions that these growth rates were unlikely to be sustained over a prolonged period.

For the purposes of the traffic assessment it was assumed that two distinct traffic growth periods would occur as follows:

- 2007 to 2021: 5-10% p.a. compound
- 2021 to 2041: 3-5% p.a. compound.

The assumed traffic growth rates exclude the specific allowances for background traffic associated with the proposed Goonyella Riverside Mine expansion and Daunia Mine developments. Traffic generated by these sites was considered as part of the background scenario in addition to the annual percentage growth.

13.4 Project Traffic Generation

13.4.1 Construction Phase

Construction of the project is expected to have commence by the start of 2011 and be completed by end of 2012. During the construction period there will be an average workforce of 843 staff with a maximum workforce of 1,200 staff during the peak six month construction period. This workforce includes the industrial area and mine construction teams who are anticipated to work one shift (7 am – 6 pm) and two shifts (7 am - 7 pm, 7 pm-7 am) seven days a week respectively.

Delivery of materials and the removal of wastes will occur five days a week. No site materials or wastes such as overburden are proposed to be relocated via the external road network during the construction phase.

All construction personnel will reside in the Denham Village, south of Moranbah, which will be accessed from Moranbah Access Road.

A privately-operated BMA bus service will transport 80% of the workforce, while the remaining 20% of staff will utilise private/company vehicles.



The movement of staff between the Denham Village and other regional centres such as Mackay at the start and end of recreational periods has not been included as the impacts of these movements will be assessed as part of a separate planning application for the accommodation village development.

13.4.1.1 Construction Phase Heavy Vehicle Demands

The heavy vehicle movements generated during the construction phase for the project are anticipated to be almost entirely associated with the delivery of construction materials, the removal of wastes and the transportation of staff. Table 13.2 summarises the expected type and quantity of heavy vehicle movements during the construction phase. During the two year construction phase there will be a six month peak activity period during which the entire delivery of some material types is likely to occur. Table 13.2 does not include movements associated with staff transport. A detailed breakdown by type of material is provided in Appendix N, Table 5.1.

During the construction phase it is anticipated that there will be approximately 5,128 two-way bus movements per annum with a maximum of 23 two-way bus movements per day during the peak six month construction period.

Table 13.2 Construction Heavy Vehicle Movements

Material	Origin/ Destination	Heavy Vehicle Volume (two way)					
		Total Construction Requirement	Annual Construction Requirement	Transport Vehicle	Total Construction Deliveries	Ave Construction Deliveries	Peak 6 Month Construction Deliveries
Construction Inputs							
Building Materials & Fuels*	Mackay	33,406 T	16,703 T	Various	1,145	573	864
Base and Sub- base materials & Aggregates	Dysart	365,200 T	182,600 T	Type 1 Road Train & Single articulated	7,460	3,730	4,082
Concrete	Moranbah	50,400 T	25,200 T	Concrete Transit Vehicle	4,200	2,100	1,800
Prefabricated Buildings - Offices	Clermont	400 T	200 T	Single Articulated	20	10	20
Total	-	449,406T	224,703T	-	12,825	6,413	6,766
Construction Outputs							
Waste (Oil + Sludge, Grease, Hydraulic fluid, metal, etc)*	Mackay	47 T	24 T	Single Articulated	<3	<3	<1
General, Recyclable & Septic Waste	Moranbah	2,788 T	1,394 T	Single Articulated	276	138	138
Total	-	2,835 T	1,418 T	-	279	141	139
Total (Inputs & Outputs)	-	452,240T	226,120T	-	13,104	6,552	6,905

*dangerous goods /hazardous substance

13.4.1.2 Construction Phase Oversized Vehicles

The construction and modularisation of oversize modules will take place in Paget instead of importing oversized units into the Mackay port. The preferred overland route for transportation of modules is currently:

- Paget (Southern Mackay) to Eton (via Homebush Road)
- Eton to the turnoff to Moranbah (via Peak Down Highway).

Modules will be designed which will require an unhindered height clearance of 6.5 m. This is based on a 5.5 m high module being transported on a low loader trailer 1 metre above the ground. The number of oversized deliveries will only be known once the final design for the project has been completed.

Whilst the over dimensional transport corridor from Mackay is 8.5 m wide X 5.2 m high (cargo height 4.2 m high). The height can be increased with additional permits from the power authority. As a worst case scenario an item measuring 24.5 m long x 8.5 m wide positioned on a 14-row platform trailer set at 4.6 m wide was used for the route study. The transportation study identified that some 42 power lines crossing the highway between Mackay and the intersection of the Peak Downs Highway and the Moranbah Access Road will be upgrade or altered by Ergon to allow for oversized plant and equipment modules to be



delivered to site by heavy vehicle. BMA has advanced discussions on the required increased ground conductor activities, and is in commercial negotiations with Ergon regarding the provision of services to upgrade or later these changes.

The transportation process will include a risk assessment and the development of a comprehensive traffic management plan and traffic control plan, by BMA in conjunction with the transport company. This plan will be submitted to the necessary approval authorities, including the Department of Transport and Main Roads.

13.4.1.3 Construction Phase Light Vehicle Demands

Light vehicle demands to the project during the construction phase will be entirely associated with employee movements. Approximately 20% of staff will travel to the site via private vehicles with an assumed occupancy of two. It is therefore estimated that there will be 140 two-way private vehicle movements associated with the project during the peak six month construction period.

13.4.1.4 Construction Phase Traffic

The key transport routes to be used by construction traffic are shown on Figure 13.2. Traffic volumes associated with the construction phase alone (i.e. disregarding existing highway traffic) are shown for morning peak hour activities, afternoon peak hour activities and total daily activities in Figures 14.8- 10 of Appendix N.

13.4.2 Operations Phase

The road traffic movements generated during the operations phase are anticipated to be almost entirely associated with the delivery of consumables, removal of wastes and the transportation of staff.

Product coal will be transported via rail to Mackay for distribution and will not generate any external road traffic demands.

During the operations phase it is anticipated that the site will operate seven days a week with two daily 12 hour shifts starting at 7.00 am and 7.00 pm with an average workforce of 495 staff. The delivery of materials and removal of waste is anticipated to occur five days a week.

It is anticipated that 95% of operations staff will be accommodated in Moranbah and the remaining 5% in Dysart. It is anticipated that 70% of operations staff accommodated in Moranbah will travel to the site via a private bus service while the remaining 30% will travel via private/company vehicle. All staff housed in Dysart are anticipated to travel to the site via private/company vehicle. The bus service will be coordinated with the start and end of shifts such that all bus services are fully utilised. The movement of staff between Moranbah/Dysart and surrounding regional centres such as Mackay at the start and end of recreational periods has not been included in the assessment.

It is anticipated that the project will shut down for maintenance on occasion. During these times operations will cease and there will be fewer staff on-site as compared to during normal mining operations. The number of light vehicle trips generated by the mine during maintenance periods is therefore expected to be much lower than during normal operation periods. However, maintenance activities could generate a small increase in heavy vehicle movements. Such occurrences are anticipated to be infrequent and generally of lower volume than the worst case assessed herein. As such, the impacts of these maintenance periods have not been considered.

13.4.2.1 Operation Phase Heavy Vehicle Demands

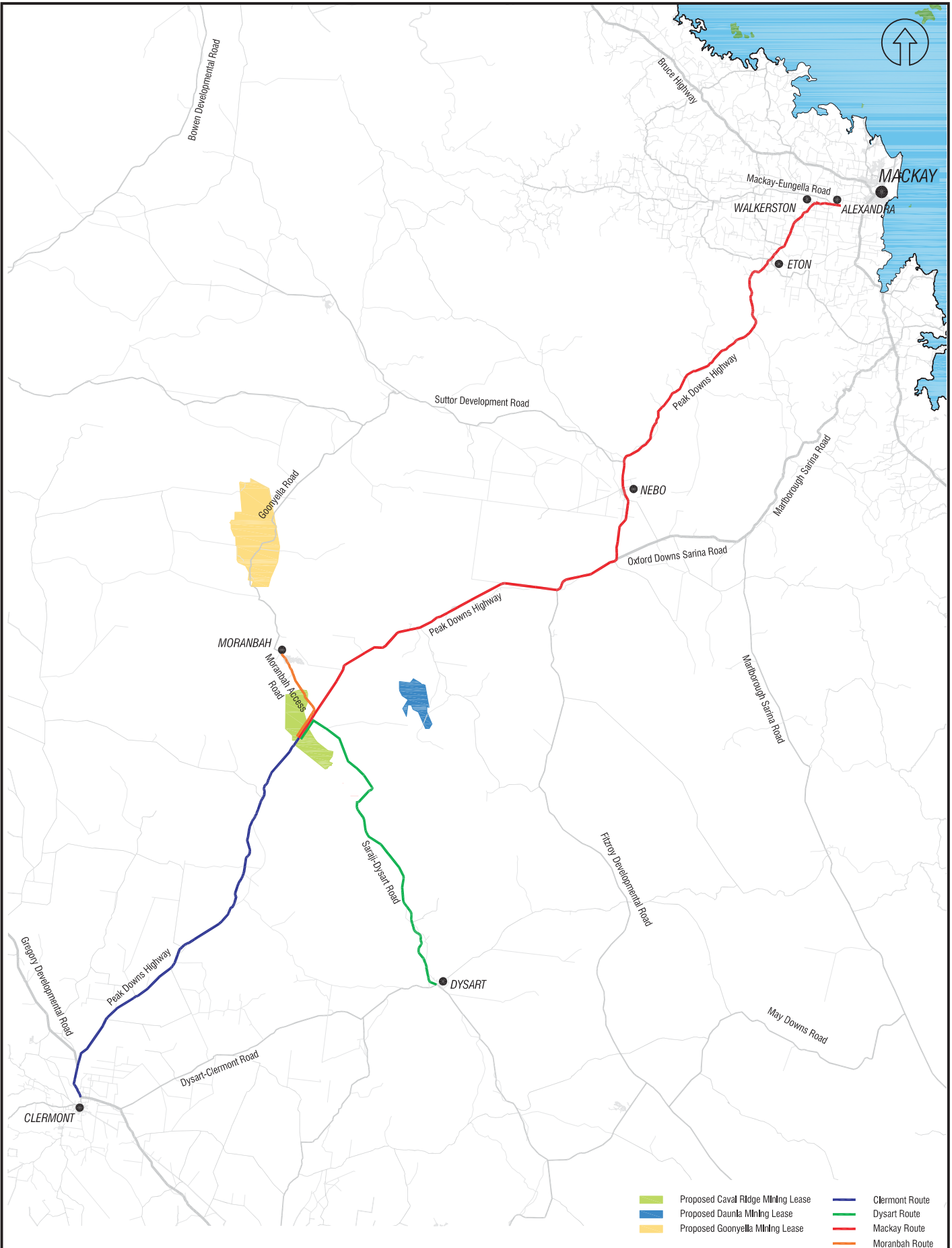
The operational phase heavy vehicle movements are summarised in . A detailed breakdown of the expected type and quantity of heavy vehicle movements during the operations phase is provided in Appendix N, Table 5.2. Table 13.3 does not include movements associated with staff transport.

During the operations phase, there will be an estimated 2,493 two-way bus movements per annum to/from the project site with an average of 7 two-way bus movements per day.



Table 13.3 Operation Phase Heavy Vehicle Movements

Material	Origin / Destination	Heavy Vehicle Volume (two-way)			
		Annual Operations Requirement	Transport Vehicle	Annual Deliveries	Average Daily Deliveries
Operation Phase Inputs					
Fuel*, Explosive & Additives*	Mackay	26,752 T	Various	525	
Explosives*	Dysart	14,000 T	Single Articulated	700	
Input Total	-	≈ 40,752 T	-	1,225	5
Operation Phase Outputs					
Waste Oil*, Sludge*, Grease*, Hoses, Metals & Filters	Mackay	2,942 T	Single Articulated	147	
General and Recyclable Waste	Moranbah	6,555 T	Single Articulated	328	
Output Total	-	≈ 9,497 T	-	475	2
Total (Input & Output)	-	≈ 50,249 T	-	1,700	7

*dangerous goods /hazardous substance



Source: Cardno Eppell Olsen, 2008.

<p>Client</p> 	<p>Project</p> <p>CAVAL RIDGE PROJECT ENVIRONMENTAL IMPACT STATEMENT</p>	<p>Title</p> <p>KEY TRANSPORT ROUTES</p>		
	<p>Drawn: VH</p> <p>Job No.: 4262 6158</p>	<p>Approved: RS</p> <p>File No. 42626158-g-591.cdr</p>	<p>Date: 08-05-2009</p> <p>Figure: 13.2</p>	<p>Rev. A</p> <p>A4</p>

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Table 13.2 and Table 13-3 identify certain materials classified as dangerous goods/hazardous substances. The route that will be used in the transport of these materials is the Mackay route as shown in Figure 13.2 and Appendix N, Figure A7.

13.4.2.2 Operations Phase Light Vehicle Demands

Light vehicle demands to the project during the operations phase are anticipated to be solely associated with personnel movements. It is anticipated that during the normal operations phase there will be 165 two-way private vehicle movements per day associated with the project.

13.4.2.3 Operations Phase Traffic

The key transport routes to be used by operations traffic are shown in Figure 13.2. Traffic volumes (light & heavy vehicles) associated with the operations phase alone (i.e. disregarding existing highway traffic) are shown in Appendix N, Section 5.2.

13.5 Traffic Impact Assessment

The traffic operation of the external road network during the construction phase has been conservatively assessed for the peak six month activity period. It is anticipated that, during the operations phase, mining activity will be generally constant and therefore average operations have been assessed during this phase.

13.5.1 Assessment Network Volumes

The project (construction and operation phases) is anticipated to generate peak demands between 6.30am-7.30am (morning) and 6.30pm-7.30pm (afternoon). Review of the traffic survey data indicates that the road network peaks in the vicinity of the project generally occur between 6.15am – 7.15am and 5.15pm-6.15pm.

It has been conservatively assumed that the road network peak periods and mine's peak generation periods coincide. This assumption is conservative (i.e. worst case) and provides BMA flexibility in shift scheduling.

13.5.2 Investigation Scope and Assessment Scenarios

In accordance with DTMR's scoping guidelines, the project's impact has been assessed at the following intersections:

- Site Access/Peak Downs Highway (construction phase)
- Site Access/Peak Downs Highway (operation phase)
- Peak Downs Highway/Winchester Road
- Peak Downs Highway/Moranbah Access Road.

This assessment scope includes all significant intersections at which peak hour turning movement volumes are anticipated to increase by 5% or more beyond existing (2008) survey volumes as a result of construction or operation of the project. It is anticipated that traffic associated with the project will have a significant impact on the traffic operation of the Peak Downs Highway/Winchester Road and Peak Downs

Highway/Moranbah Access Road intersections. Further scoping detail is provided in Appendix N, Section 6.3.

Traffic conditions have been assessed for the year 2012, which is the anticipated last year of construction, 2013 the year operations are anticipated to commence and 2023 the 10 year post completion design horizon. The traffic assessment was completed for both with and without project traffic scenarios to determine the incremental impact of the project on the State and Council controlled road network. Traffic volumes forecast for 2012, 2013 and 2023, both with and without the project traffic are presented in Appendix N, Section 6.

13.5.3 Intersection Impacts and Mitigation Works

The operation of each intersection has been analysed with and without development using SIRDA Intersection 3.2. This program assesses the operation of intersections based on input parameters, including geometry and traffic volumes. As an output, SIDRA Intersection provides estimates for an intersection's Degree of Saturation (DOS), queues lengths and anticipated delays.

In the *Guidelines for Assessment of Road Impacts of Development*, DTMR defines the following standard DOS thresholds:

- Priority-controlled intersections 0.80
- Roundabouts 0.85
- Signalised intersections 0.90.

The DTMR guideline notes that a DOS exceeding these thresholds indicates that an intersection is nearing its practical capacity and upgrade works may be required. Above these threshold values, users of the intersection are likely to experience rapidly increasing delays and queuing.

Importantly, it is noted that DOS is not the only intersection performance indicator and that other measures such as critical movement delay should also be reviewed when assessing the operations of an intersection.

13.5.3.1 Site Access/Peak Downs Highway (Construction Phase) Intersection

A new priority controlled access off the Peak Downs Highway is to be constructed to service the project during the two year construction phase. Once mining operations commence, this access will be gated and used infrequently by oversized vehicles.

The intersection should comprise short protected turn lanes on both approaches of the Peak Downs Highway (Figure 13.3) in accordance with the design criteria that the client's engineer and DTMR agreed to during pre-lodgement discussions.

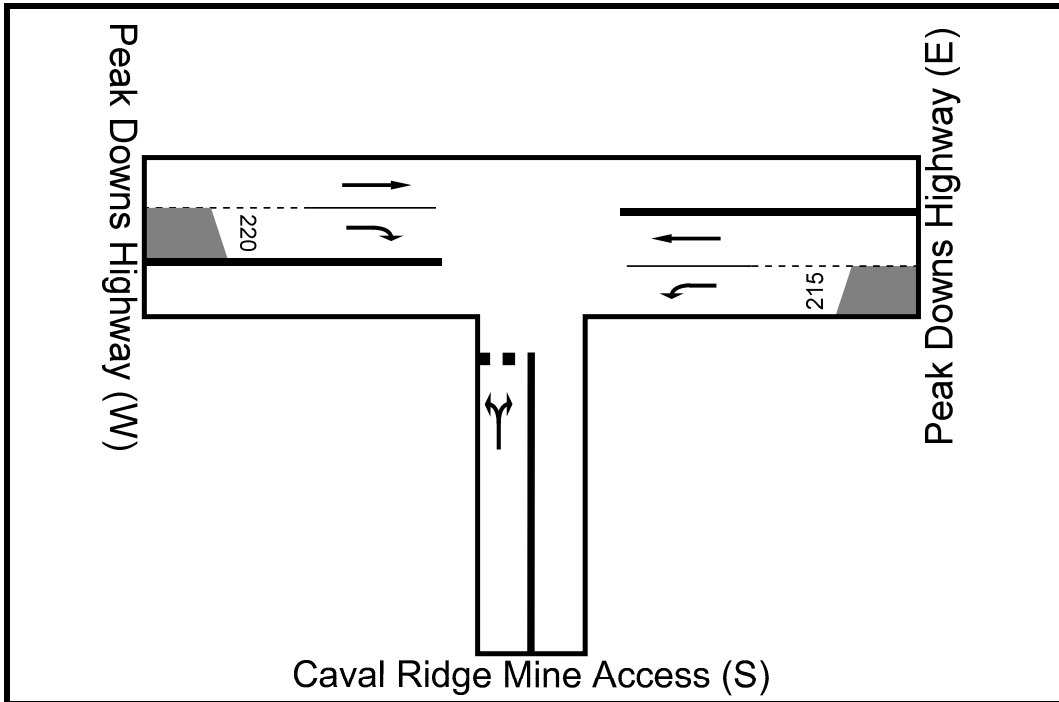


Figure 13.3 Site Access/Peak Downs Highway (Construction Phase - Intersection Layout)

The assessed form is expected to operate at an acceptable level during the construction phase. Further investigations to refine the geometric design of the intersection are required.

13.5.3.2 Site Access/Peak Downs Highway (Operations Phase) Intersection

A new priority controlled access to the Peak Downs Highway is to be constructed to service the project during the 30 year mine operation phase.

The intersection should comprise short protected turn lanes on both approaches of the Peak Downs Highway (Figure 13.4) in accordance with previous agreements with DMR.

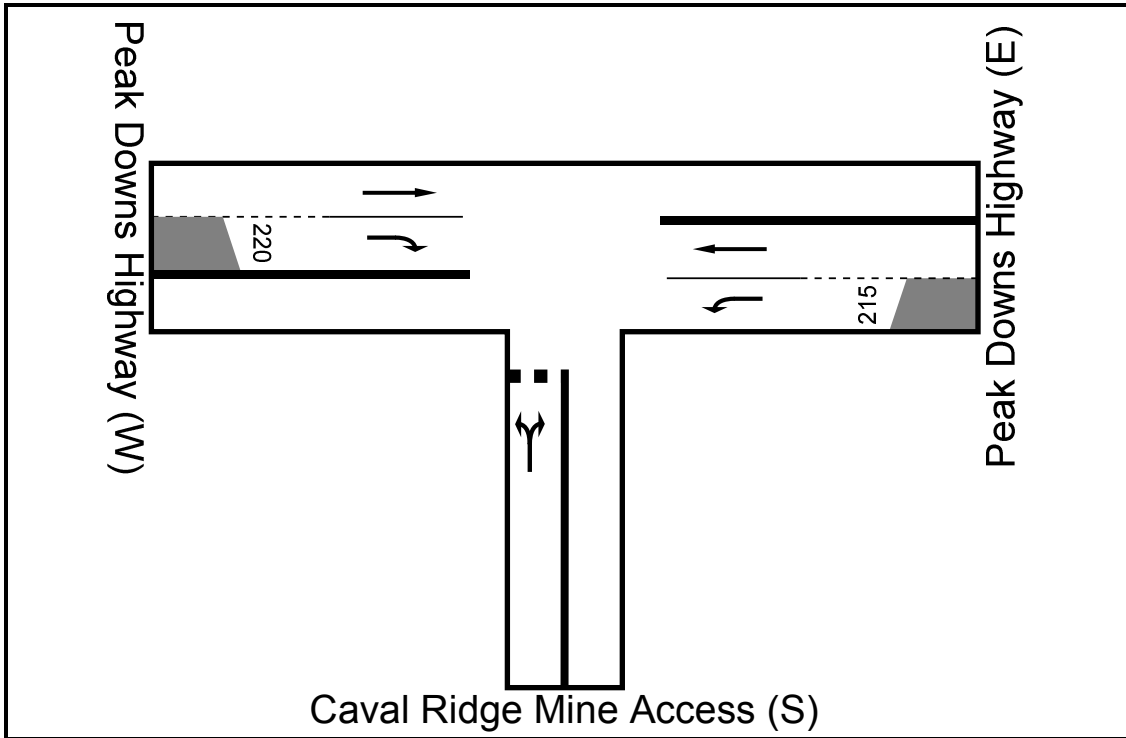


Figure 13.4 Site Access/Peak Downs Highway (Operations Phase -Intersection Layout)

The proposed access form is expected to operate at an acceptable level for all operational scenarios assessed. Further investigations to refine the geometric design are required.

13.5.3.3 Winchester Road/Peak Downs Highway Intersection

The Winchester Road/Peak Downs Highway intersection (Figure 13.5) is currently a priority-controlled intersection. Detailed assessment of this intersection, against DTMR's DOS criteria and industry-accepted critical delay criteria is provided in Appendix N, Section 6.7.

Based on background growth rates, this intersection is anticipated to operate outside DTMR's standard performance threshold prior to 2023 irrespective of the project development proceeding.

The project will generate significant additional through traffic at this intersection although only minor additional turning movements. It is anticipated that if the project proceeds the subject intersection will fail to meet DTMR's standard DOS criteria during 2016, 2.5 years earlier than if the proposed development was not to occur. The project's impact on this intersection is therefore classified as significant based on standard industry practise (i.e. accelerates failure by one year or more). BMA therefore has a responsibility to mitigate the development's impact at this location.

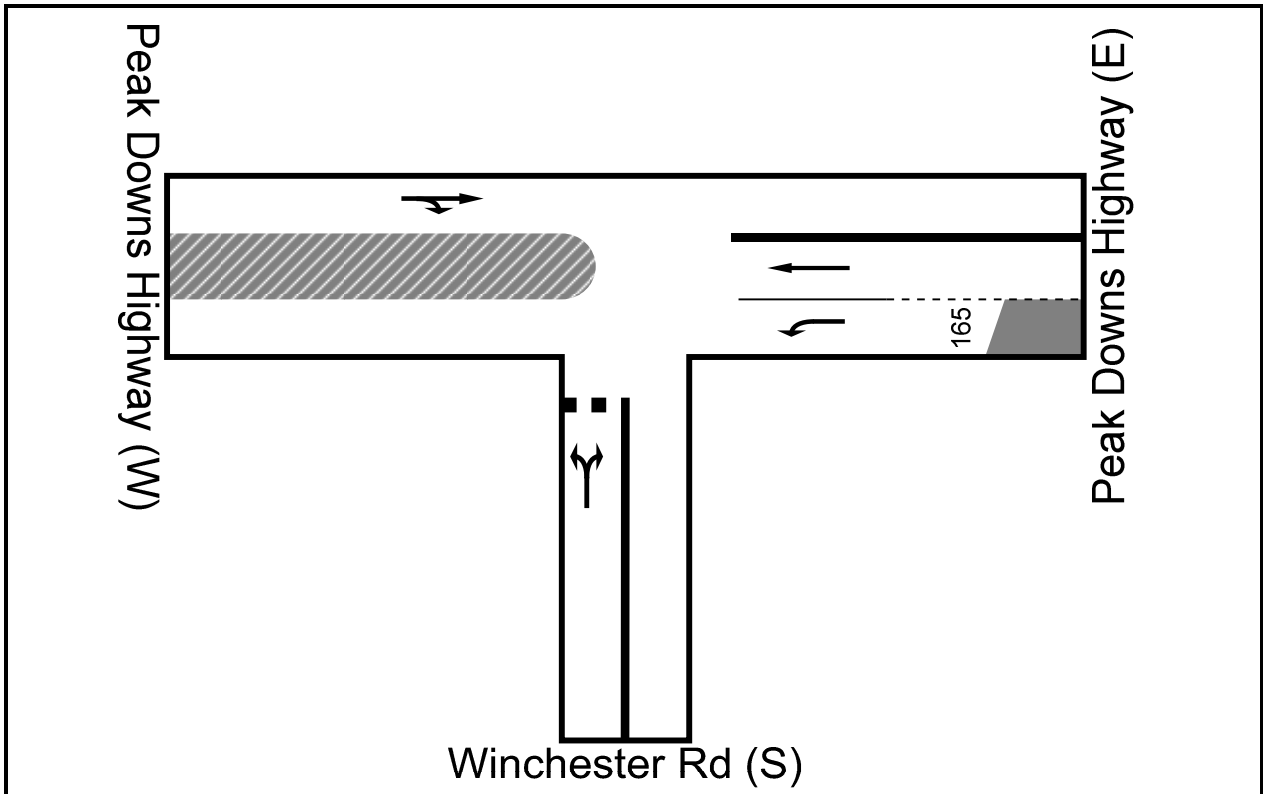


Figure 13.5 Winchester Road/Peak Downs Highway (Existing Intersection Layout)

Proposed Upgrades

Given current driver expectations and the current speed environment, it is recommended that the intersection be converted to a seagull form (as detailed in Chapter 13 of the *Road Planning and Design Manual*). Consideration of the appropriateness of alternative intersection forms (e.g. signals, roundabouts) is detailed at Appendix N, Section 6.7.

The intersection was reassessed for 2023 assuming conversion to the seagull form. The first stage minor road right out movement was modelled using SIDRA Intersection. The second stage left to right merge was modelled using the merge analysis methodology documented in the *Highway Capacity Manual* prepared by the Transportation Research Board. The intersection has not been assessed as a two stage crossing as this is not representative of how the DTMR seagull form operates. The proposed seagull form is shown on Figure 13.6.

The analysis results indicate that the seagull intersection will operate outside DTMR's standard thresholds at 2023 irrespective of the project proceeding. Furthermore, the seagull form would operate outside generally accepted critical delay thresholds should the development proceed. Detailed analysis results are provided in Appendix N, Section 6.7.

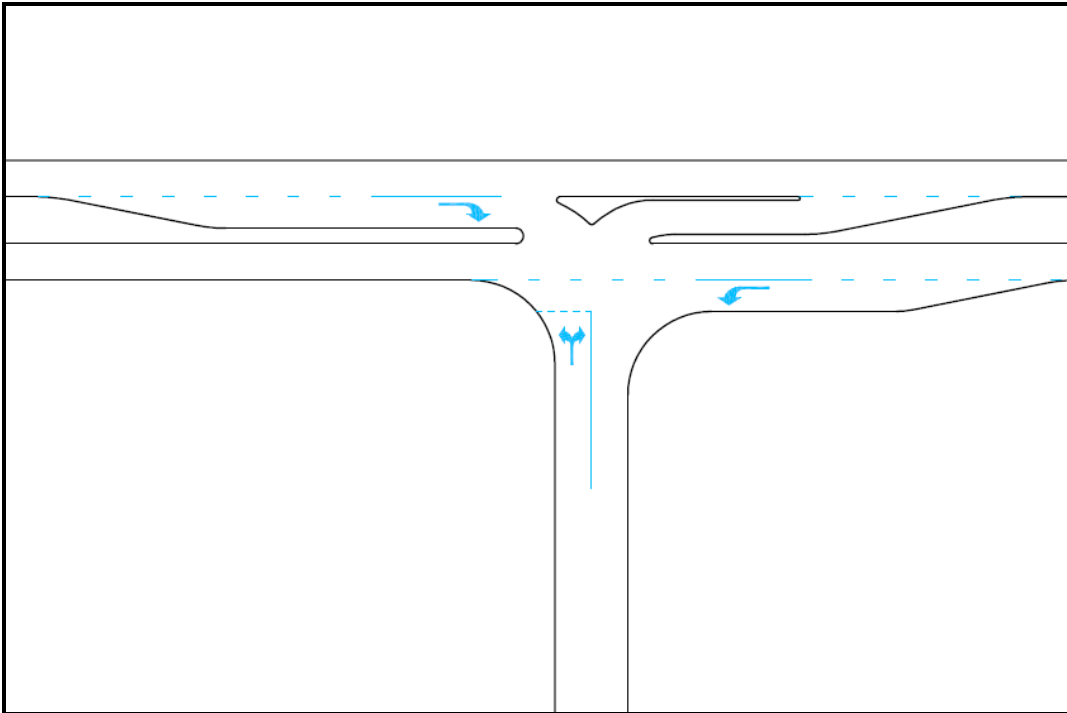


Figure 13.6 Winchester Road/Peak Downs Highway – (Proposed Seagull Layout)

The analysis results indicate that the seagull intersection will operate outside DTMR’s standard thresholds at 2023 irrespective of the project proceeding. Furthermore, the seagull form would operate outside generally accepted critical delay thresholds should the development proceed.

Sensitivity Analysis

A sensitivity analysis was undertaken to determine the influence the assumed background traffic growth rate between 2008 and 2021 has on intersection operation. Note that the assumed growth rate between 2021 and 2043 was not adjusted as part of the sensitivity analysis. The traffic growth sensitivity analysis results are presented in Table 13.4.

Table 13.4 Winchester Rd/Peak Downs Highway - Proposed Seagull Form (1st Stage) – Traffic Growth Sensitivity Analysis SIDRA Summary

Scenarios	AM Peak			PM Peak		
	DOS	Critical Delay	95 th %le Queue	DOS	Critical Delay	95 th %le Queue
2023 With Development (7% p.a.)	0.57	15	37	0.70	15	68
2023 With Development (8% p.a.)	0.66	17	50	0.81	19	101
2023 With Development (9% p.a.)	0.79	21	75	0.95	30	186
2023 With Development (10% p.a.)	0.94	36	146	1.08	104	463

It is noted that the results are based on the assumption that project's peak generation periods coincides with the network peak periods, which is a worst case assessment.

It is recommended that the existing intersection be upgraded to a seagull form, by 2016 to mitigate development impacts. It is noted that the recommended form does not operate within DTMR's standard thresholds at 2023 should traffic growth exceed 7% p.a. compound between 2008 and 2021.

13.5.3.4 Moranbah Access Road/Peak Downs Highway Intersection

The Moranbah Access Road/Peak Downs Highway intersection is currently a priority-controlled intersection. The intersection layout used for analysis is provided on Figure 13.7 and a summary of the analysis results for this form is provided in Appendix N, Section 6.8.

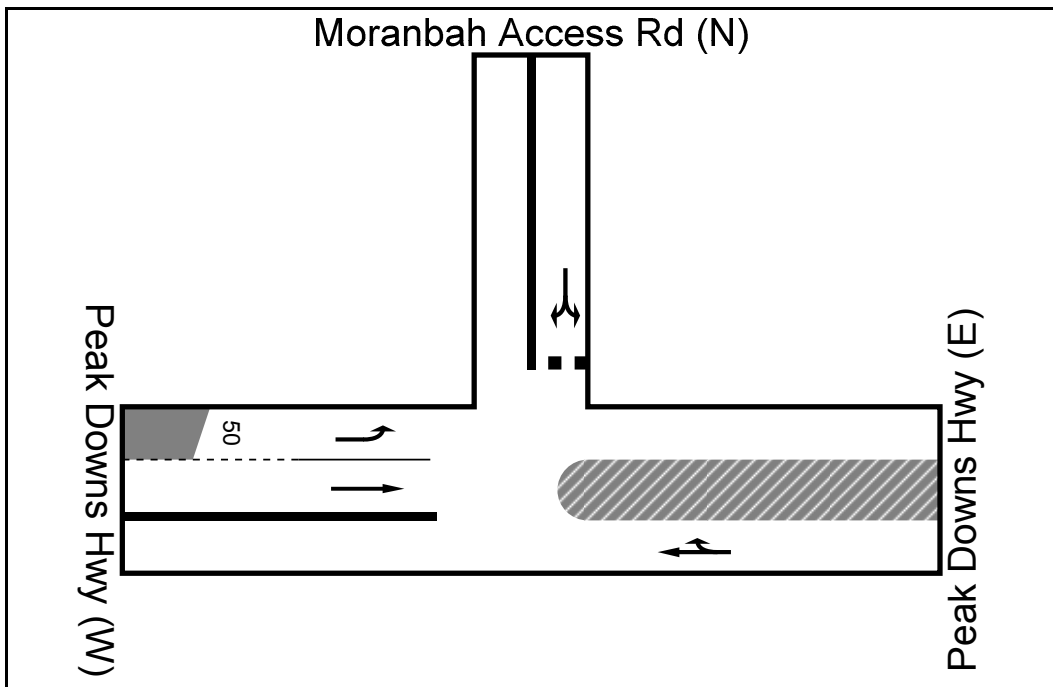


Figure 13.7 Moranbah Access Road/Peak Downs Highway (Existing Intersection Layout)

Detailed assessment of this intersection, using DTMR DOS criteria and industry-accepted critical delay criteria is provided at Appendix N. If the project proceeds, the intersection will fail to meet DTMR's standard DOS thresholds in early 2014, approximately 1.5 years earlier than if the proposed development was not to proceed. The project's impact on the intersection is therefore classified as significant based on standard industry practise (i.e. accelerates failure of intersection by one year or more). As no upgrading works are planned by DTMR, BMA should be responsible for upgrading the intersection.

Possible Upgrades

Given existing driver expectations and the current speed environment, it is recommended that the intersection be converted to a seagull form. The proposed seagull intersection treatment is shown in

Figure 13.8. The appropriateness of alternative forms is detailed in Appendix N, Section 6.8 in addition to detailed analysis results for the existing and proposed intersection forms.

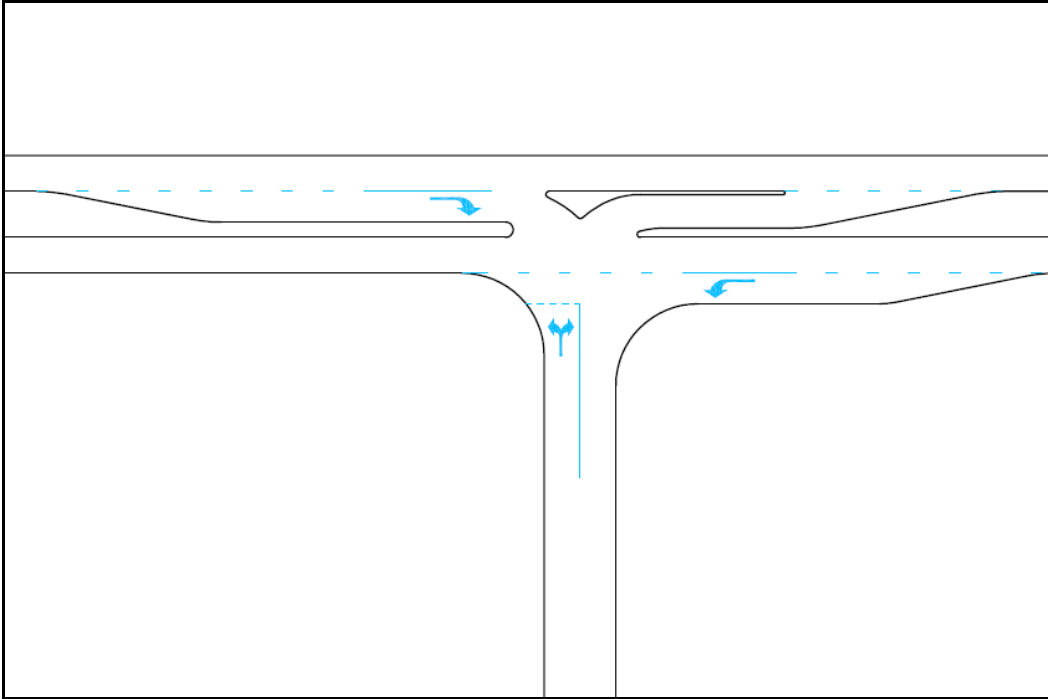


Figure 13.8 Moranbah Access Road/Peak Downs Highway – (Proposed Seagull Form)

Based on the analysis results, the proposed seagull intersection will operate outside DTMR’s standard DOS thresholds and industry standard critical delay criteria at 2023 irrespective of the project proceeding.

Sensitivity Analysis

A sensitivity analysis was undertaken to determine the influence the assumed background traffic growth rate between 2008 and 2021 has on intersection performance. Note that the assumed growth rate between 2022 and 2043 was not adjusted as part of the sensitivity analysis. The results of the traffic growth sensitivity analysis are presented in Table 13.5.

Table 13.5 Moranbah Access Rd/Peak Downs HWay - Proposed Seagull Form (1st Stage) – Traffic Growth Sensitivity Analysis SIDRA Summary

Scenarios	AM Peak			PM Peak		
	DOS	Critical Delay	95 th %le Queue	DOS	Critical Delay	95 th %le Queue
2023 With Development (7% p.a.)	0.69	18	59	0.81	30	63
2023 With Development (8% p.a.)	0.80	22	85	1.06	76	157
2023 With Development (9% p.a.)	0.95	39	162	1.28	293	473
2023 With Development (10% p.a.)	1.13	149	445	1.69	659.6	869

Table 13.6 Forecast Link Volumes and LOS Assessment

Link	Survey K factor	Assumed K factor	Existing (2007)		2012				2013				2023			
					Background		With Development		Background		With Development		Background		With Development	
			AADT	LOS	AADT	LOS	AADT	LOS	AADT	LOS	AADT	LOS	AADT	LOS	AADT	LOS
A	6.6%	10.0%	512	A	845	A	1,277	A	1,067	A	1,424	A	2,290	A	2,647	B
B	16.6%	15.0%	1,876	B	3,133	B	3,503	C	3,561	C	3,864	C	8,044	D	8,346	D
C	11.8%	12.0%	3,821	B	6,326	C	6,683	D	7,126	D	7,423	D	16,376	E	16,673	E

Link A - Peak Downs Highway between Mine Site Access and Winchester Road

Link B - Peak Downs Highway between Winchester Road and Moranbah Access Road

Link C - Moranbah Access Road between Peak Downs Highway and Moranbah Railway Station Road



The results presented in Table 13.6 indicate that Link A is expected to operate within DTMR's standard LOS thresholds irrespective of the project proceeding. Links B and C are anticipated to operate outside accepted criteria prior to 2023 irrespective of the development proceeding. The impact of the project on the operation of these links is classified as insignificant in accordance with standard industry practice. No upgrade works or developer contributions are therefore warranted. Road Alignment

The project site is bisected by Peak Downs Highway. To ensure the site can operate as a single integrated site with no requirement for mining vehicles to interact with the highway, grade separation of the internal mine haul routes and the highway is required. It is proposed to undertake a vertical realignment of the highway, retaining the existing horizontal road corridor. This vertical realignment is required entirely by the project and will therefore be BMA's responsibility.

13.6 Pavement Impact Assessment

The pavement impacts of heavy vehicle movements on the state controlled road network, generated during the construction and operations phases, were assessed in accordance with DTMR's *Guidelines for the Assessment of Road Impacts of Development* and *Notes for Contribution Calculations* prepared by the former DMR Central District.

The methodology, growth rates and assumptions for the pavement assessment are detailed at Appendix N, Section 7.

13.6.1 Pavement Rehabilitation Impacts

The reduction in estimated service life on the Peak Downs Highway as a result of the project was calculated for the various sections of the highway. Reduction in estimated service life ranged from 0 – 0.8 years. A more detailed summary is provided at Appendix N, Section 7.5.

Analysis indicates that, for all road segments, the increased heavy vehicle loading due to the project is negligible and will not significantly impact the timing of pavement rehabilitation works (i.e. it will not accelerate works by one year or more). No developer contribution towards pavement rehabilitation is therefore warranted.

13.6.2 Pavement Maintenance Impacts

BMA's obligation towards routine maintenance of the Peak Downs Highway has been calculated based on the percentage increase in Equivalent Standard Axels (ESA) for each road segment upon which the proposed development has a significant impact from 2011 to 2043.

Developer contributions towards maintenance of the Peak Downs Highway between the site access and the Moranbah Access Road/Peak Downs Intersection are warranted. Further details regarding the extent of developer contributions are provided at Appendix N, Section 7.6.

13.7 Conclusion

13.7.1 Traffic Generation

The project has been divided into two distinctive phases for the purposes of this traffic assessment due to the different traffic demands of each phase. The construction phase will generate the highest rates of traffic with an average workforce of 843 and average deliveries by 12 trucks per day over two years. Within this two years is expected a peak six month period with a 1,400-strong workforce and deliveries by 52 trucks per day. The mining operations phase will extend over 30 years with an average workforce of 493 staff and average deliveries by seven trucks per day. Staff will be predominantly bussed to site from the vicinity of Moranbah while goods and waste trucks are expected to primarily arrive from both Moranbah and Mackay.

13.7.2 Background Traffic

The adjacent road network, particularly the Peak Downs Highway and Moranbah Access Road, are expected to experience significant traffic growth due to other industrial activities planned for the vicinity. In addition to that growth, other BMA BBGP components are expected to commence activities during the assessed timeframe. These include the Daunia Mine development and the Goonyella Riverside Mine expansion. These growth projects have been considered in addition to the expected high background traffic growth. Given the extent of the expected traffic growth (in the order of 5-10% p.a. compound), it is unlikely that this will be sustained for more than about ten years. Moderate growth rates have therefore been assumed beyond 2021.

13.7.3 Traffic Impacts & Required Upgrades

The spatial extent of the proposed developments impact on the external road network has been defined in accordance with DTMR's *Guidelines for the Assessment of Road Impacts of Developments*, that is where the mine's traffic will exceed 5% of existing traffic volumes. The impacted road elements have then be assessed for at 2012, 2013 and 2023:

Recommended road works to mitigate the traffic impacts of project are:

- Formation of a priority-controlled construction access on Peak Downs Highway to include a 220 m right turn bay and a 215 m left turn lane on the highway.
- Formation of a priority-controlled mining operations access on Peak Downs Highway to include a 220 m right turn bay and a 215 m left turn lane on the highway.
- Upgrade of the Peak Downs Highway/Winchester Road intersection to a seagull intersection in accordance with Chapter 13 of DMR's Road Planning and Design Manual.
- Upgrade of the Peak Downs Highway/Moranbah Access Road intersection to a seagull intersection in accordance with Chapter 13 of DMR's Road Planning and Design Manual.



The assumed very high background traffic growths have a significant influence on the required works. Furthermore, it is believed DTMR are currently in negotiations with another party regarding upgrading the Peak Downs Highway/Moranbah Access Road intersection.

13.7.4 Pavement Impacts & Required Upgrades

The spatial extent of the pavement impacts of the traffic associated with the project has been defined in accordance with the DMR *Guidelines for the Assessment of Road Impacts of Developments* and the *Notes for Contribution Calculations*. The impacted road sections have then been assessed for the life of the mine.

The additional heavy vehicle demands generated by the project do not warrant developer contributions towards pavement rehabilitation. Contributions towards pavement maintenance are however warranted for the section of the Peak Downs Highway between the site access and the Moranbah Access Road/Peak Downs Highway intersection.