CHAPTER 8
TRAFFIC

DISCLAIMER

A declaration has been made on behalf of IRD Mining Operations Pty Ltd by its Managing Director that he has taken reasonable steps to review the information contained in this document and to ensure its accuracy as at 5 November 2015.

Subject to that declaration:

(a) in writing this document, Iron Road Limited has relied on information provided by specialist consultants, government agencies, and other third parties. Iron Road Limited has reviewed all information to the best of its ability but does not take responsibility for the accuracy or completeness; and

(b) this document has been prepared for information purposes only and, to the full extent permitted by law, Iron Road Limited, in respect of all persons other than the relevant government departments, makes no representation and gives no warranty or undertaking, express or implied, in respect to the information contained herein, and does not accept responsibility and is not liable for any loss or liability whatsoever arising as a result of any person acting or refraining from acting on any information contained within it.

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8 Traffic

The construction and operation of the proposed mine will generate traffic above existing levels which may impact the existing traffic and transport environment on the Eyre Peninsula. The mine will alter the local road network, including the closure of a number of roads on the mine site. Traffic generation will also be increased throughout the life of the project. This chapter assesses the impact to the existing traffic and transport environment as a result of the mine, taking into account the existing transport network and proposed design modifications. Further information is provided in the Traffic Impact Assessment Report in Appendix I.

8.1 Applicable Legislation and Standards

The relevant legislation relating to traffic at the mine site is as follows:

- *Road Traffic Act 1961*
- *Local Government Act 1999*
- *Highways Act 1926*

Further information regarding the requirements and relevance of the legislation is provided in Chapter 4. Specifically, the following standards provide a range of criteria relevant to traffic:

- Austroads Guide to Traffic Management
- Highway Capacity Manual (HCM) volume 2, chapter 15 methods for analysis of two lane highways (TRB 2010)

The Austroads Guide to Traffic Management includes definitions for the level of service (LOS) which represent the traffic capacity on a road using service measures such as speed and travel time, freedom to manoeuvre and convenience. There are six LOS ranging from LOS A (uncongested and free flowing) to LOS F (queuing and delays) that represent a range of operating conditions and the driver's perception of those conditions. These are defined in Table 8-1.

Table 8-1 Level of Service Definitions

Level of Service	Definition
A	Level of service A is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of comfort and convenience provided is excellent.
B	Level of service B 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, although the general level of comfort and convenience is a little less than with level of service A.
C	Level of service C 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 within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
D	Level of service D is close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor and small increases in traffic flow will generally cause operational problems.

Level of Service	Definition
E	Level of service E occurs when traffic volumes are at or close to capacity and there is virtually no freedom for drivers to select their desired speeds and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause flow breakdown.
F	Level of service F 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.

Source: Austroads 2009

8.2 Assessment Method

The traffic impact assessment was undertaken for the whole of the project, including the infrastructure components, since the impacts from the mine and infrastructure components are intrinsically linked. The assessment methodology for the traffic impact assessment is outlined in detail in the Traffic Impact Assessment Report in Appendix I. The assessment involved the following:

- Establishing baseline traffic and transport conditions for the study area by calculating existing roadway level of service, road safety and existing roadway asset conditions and accessibility.
- Quantifying construction stage activities impacting the road network by calculating materials and equipment delivery loads based on quantity estimates and construction workforce traffic based on manning schedules provided by Iron Road, planned construction camp locations and estimated workforce draw from surrounding Eyre Peninsula towns.
- Having determined both the baseline and project case conditions, the severity of impacts to the study area road network due to the proposed development were assessed as follows:
    - Level of service degradation due to project traffic generation was calculated according to the US Highway Capacity Manual (HCM) methodology for two lane highways (TRB 2010).
    - Delay due to train movements at level crossings was estimated by comparison of probable vehicle arrival volume and calculated train crossing closure time.
    - Any potential road safety and accessibility concerns were identified by assessing likely traffic-generation volumes of different vehicle types against the observed existing road geometry and condition data (sight distances, pavement condition, road widths).
    - The level of impact was assessed in accordance with the methodology outlined in Chapter 6.
- Where required, to reduce the severity of impacts, control measures were developed. These include road/intersection upgrades, traffic management procedures and signing strategies.

The study area (refer to Figure 8-1) for the transport assessment was determined in consultation with DPTI based on the likely extent of impact from project-generated traffic. The relative impact of the project-generated traffic would fall below 1% of traffic on the arterial roads outside of the study area, which is below the threshold for impact analysis in the Austroads Guide to Traffic Management.

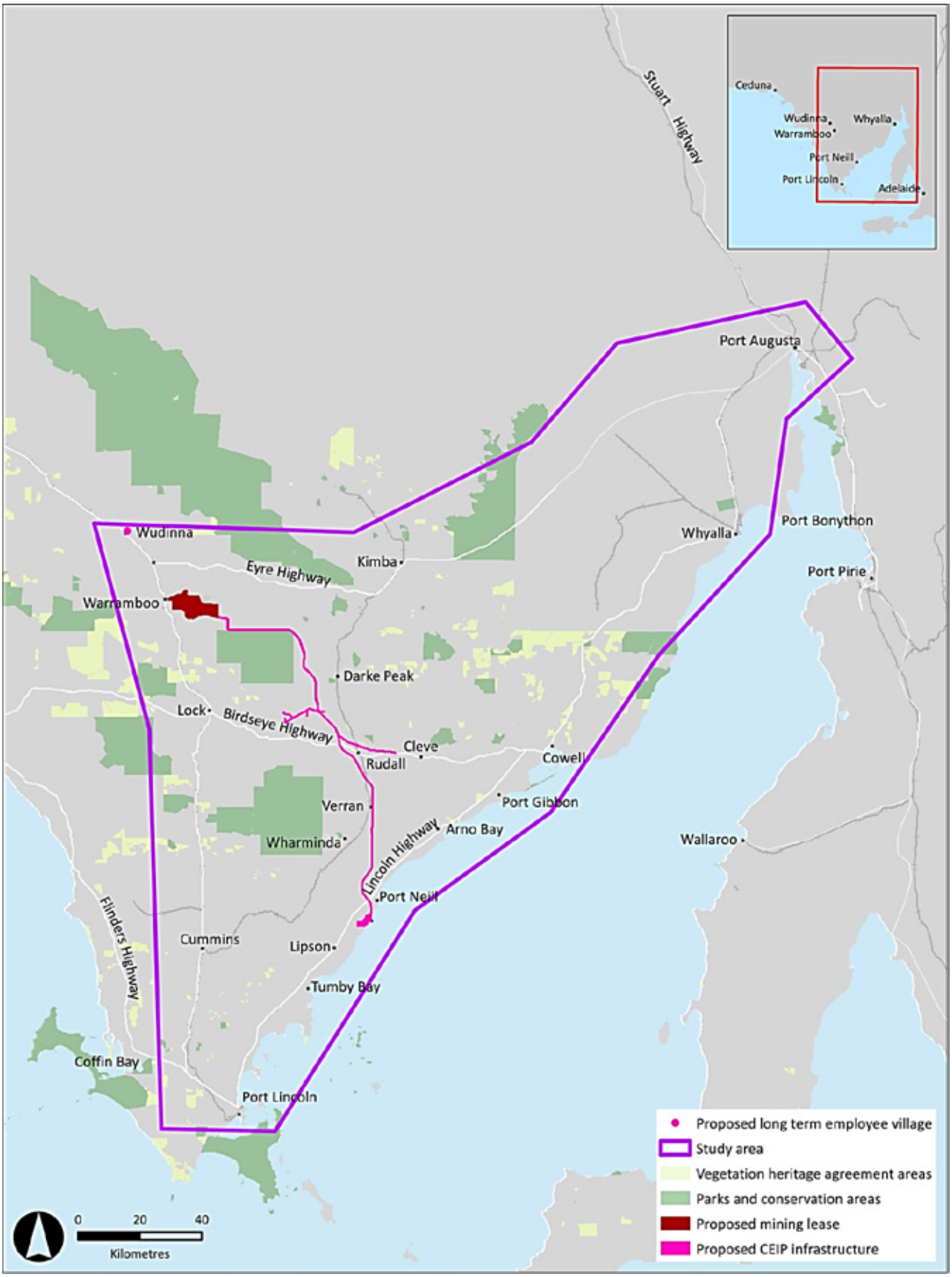


Figure 8-1 Transport Assessment Study Area

8.3 Existing Environment

This section provides a summary of the existing transport network within the study area as relevant to the proposed mining lease, including highways, local roads, road safety, existing rail and public transport. The existing transport network on the Eyre Peninsula is shown in Figure 8-2.

The Eyre Peninsula has a low population density and consequently traffic volumes, even on rural highways in the study area, are low and well below road capacity thresholds. The bulk of rural movements, including most road and all rail movements, are for freight transport and many roads are gazetted for heavy vehicles.

8.3.1 Eyre Peninsula Highway Network

There are four highways across the Eyre Peninsula that would be utilised in some way due to the mine, such as by personnel commuting to and from work or materials being delivered to site. They are:

- Lincoln Highway
- Tod Highway
- Birdseye Highway
- Eyre Highway

A description of each of the four highways is provided in Table 8-2. The Eyre Highway is the only Austroads Class 1 road in the study area. Class 1 roads form the principal avenue for movements between major regions of Australia, including direct connections between capital cities (Austroads 2009). The Lincoln Highway follows the eastern coast of the Eyre Peninsula. It is an Austroads Class 2 Road, which are generally the principal avenue for movements between a capital city and key towns or between key towns. The Tod Highway and Birdseye Highway are Austroads Class 3. These roads form an avenue for movements between important centres or between Class 1 and Class 2 roads. The Tod Highway passes through Warramboo and is approximately 750 m west of the mine site.

The Annual Average Daily Traffic (AADT) of each of the highways varies over segments between towns and major intersections. Table 8-3 details the varying AADT and percentage of heavy vehicle values by road segment. It is important to note that these figures are annual averages and in harvest season (November and December) the daily traffic is likely to be higher on the main roads south of Wudinna, Darke Peak, Cleave and Port Gibbon where land use is dominated by cropping practices.

Table 8-3 also contains a projection of likely future traffic volumes anticipated during 2017 without the mine. The pattern of population, employment and consequently traffic growth in the Eyre Peninsula is highly variable across the region. As such, the projected traffic volumes also vary. For most of the State roads in the study area there has been negligible to no growth in daily traffic in the past 20 years and traffic growth is expected to be zero or even negative. However, in locations where population is growing (such as in Port Lincoln), traffic growth of up to 3% per annum is occurring on approach roads. Traffic growth on the Lincoln Highway is therefore projected to continue at 3% per annum, equating to approximately 12% growth between 2013 and 2017.

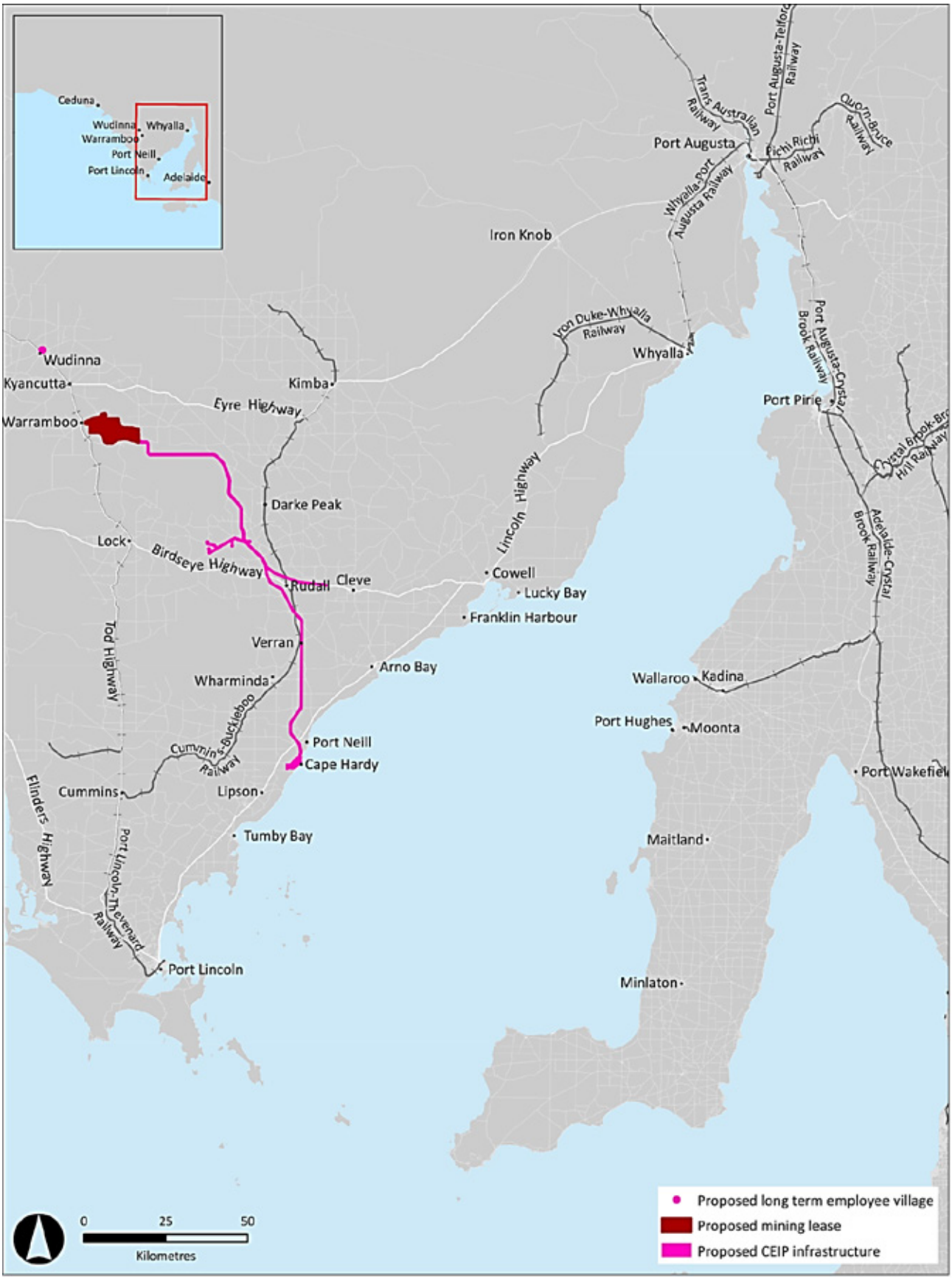


Figure 8-2 Eyre Peninsula Transport Network

Table 8-2 Summary of Eyre Peninsula Highways

Name	Class	Description	Photo
Eyre Highway (A1)	1	The Eyre Highway forms part of the Australian National Highway Network, linking Adelaide to Perth. Within the Eyre Peninsula, it provides connectivity between Port Augusta and a number of smaller towns, including Kimba, Kyancutta and Wudinna. It consists of a sealed single carriageway with one lane in each direction.	
Lincoln Highway (B100)	2	The Lincoln Highway is the major Eyre Peninsula highway, serving as the primary route from Port Lincoln to Whyalla and providing connectivity to numerous towns along the way. It consists of a sealed single carriageway with one lane in each direction.	
Tod Highway (B90)	3	The Tod Highway provides north-south connectivity through the centre of the Eyre Peninsula, from Kyancutta to the Flinders Highway approximately halfway between Coffin Bay and Port Lincoln. It consists of a sealed single carriageway with one lane in each direction.	
Birdseye Highway (B91)	3	The Birdseye Highway provides east-west connectivity across the Eyre Peninsula, linking Cowell to Elliston. It is a sealed, single carriageway road with one lane in each direction.	

Table 8-3 Existing AADT and Percentage of Heavy Vehicles

Road name	Segment	AADT [1] (2013)	%HV[2]	Projected AADT (2017)[3]
Eyre Highway (A1)	Stuart Highway to Lincoln Highway	2,700	22	2,700
	Lincoln Highway to Iron Knob Whyalla Road	650	35.5	650
	Iron Knob Whyalla Road to Kimba-Cleve Road	750	32	750
	Kimba-Cleve Road to Tod Hwy	800	35	800
	Tod Hwy to Wudinna	1,000	31	1,000
Lincoln Highway (B100)	Eyre Highway to Whyalla	2,000	16	2,240
	Whyalla to Kimba-Whyalla Road	1,100	17	1,232
	Kimba-Whyalla Road to Ash Road	1,100	27.5	1,232
	Ash Road to Cowell	950	18	1,064
	Cowell to Birdseye Highway	800	17.5	896
	Birdseye Highway to Arno Bay	550	18	616
	Arno Bay to Tumby Bay	700	17	784
	Tumby Bay to Louth Bay	1,200	17.5	1,344
	Louth Bay to North Shields	1,800	13.5	2,016
	North Shields to Port Lincoln	3,000	9.5	3,360
Tod Highway (B90)	Kyancutta to Lock	220	17.5	220
Birdseye Highway (B91)	Lincoln Highway to Cleve	240	17	240
	Cleve to Rudall	350	10.5	350
	Rudall to Lock	130	13	130

[1]Annual Average Daily Traffic (AADT) (source DPTI 2013a)
[2]Heavy vehicles (HV)
[3]Refer to the Traffic and Transport Assessment report for further detail on traffic projections

8.3.2 Local Road Network

The local road network in the study area generally consists of unsealed, one lane each way roads. Dolphin Road, Murphy Road and Kimba Road all cross through the mine site while Schulze Road, Nantuma Road and Mays Road run along the northern, southern and western boundaries respectively. During operation of the mine, access to the mine site will be from Nantuma Road.

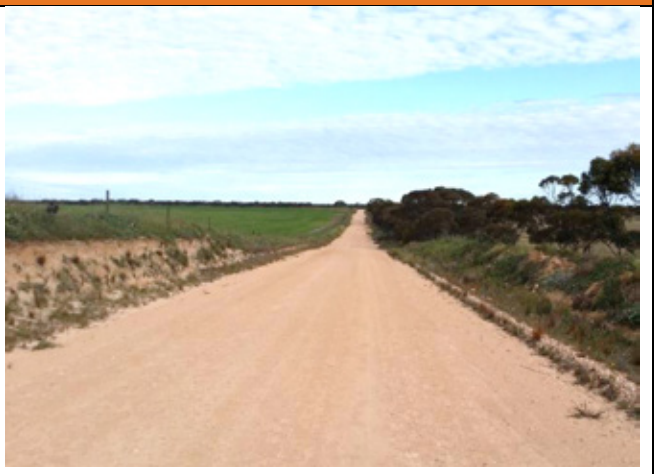
During construction of the mine site, mine plant modules arriving at the module offloading facility at the port site would travel to the mine site via the haul route which consists of the following roads:

- North Coast Road
- Port Neill Access Road
- Lincoln Highway (Port Neill Access Road to Balumbah-Kinnard Road)
- Balumbah-Kinnard Road
- Birdseye Highway (Rudall to Lock)
- Tod Highway (Lock to Warramboo)
- Kimba Road (Warramboo to mine site)

The local road networks and the module haul route to the mine site are shown on Figure 8-3 and Figure 8-4 respectively. A description of each of these local roads at the mine site is provided in Table 8-4.

Table 8-4 Local Road Network at Proposed Mine Site

Name	Description	Photo
Kimba Road	Kimba Road is a single carriageway two-way unsealed road which links Warramboo to the mine site. It is maintained by Wudinna District Council and is approximately 8.5 m in width. It consists of good strength material, well graded, well compacted with some corrugations and large windrows, however it is noted that feedback from the community has advised that some sections of the road are rough. There is no excessive erosion or fines and some drainage turnouts. Currently it provides access to a small number of farm properties.	
Schulze Road	Schulze Road is a single carriageway two-way unsealed road which links Warramboo to the mine site. Currently it provides access to a small number of farm properties.	
Nantuma Road	Nantuma Road is a single carriageway two-way unsealed road which would link the mine site to the Tod Highway during the Operation phase of the mine. Currently it provides access to a small number of farm properties.	

Name	Description	Photo
May Road	May Road is a single carriageway two-way unsealed road. Currently it provides access to a small number of farm properties.	
Lock Road	Lock Road is a single carriageway two-way unsealed road which provides access to a small number of farm properties.	

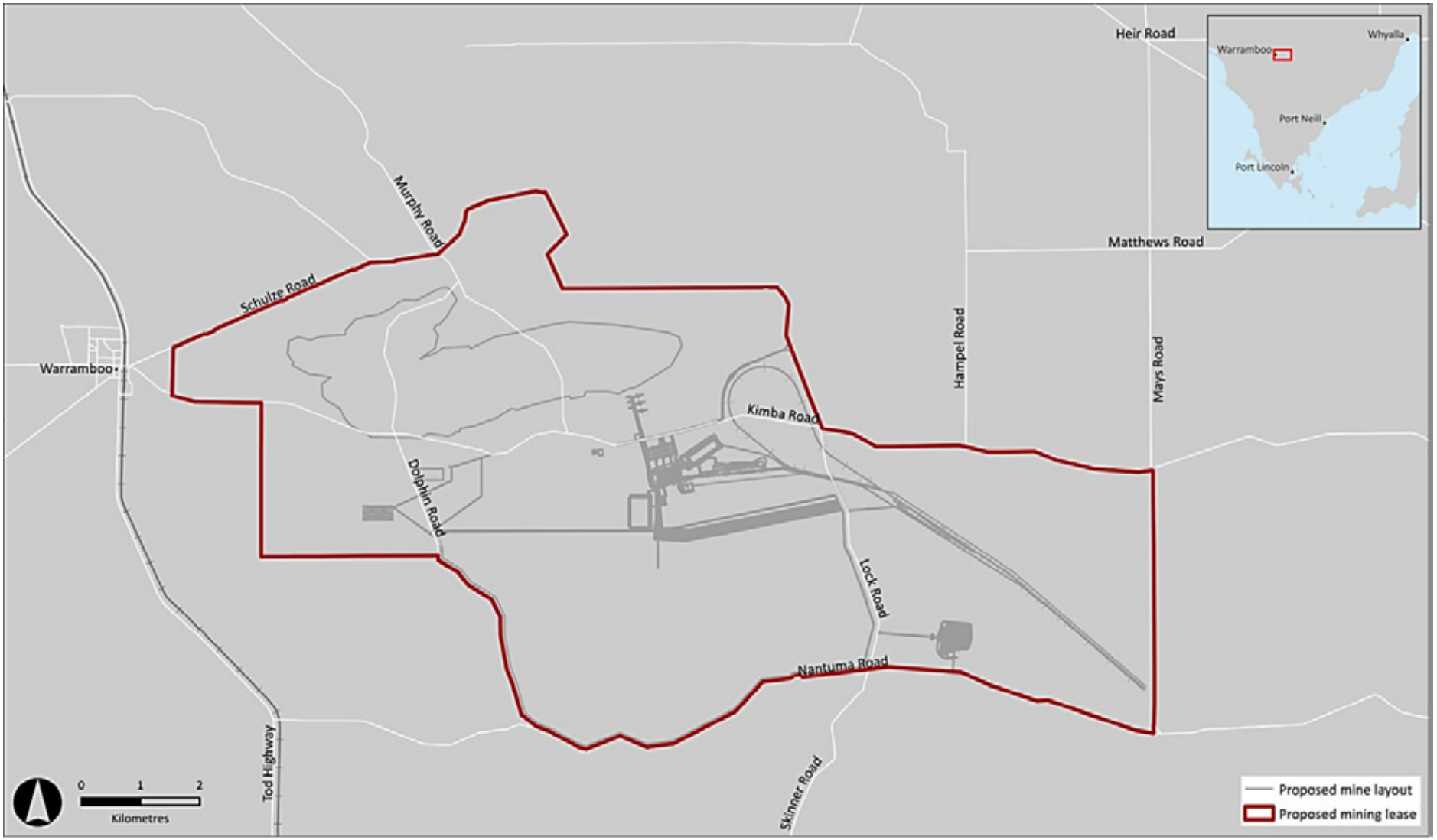


Figure 8-3 Proposed Mining Lease Area Local Road Network

Figure 8-4 Module Haul Route Local Road Network

8.3.3 Road Safety

Crash history data was obtained from DPTI for the following roads:

- Birdseye Highway between Lock and Cowell
- Eyre Highway between Port Augusta and Kyancutta
- Lincoln Highway between Port Augusta and Port Lincoln
- Tod Highway between Kyancutta and Lock
- Tod Highway between Kyancutta and Flinders Highway
- Flinders Highway between Tod Highway intersection and Western Approach Road near Port Lincoln
- Western Approach Road, Port Lincoln
- Balumbah-Kinnard Road south of Rudall to Lincoln Highway
- Iron Knob to Whyalla Road

The crash rate for each of these roads is shown on Figure 8-5. Roads with a crash rate under 50 crashes per 100 million vehicle kilometres travelled are considered to have an average or better crash history. As can be seen in Figure 8-5 the highest crash rates per 100 million vehicle kilometres travelled occurred between:

- Kyancutta and Warramboo on the Tod Highway
- Whyalla and Iron Knob on Iron Knob Road
- Lipson and Tumby Bay on the Lincoln Highway
- Lock and Yeelanna on the Tod Highway
- Cleve and Cowell on the Birdseye Highway

No road crash data is available for local roads in the study area. Given the very low traffic volumes on the roads concerned, it is considered unlikely that any statistically significant pattern in road crashes could be detected.

8.3.4 Rail Network

There is an existing rail network on the Eyre Peninsula that is operated by Genesee and Wyoming Australia Pty Ltd. It is primarily used to transport grain to Port Lincoln and consists of the Port Lincoln-Thevenard railway line and the Cummins-Buckleboo railway line. The Cummins-Buckleboo railway connects with the Port Lincoln-Thevenard railway at Cummins.

8.3.5 School Bus Routes

School buses are operated by the schools within the study area including Wudinna Area School and Cleave Area School. The school bus routes are generally revised annually depending on the requirements of the school population.

8.3.6 Public Transport

Public transport on the Eyre Peninsula is limited and there are no passenger rail services. Premier Stateliner runs regular bus services between Adelaide and regional centres (Premier Stateliner 2014) including:

- A service between Port Lincoln and Adelaide with six buses each way a week, buses leave Adelaide Monday to Saturday and Port Lincoln Sunday to Friday.
- A service between Ceduna and Adelaide with two buses each way a week, buses leave Adelaide Monday and Thursday mornings and Ceduna Tuesday and Friday mornings.
- A service between Adelaide and Whyalla which runs four times a day each way Monday to Friday and less frequently on weekends.

8.3.7 Summary of Key Environmental Values

Four main highways are located on the Eyre Peninsula; Lincoln Highway, Tod Highway, Birdseye Highway and Eyre Highway. The Tod Highway is closest to the mine site, approximately 750 m west, whilst the Eyre Highway is located approximately 5 km north. The Lincoln Highway, Birdseye Highway and Tod Highway will all be utilised to transport modules from the proposed port facility to the mine site.

Analysis of historical crash data indicates that each of the Highways have average or better crash history, with the exception of the Tod Highway. The highest crash rates occurred on the Tod Highway between Lock and Yeelanna and between Kyancutta and Warramboo, the Lincoln Highway between Lipson and Tumby Bay and the Birdseye Highway between Cleve and Cowell.

Public transport in the region is limited to periodic bus services between Adelaide and the regional centres of Port Lincoln, Ceduna and Whyalla. No passenger rail services operate on the Eyre Peninsula. A number of school bus routes operate in the study area and are generally revised annually to suit the requirements of the school population.

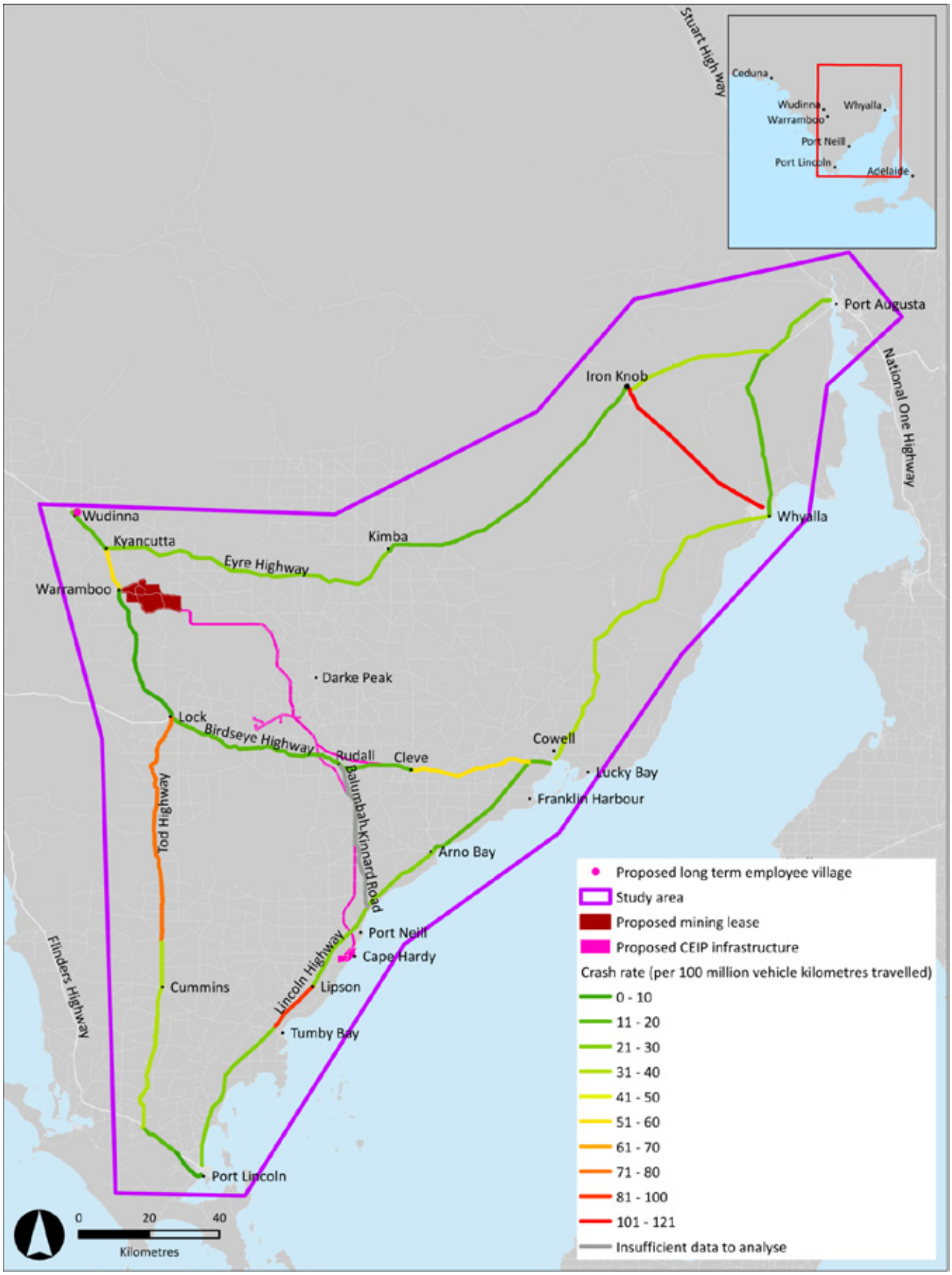


Figure 8-5 Crash Rate per 100 Million Vehicle Kilometres Travelled (for Selected Sections of Roads)

8.4 Context and Views of Affected Parties

The stakeholders relevant to traffic include the local and regional community, landowners within the mine site, landowners whose properties neighbour the mine site, local and regional industry and business, Wudinna DC and DPTI. Following consultation, stakeholders are seeking the following outcomes in relation to traffic:

- No safety-related implications to local community and landowners, particularly during harvest, as a result of additional traffic movements during construction and operation of the mine (PIM_08_07).
- No loss of amenity due to dust generation associated with vehicle movements resulting from activities associated with the mine site (PIM_15_15).
- Additional road maintenance provided to reflect increased patronage of local roads during construction and operation PIM_08_01, 02).
- No increased travel times for road users due to increased vehicle movements and the transport of large plant (PIM_08_03).
- No inconvenience to other road users as a result of road closures at the mine site (PIM_08_03-10).

Impacts and risks relating to the key existing environmental values and the issues identified by relevant stakeholders are discussed in Section 8.7 below.

All issues raised by stakeholders across the entire project are presented in Chapter 5 Stakeholder Consultation and summarised in Table 5-8. Impacts and risks relevant to each of the existing values associated with traffic and transport and potential issues identified by stakeholders are discussed below and summarised in Table 8-10. All impact events across the entire project are presented in the Impact and Risk Register in Appendix C.

8.5 Potentially Impacting Events

Considering the views and contexts of affected parties and the issues raised during technical studies, an assessment of Source Pathway Receptors (SPR) has been undertaken, as per the methodology outlined in Chapter 6, to determine which potential impact events (PIMs) are considered applicable to this project. Potential impact events associated with the construction, operation and closure of the mine that have a confirmed SPR linkage which effects the transport environment include:

- Construction traffic impacts on road capacity (IM_08_08)
- Transport of mine site modules results in traffic delays for road users in the region (IM_08_05)
- Operation traffic impacts on road capacity (IM_08_09)
- Mine site traffic increases road safety risk for local residents and other road users (IM_08_04, 06, 07)
- Increased road maintenance requirements as a result of mine site traffic (IM_08_01, 02)
- Increased traffic resulting in the need for intersection upgrades (IM_08_08, 09)
- Delays to the operation of the school bus (IM_08_10)
- Road closures at mine site result in increased travel times for local community (IM_08_03)

The Impact and Risk Register presented in Appendix C provides confirmation of a source pathway and receptor for each of the PIMs considered above and therefore follows each through as actual impact events (IMs) with a complete impact and risk assessment. For traffic, no potentially impacting events were negated due to a lack of source, pathway and receptor.

8.6 Control Measures to Protect Environmental Components

The following section identifies design and control measures implemented to mitigate the level of impact and risk associated with traffic such that it is considered as low as reasonably possible (ALARP).

8.6.1 Design Measures

The following design control measures have been incorporated to minimise the impacts and risks to traffic as a result of the construction, operation and closure of the mine:

- The use of modularised construction methods which will reduce the overall volume of construction traffic for the CEIP.
- Construction of a camp for contractors on the minesite.
- Upgrade of Nantuma Road between the Tod Highway and the proposed CEIP Infrastructure corridor.
- Upgrade of the Tod Highway and Nantuma Road intersection.
- Upgrade of the Eyre Highway and Mays Road intersection.
- Upgrade of the North Coast Road and Port Neill Access Road intersection to allow for the turning circle of the module transporter.
- Upgrade of the Port Neill Access Road and Lincoln Highway intersection to allow for the turning circle of the module transporter.
- Upgrade of the Lincoln Highway and Balumbah-Kinnard Road intersection to allow for the turning circle of the module transporter.
- Upgrade of the Birdseye Highway and Tod Highway intersection to allow for the turning circle of the module transporter.
- Upgrade of the Tod Highway and Kimba Road intersection to allow for the turning circle of the module transporter.
- Undergrounding of power lines that cross the module haul route roads. Check of clearance for power lines parallel and close to module route roads.
- Widening of culverts and road formations to at least 12 m along the module haul route to allow for the module transporter.
- Grading of cuttings which have insufficient width for the module transporter to pass through along the module haul route.
- Installation of foldable signs along the module haul route.
- During detailed design each of the proposed level crossings along the infrastructure corridor will be designed in accordance with AS1742.7, which defines the sighting required for level crossings in order to provide clear visibility of warning signage for an approaching motorist as well as between a road vehicle and an oncoming train.

8.6.2 Management Strategies and Commitments

Control and management measures to assist in the avoidance or mitigation of traffic impacts and risks during the construction, operation and closure of the mine will be incorporated into the PEPR and implemented for relevant project phases. Key control and management strategies are outlined in Table 8-5.

Table 8-5 Control and Management Strategies: Traffic

Control and Management Strategies	Project Phase[1]
Proposed road closures and realignments will be reviewed and confirmed in consultation with DPTI and Wudinna District Council as detailed design progresses.	CO
Slow-moving heavy equipment deliveries would be scheduled to arrive outside peak traffic periods and avoid potential conflict times identified during harvest season.	CO, OP
Management of the construction programme to reduce peak traffic generation and/or avoid peak traffic periods to minimise traffic delay to the public, if required.	CO
Liaison with local schools to discuss any impacts to bus routes due to road closures or traffic movements. Where possible traffic will be timed to avoid school bus services.	CO, OP
Progressive temporary road closures during module, heavy materials and equipment deliveries, with road diversion routes clearly signed.	CO
Modules will be delivered outside of peak traffic periods at night.	C
Use of accredited traffic controllers to manage intersection priority during heavy materials and equipment deliveries to the mine site, including along the module haul route.	CO, OP
Designated delivery transport routes for heavy vehicle and light vehicles.	CO, OP
Development of pavement monitoring, management and rehabilitation procedures in consultation with DPTI. This will identify different types of possible road and pavement damage, required inspection frequencies, intervention levels and required treatments. As part of the management plan, Iron Road will undertake pavement deflection (strength) testing on haul route pavements before and after the construction period to determine whether any remedial pavement rehabilitation treatment is required as the result of the mine site construction. Inspections should identify the following: · Rutting · Corrugations · Significant cracking · Potholing	CO, OP
Schedule shift changeovers away from current peak traffic hours.	CO, OP
Implementation of incident reporting system for the management of and implementation of traffic improvement measures.	CO, OP
Provision of bus to transport workers from the accommodation village in Wudinna to the minesite	OP

[1]CO = Construction, OP = Operation, CL = Closure

8.7 Impact and Risk Assessment

This section identifies and assesses impacts and risks associated with traffic as a result of the construction, operation and closure of the mine. Impact events (confirmed by presence of a source, pathway and receptor) are those considered certain to occur as a result of the development, whilst risks would not be expected as part of the normal operation of the project, but could occur as a result of uncertainty in the impact assessment process. Although the risks may or may not eventuate, the purpose of the risk assessment process is to identify management and mitigation measures required to reduce the identified risks to a level that is ALARP. This assessment has been undertaken in accordance with the methodology outlined in Chapter 6, with impacts classified in accordance with the criteria for categorising residual project economic and social impacts and the consequences of identified risks classified in accordance with either the public safety or social criteria as relevant.

Impacts and potential risks were identified through technical studies and stakeholder consultation. Impact events can include multiple sources, pathways or receptors and where practical have been grouped together to minimise duplication of information. Risks are events that would not be expected as part of the normal operation of the project, but could occur as a result of either uncertainties with the impact assessment, or as a result of faults, failures and unplanned events. A summary of impact and risk events relating to traffic and transport is presented in Table 8-10 at the end of this section (with Impact IDs). A complete register of impact and risk events by source, pathway and receptor is provided in Appendix C.

Impacts and risks are assessed following the application of the design and control measures outlined in Section 8.5. Where required, management measures are proposed (Section 8.5) to reduce the impact to a level that is considered ALARP. Through the adoption of design modification or specific mitigation measures, all identified impacts and risks were considered ALARP. The key environmental risks would be monitored through the environmental management framework.

8.7.1 Traffic Capacity Impacts during Construction

Additional traffic generated during the construction period would include a wide range of vehicle types depending on the type of load to be carried. This includes delivery of construction materials, plant modules, workers transportation and heavy machinery transport to the site. Traffic generated from the construction phase of the project was estimated by using anticipated quantities and vehicle load sizes for materials, size of workforce and vehicle occupancy for workers and the number of loads required to transport modules and equipment to the site. The trip generation estimates only account for vehicles travelling on public roads to and from site and do not include internal movements.

The distribution of vehicle trips within the study area was determined by assigning origin and destinations for each vehicle. Further detail on the traffic generation methodology is provided in the Traffic Impact Assessment Report (Appendix I).

The volume of traffic generated over the three year construction period for the mine site will be the highest in the first year of construction. The total two-way vehicle movements during the first year of construction are shown on Figure 8-6.

Total two way vehicle movements for proposed mining lease, construction year 1	Total	Daily
Arno Bay to Lincoln Hwy / Balumbah-Kinnard Rd Int.	0	0
Cleve to Rudall	0	0
Cowell to Arno Bay	0	0
Cowell to Cleve	0	0
Cummins to Lock	58	1
Eyre/Lincoln Hwy Int. to Iron Knob	12694	35
Eyre/Lincoln Hwy Int. to Whyalla	0	0
Iron Knob to Kimba	69776	192
Kimba to Kyancutta	69776	192
Kyancutta to Warramboo	70222	193
Kyancutta to Wudinna	446	2
Lincoln Hwy/Kinnard Rd Int. to Port Neill Turnoff	0	0
Lock to Rudall	0	0
Mine Site Turnoff to Lock	58	1
Port Augusta to Eyre/Lincoln Hwy Int.	12694	35
Port Lincoln to Tod/Flinders Hwy Int.	58	1
Port Lincoln to Tumby Bay	0	0
Port Neill Turnoff (Lincoln Hwy) to Port	0	0
Rudall to Balumbah-Kinnard Rd/Lincoln Hwy Int.	0	0
Tod Hwy/Flinders Hwy Int. to Cummins	58	1
Tumby Bay (Eyre Hwy Int.) to Port Neill Turnoff	0	0
Warramboo to Mine Site Turnoff	70222	193
Whyalla to Cowell	0	0
Whyalla to Iron Knob	57082	157

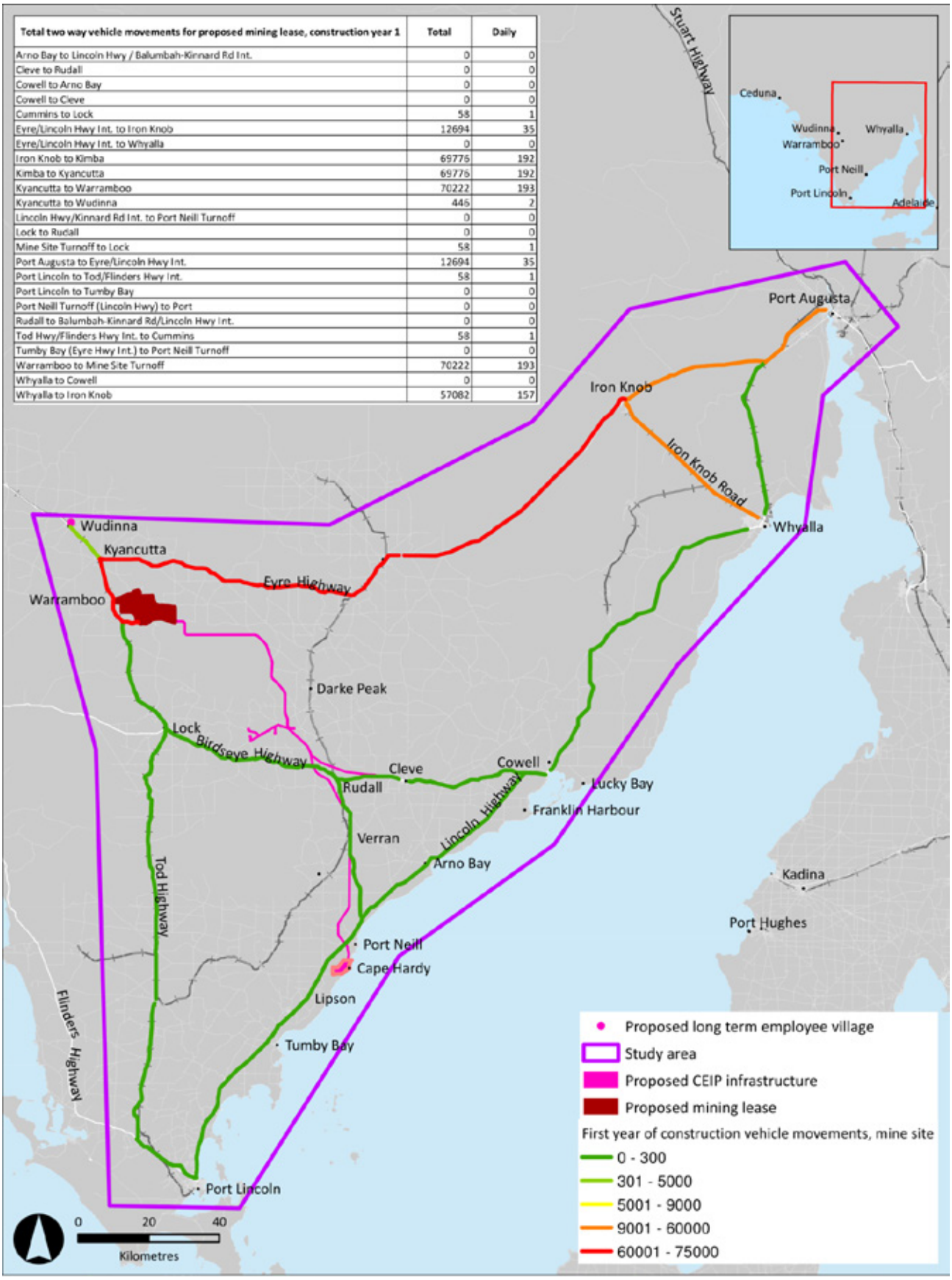


Figure 8-6 Total Two-Way Vehicle Movements for Proposed Mine Site, Construction Year 1

Traffic capacity of roads can be measured using level of service (LOS) to represent service measures such as speed and travel time, freedom to manoeuvre and convenience. As outlined in Table 8-1, there are six LOS ranging from LOS A (uncongested and free flowing) to LOS F (queuing and delays) that represent a range of operating conditions and the drivers perception of those conditions (Austroads 2009). The level of service for each of the road segments in the study area was calculated for the base case (without the project) and for each year over the construction period for Average Travel Speed (ATS) and Percentage Time Spent Following (PTSF) which reflects a measure of queuing. The results, shown in Table 8-6 predict no change to the current (2013) level of service as a result of the construction of the mine site. This indicates that even with the additional traffic generated, there is sufficient capacity on each of the roads to operate effectively at the same LOS. As such traffic capacity impacts during construction are expected to be **negligible**.

Table 8-6 Predicated Level of Service within the Study Area: Construction

Road Name	Direction	Base Case (No Project Vehicles)		Construction Year 1		Construction Year 2		Construction Year 3	
		ATS	PTSF	ATS	PTSF	ATS	PTSF	ATS	PTSF
Eyre Highway (Wudinna – Kyancutta)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Eyre Highway (Kyancutta – Kimba)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Eyre Highway (Kimba – Iron Knob)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Eyre Highway (Iron Knob – Lincoln Highway Intersection)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Eyre Highway (Lincoln Highway Intersection – Port Augusta Bridge)	Eastbound	A	B	A	B	A	B	A	B
	Westbound	A	B	A	B	A	B	A	B
Lincoln Highway (Tumby Bay – Port Neill Turnoff)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Port Neill Turnoff – Balumbah-Kinnard Road)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Balumbah-Kinnard Road – Arno Bay)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Arno Bay – Cowell)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Cowell – Ash Rd)	Eastbound	A	B	A	B	A	B	A	B
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Ash Rd – Kimba-Whyalla Rd)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Kimba-Whyalla Rd - Whyalla)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Highway (Whyalla – Eyre Hwy)	Northbound	A	A	A	A	A	A	A	A
	Southbound	A	A	A	A	A	A	A	A
Tod Highway (Eyre Hwy –	Northbound	A	A	A	A	A	A	A	A

Road Name	Direction	Base Case (No Project Vehicles)		Construction Year 1		Construction Year 2		Construction Year 3	
		ATS	PTSF	ATS	PTSF	ATS	PTSF	ATS	PTSF
Warramboo)	Southbound	A	A	A	A	A	A	A	A
Tod Highway (Warramboo – Lock)	Northbound	A	A	A	A	A	A	A	A
	Southbound	A	A	A	A	A	A	A	A
Birdseye Highway (Lock – Rudall)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Birdseye Highway (Rudall – Cleve)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Birdseye Highway (Cleve – Cowell)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Whyalla – Iron Knob Road	Northbound	A	A	A	A	A	A	A	A
	Southbound	A	A	A	A	A	A	A	A

The estimates of traffic generated by construction of the mine site are based on conservative assumptions of traffic generation and trip-destination origin as described in the Traffic Impact Assessment Report (Appendix I). However, there is a risk that the actual traffic generated during construction will be greater than predicted, which could result in reduced road capacity leading to an increase in travel time for road users. Should travel times be increased beyond what is predicted, a consequence rating of **minor** has been assigned, reflecting the inconvenience caused to the community. However, as it has been identified that there is substantial capacity in the existing road network, it is considered **unlikely** that travel times will be greater than conservatively predicted in this assessment. As such, the overall risk of travel time increases being greater than expected is considered to be **low**.

8.7.2 Travel Time Delay from Module Transport

The transportation of modules from the module offloading facility at the proposed port will result in delays to traffic required to wait for, or divert around, the large, slow moving modules. A range of module load sizes are under consideration for delivery to the mine site, as depicted in Table 8-7.

Table 8-7 Module Sizes

Module Size	Max. Load	Quantity	Haul Mode	Haul Speed
Large (Port site to Mine site) Approx. 13 m x 47 m x 43 m	2,200 tonnes	22	Self-Propelled Modular Transporter	1 km/hr
Medium (Port site to Mine site) Approx. 13 m x 53 m x 29 m	800 tonnes	123	Self-Propelled Transporter	Up to 40 km/hr

A traffic simulation model was developed to estimate likely travel time delay from delivery of the modules, based on scenarios where vehicles are following modules or being redirected through road diversions (presented in Figure 8-7). Delays were modelled in segments representative of the start and end points of the proposed diversion routes to take third party motorists around modules (refer to Appendix I for further information).

The majority of existing traffic movements in the study area occur between 5 a.m. and 8 p.m. each day. Module movement will occur during 12 hour overnight shifts to minimise conflict with road users. However, the 12 hour shift is likely to overlap with morning or afternoon peak traffic movements. The results of the simulation model are presented in Table 8-8.

Table 8-8 Delay to Individual Motorists as a Result of Module Movements

Module Speed	Route Taken	Average Estimated Delay (minutes)		
		4 p.m. – 4 a.m.	6 p.m. – 6 a.m.	8 p.m. – 8 a.m.
Large Module 1 km/hr	Primary	221	214	222
	Diversion	11	10	10
Medium Module 40 km/hr	Primary	3	3	3
	Diversion	7	5	3

The simulation model shows that the utilisation of diversion routes will reduce average delays for motorists by approximately 95% for modules travelling at 1 km/hr. When the speed of the module approaches 40 km/hr, less delay would be experienced by following the module and passing it at the end of the section or when the module temporarily pulls over at a laydown pad. Delays associated with module movements will occur throughout construction of the project and will result in a short-term inconvenience to motorists utilising the primary module route, which is considered to represent a **low impact**.

Although it is not expected that traffic delays will be longer than predicted for the delivery of modules, this has been identified as a risk as the operation and management of the road network is outside of the control of Iron Road. Should travel times along the diversion routes be increased beyond what is predicted, a consequence rating of **minor** has been assigned, reflecting the short-term inconvenience that would be caused to other road users. However, as accredited traffic controllers will be in place to manage the intersections and diversion routes, it is considered **unlikely** that travel delays will be greater than predicted in this assessment. As such, the overall risk of travel time increases being greater than expected is considered to be **low**.

As the design of the CEIP continues to progress, opportunities to further optimise the proposed development will be pursued. The objective of optimisation studies is to minimise environmental and/or social impacts of the project, whilst maximising benefits to the local community and other third parties. Optimisation studies are ongoing and include consideration of module route options, including the potential utilisation of the railway access road as opposed to, or in addition to, the existing local roads.

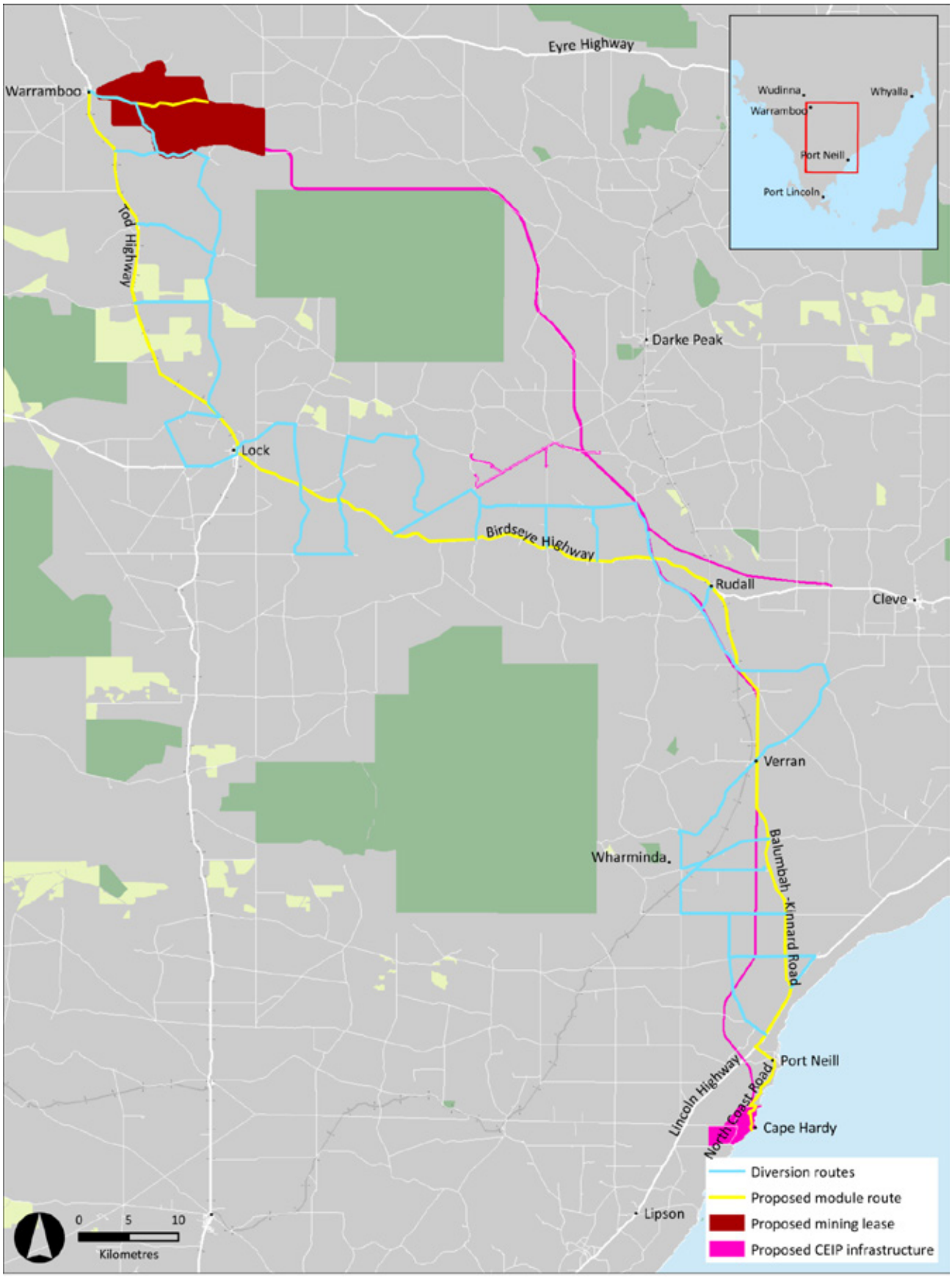


Figure 8-7 Module Delivery and Diversion Routes

8.7.3 Traffic Capacity Impacts during Operation

Operation of the mine will generate traffic from activities including:

- Employees travelling to work from the long-term employee village to the mine site
- Deliveries of supplies to the mine site
- Maintenance and other operational vehicle movements

The predicted traffic distribution for annual traffic during project operations at the mine site is shown in Figure 8-8.

As previously outlined, traffic capacity can be measured using LOS. The level of service for each of the road segments in the study area was calculated for the base case (without the project) and for the operation of the mine for Average Travel Speed (ATS) and Percentage Time Spent Following (PTSF). The results, shown in Table 8-9, predict no change to the 2013 level of service as a result of the operation of the mine. This indicates that even with the additional traffic generated, there will be enough capacity on each of the roads to operate effectively, at the same LOS as in 2013. As such, traffic capacity impacts during operation are expected to be **negligible**.

Total two way vehicle movements per segment of road during operation	Per year	Daily
Arno Bay to Lincoln Hwy / Balumbah-Kinnard Rd Int.	0	0
Cleve to Rudall	0	0
Cowell to Arno Bay	0	0
Cowell to Cleve	0	0
Cummins to Lock	0	0
Eyre/Lincoln Hwy Int. to Iron Knob	6163	17
Eyre/Lincoln Hwy Int. to Whyalla	0	0
Iron Knob to Kimba	6163	17
Kimba to Kyancutta	6163	17
Kyancutta to Warramboo	179306	492
Kyancutta to Wudinna	173143	475
Lincoln Hwy/Kinnard Rd Int. to Port Neill Turnoff	0	0
Lock to Rudall	0	0
Mine Site Turnoff to Lock	0	0
Port Augusta to Eyre/Lincoln Hwy Int.	6163	17
Port Lincoln to Tod/Flinders Hwy Int.	0	0
Port Lincoln to Tumby Bay	0	0
Port Neill Turnoff (Lincoln Hwy) to Port	0	0
Rudall to Balumbah-Kinnard Rd/Lincoln Hwy Int.	0	0
Tod Hwy/Flinders Hwy Int. to Cummins	0	0
Tumby Bay (Eyre Hwy Int.) to Port Neill Turnoff	0	0
Warramboo to Mine Site Turnoff	179306	492
Whyalla to Cowell	0	0
Whyalla to Iron Knob	0	0

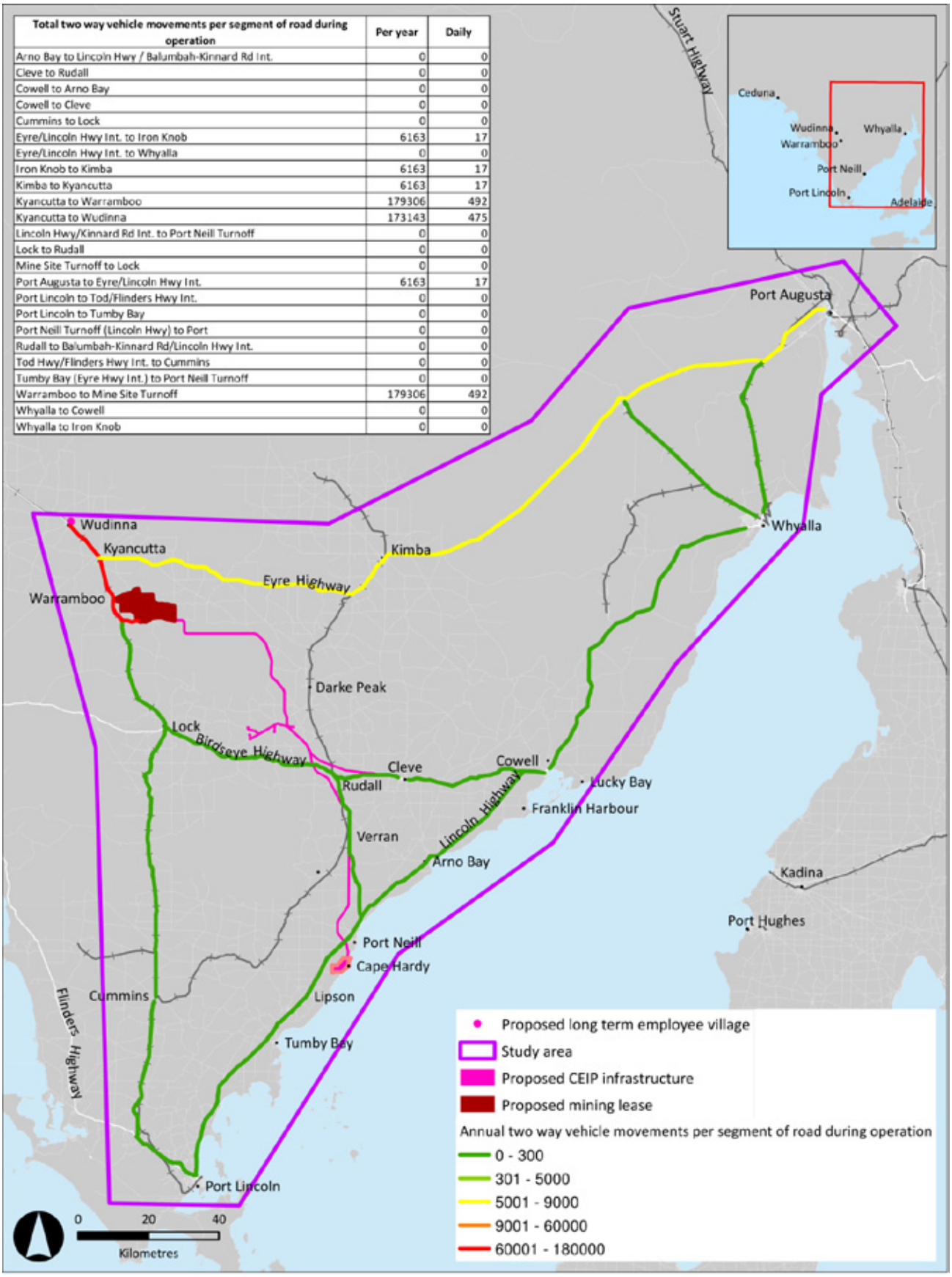


Figure 8-8 Total Two-Way Vehicle Movements per Segment of Road during Operation: Mining Operations

Table 8-9 Level of Service within the Study Area: Operation

Road Name	Direction	Base Case (No Project Vehicles)		Operation of Proposed Mine	
		ATS	PTSF	ATS	PTSF
Eyre Highway (Wudinna – Kyancutta)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Eyre Highway (Kyancutta – Kimba)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Eyre Highway (Kimba – Iron Knob)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Eyre Highway (Iron Knob – Lincoln Highway Intersection)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Eyre Highway (Lincoln Highway Intersection – Port Augusta Bridge)	Eastbound	A	B	A	B
	Westbound	A	B	A	B
Lincoln Highway (Tumby Bay – Port Neill Turnoff)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Port Neill Turnoff – Balumbah-Kinnard Road)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Balumbah-Kinnard Road – Arno Bay)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Arno Bay – Cowell)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Cowell – Ash Rd)	Eastbound	A	B	A	B
	Westbound	A	A	A	A
Lincoln Highway (Ash Rd – Kimba-Whyalla Rd)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Kimba-Whyalla Rd – Whyalla)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Highway (Whyalla – Eyre Hwy)	Northbound	A	A	A	A
	Southbound	A	A	A	A
Tod Highway (Eyre Hwy – Warramboo)	Northbound	A	A	A	A
	Southbound	A	A	A	A
Tod Highway (Warramboo – Lock)	Northbound	A	A	A	A
	Southbound	A	A	A	A
Birdseye Highway (Lock – Rudall)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Birdseye Highway (Rudall – Cleve)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Birdseye Highway (Cleve – Cowell)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Whyalla – Iron Knob Road	Northbound	A	A	A	A
	Southbound	A	A	A	A

The estimates of traffic generated by operation of the mine are based on conservative assumptions of traffic generation and trip-destination origin as described in the Traffic Impact Assessment Report (Appendix I). However, as for construction, there is a risk that the actual traffic generated during operations will be greater than predicted, which could result in reduced road capacity leading to an increase in travel time for road users. Should travel times be increased beyond what is predicted, a consequence rating of **minor** has been assigned, reflecting an ongoing social issue. However, as it has been identified that there is substantial capacity in the existing road network it is considered **unlikely** that travel times will be greater than conservatively predicted in this assessment. As such, the overall risk of travel time increases being greater than expected is considered to be **low**.

8.7.4 Road Safety

No events that negatively impact the safety of any member of the public, or employees of Iron Road are planned during the construction, operation or closure of the mine, nor anticipated to occur. Impacts to road safety will only occur as a result of unforeseen factors during the construction, operation or closure of the mine. As such, impacts to road safety are considered a risk to the project.

A vehicle accident could occur due to the increased traffic travelling on roads as a result of the mine. Mine traffic during operation will be decreased by siting the contractors' camp on the proposed mining lease and the uses of buses to ferry staff from the Wudinna camp. However, vehicle accidents have the potential to lead to multiple fatalities which would result in a public safety consequence rating of **catastrophic**. Given the existing low traffic volumes in the area and the measures to reduce traffic accidents, the likelihood of such an event is considered to be **rare**. This results in a risk rating of **high**.

A vehicle accident could also be caused by the transport of modules to the minesite. As the module transporters will be travelling at low speeds and at times of reduced local traffic, they are unlikely to directly cause an accident. However, it is possible that the disruption caused to traffic by module transport could result in a vehicle accident. This could result in a fatality which is rated as a **major** consequence. The likelihood of such an event is considered to be **rare** and, consequently, this is a **medium** risk.

Drag-out from the mine (deposition onto public roads of dirt from vehicles leaving the minesite) could also cause a safety hazard. This will be monitored and washed off if necessary. While it is conceivable that drag-out could result in a fatality from a vehicle accident – a **major** consequence – the likelihood of such an event would be rare. Consequently, it is considered to be a **medium** risk.

8.7.5 Pavement Condition and Wear

Traffic generated by the mine has the potential to increase the wear and tear on the road network over and above what would be expected without the project traffic, due to the additional axle loading on the road pavement. Pavement impacts were therefore assessed through estimating this additional axle loading (refer to the Traffic Impact Assessment Report in Appendix I for further information).

For the construction period the increase in daily axle loading was estimated to vary across the study area from 0% to 1866%, however the percentage increase is from a very low base and the actual daily increase in vehicles would not be more than 150 vehicles per day. To manage this impact Iron Road will implement pavement monitoring, management and rehabilitation procedures in consultation with DPTI. This will include undertaking pavement deflection (strength) testing on haul route pavements before and after the construction period to monitor pavement condition and undertaking remedial pavement rehabilitation treatment if required.

During operation of the mine, a negligible (0 to 1%) increase in the axle loading on the road pavement is predicted. The impact of this additional loading on pavement condition is likely to be very slight and should not significantly affect the condition and remaining life of the pavement within the study area.

As such the impact of pavement deterioration during the construction phase is considered to be **low** (short term and restricted to the project area with mitigation measures planned where required) and the impact on pavement condition as a result of traffic generated during the operation phase is anticipated to be **negligible**.

The risk of road pavement deteriorating faster than anticipated during construction as a result of module movements has been considered. Pavement monitoring, management and rehabilitation procedures will be developed in consultation with DPTI and the local Councils as a management strategy. As such, any unforeseen level of damage is considered to be **minor**, as it will be able to be immediately repaired and therefore would not represent an ongoing issue. As the existing strength and condition of local roads is not currently known, it is considered **possible** that higher levels of damage will occur. As such, the overall risk of unforeseen wear and tear and road pavements during construction is considered to be **low**.

Unforeseen damage during operation of the mine is not anticipated given the very low predicted increase in axle loading.

8.7.6 Intersection Capacity

Increased traffic volumes on the road network can reduce how well intersections function, with traffic delays and vehicle queuing occurring when traffic volumes are greater than the intersection capacity. Intersections within the study area through which construction or operational traffic would pass were analysed to determine the likely increase in traffic volumes as a result of the mine. The intersections analysed (refer to Figure 8-9) were:

- Eyre Highway/Lincoln Highway
- Whyalla-Iron Knob/Lincoln Highway
- Eyre Highway/Mine Site Turnoff
- Eyre Highway/Tod Highway
- Tod Highway/Kimba Road
- Tod Highway/Birdseye Highway
- Balumbah-Kinnard Road/Lincoln Highway
- Lincoln Highway/Port Neill Access Road
- Birdseye Highway/Lincoln Highway

The assessment found that during construction and operation, the maximum number of vehicles making the same turn through an intersection as a result of the mine in a given hour was one, with the exclusion of operational traffic travelling between Wudinna (the location of the proposed long-term employee village) and the mine site. The peak hour operational traffic between the long-term employee village and the mine site was estimated at 117 vehicles. These predicted increases will not impact on the capacity of the intersections. Further information on the intersection capacity analysis is included in the Traffic Impact Assessment Report in Appendix I.

The impact on intersection capacity in the study area as a result of construction traffic is therefore considered to be **negligible**. Likewise, the impact on intersection capacity as a result of operational traffic is also expected to be **negligible**.

As discussed in Sections 8.7.1 and 8.7.3, there is a risk that the actual traffic generated by the mine will be greater than predicted which could reduce the functionality of intersections within the study area. The potential delay to motorists has been assigned a consequence rating of **minor**, reflecting the potential inconvenience caused to the community.

As it has been identified that there is capacity in the existing intersections, it is considered **unlikely** that the capacity of the intersections will be reduced if traffic generated by the mine is greater than predicted. As such, the overall risk of travel time increases being greater than expected is considered to be **low**.

8.7.7 School Bus Operations

The mine site has the potential to impact the operation of school buses through delays from additional traffic generated by the project and from temporary and permanent changes to the road network as a result of construction and operation of the proposed railway line.

The current (2015) school bus routes for Cleve Area School crosses the module haul route at various points. Minor changes and disruptions to these school bus routes are expected to occur during the movement of modules. Additionally, one of the current Wudinna Area School bus routes crosses into the mine site using Kimba Road in order to access one of the properties within the lease area. Although this part of the bus route will not be possible with the operation of the mine, it will also not be required given that school children will not be living within the mine site. Iron Road will liaise with local schools to plan suitable alternative routes where required.

Delays to school bus routes due to traffic generated during construction or operation of the mine are not anticipated as there is sufficient road capacity to accommodate vehicle movements generated by the mine and no changes to the existing level of service are predicted. Construction traffic will be timed to avoid school bus services where possible. As such the impact of delays to school buses due to traffic generated during construction and operation of the mine is considered to be **negligible.**

As noted in Section 8.3.5, school bus routes are generally revised annually depending on the requirements of the school students. As such, the bus routes considered for this assessment may change in the future, which could result in a new bus route being planned that has longer travel times than would have been the case without the mine as a result of the road closures. The potential increase in travel time for school buses as a result of road closures has been classified as a **minor** consequence, as alternative bus routes will be available. Although Iron Road will liaise with the local schools to assist in planning alternative routes, it is considered **possible** that over the life of the mine a potential school bus route may be required to use an alternative route. As such, the overall risk of school bus travel times being longer as a result of the mine is considered to be **low**.

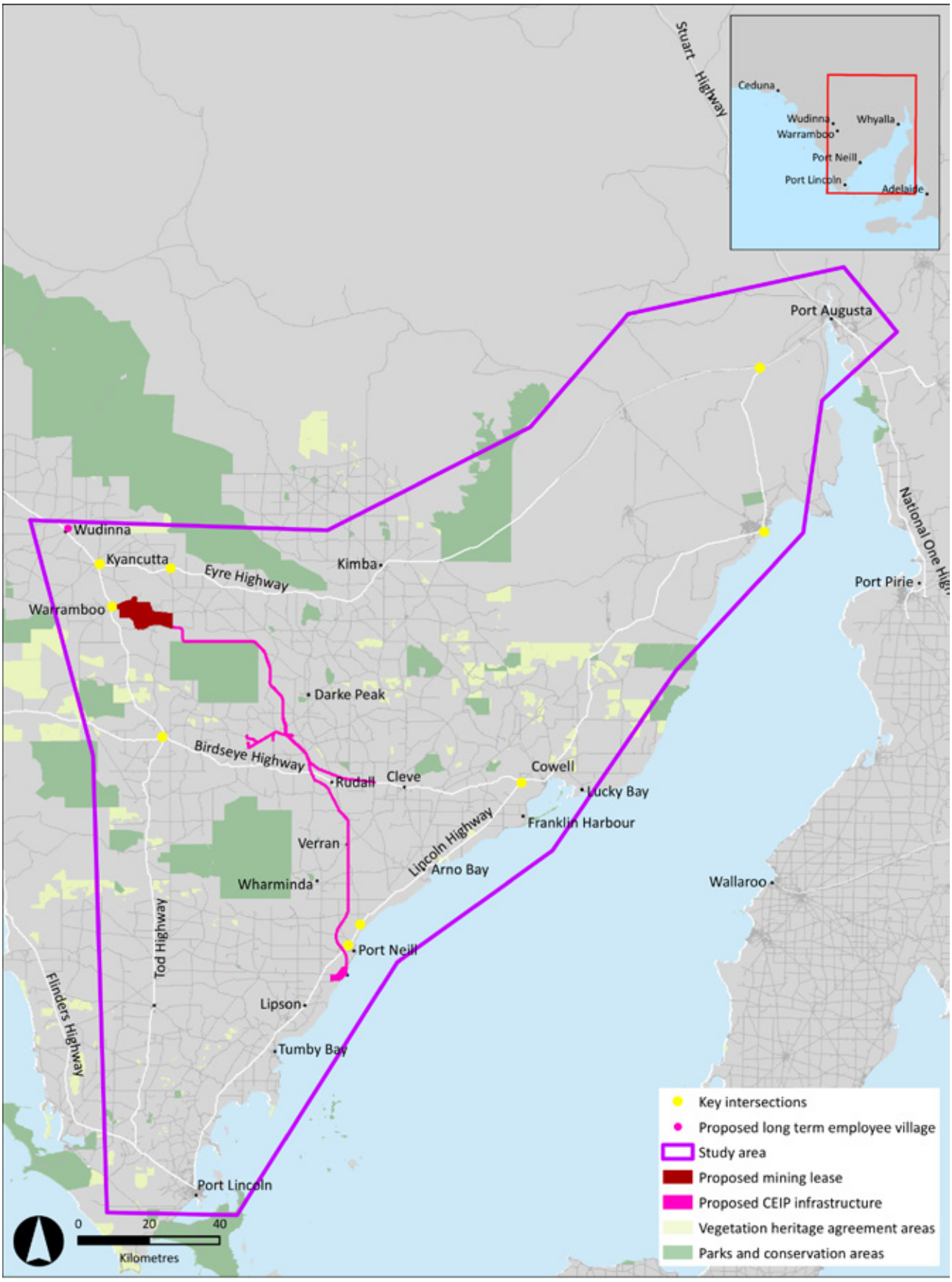


Figure 8-9 Key Intersections Analysed

8.7.8 Altered Local Access from Road Closures and Road Realignments

Changes to the existing road network from the closure and realignment of roads can impact motorists and transport of farm machinery through longer travel times. The following road closures will be required where located within the mine site as shown in Figure 8-10:

- Dolphin Road
- Murphy Road
- Kimba Road
- Lock Road

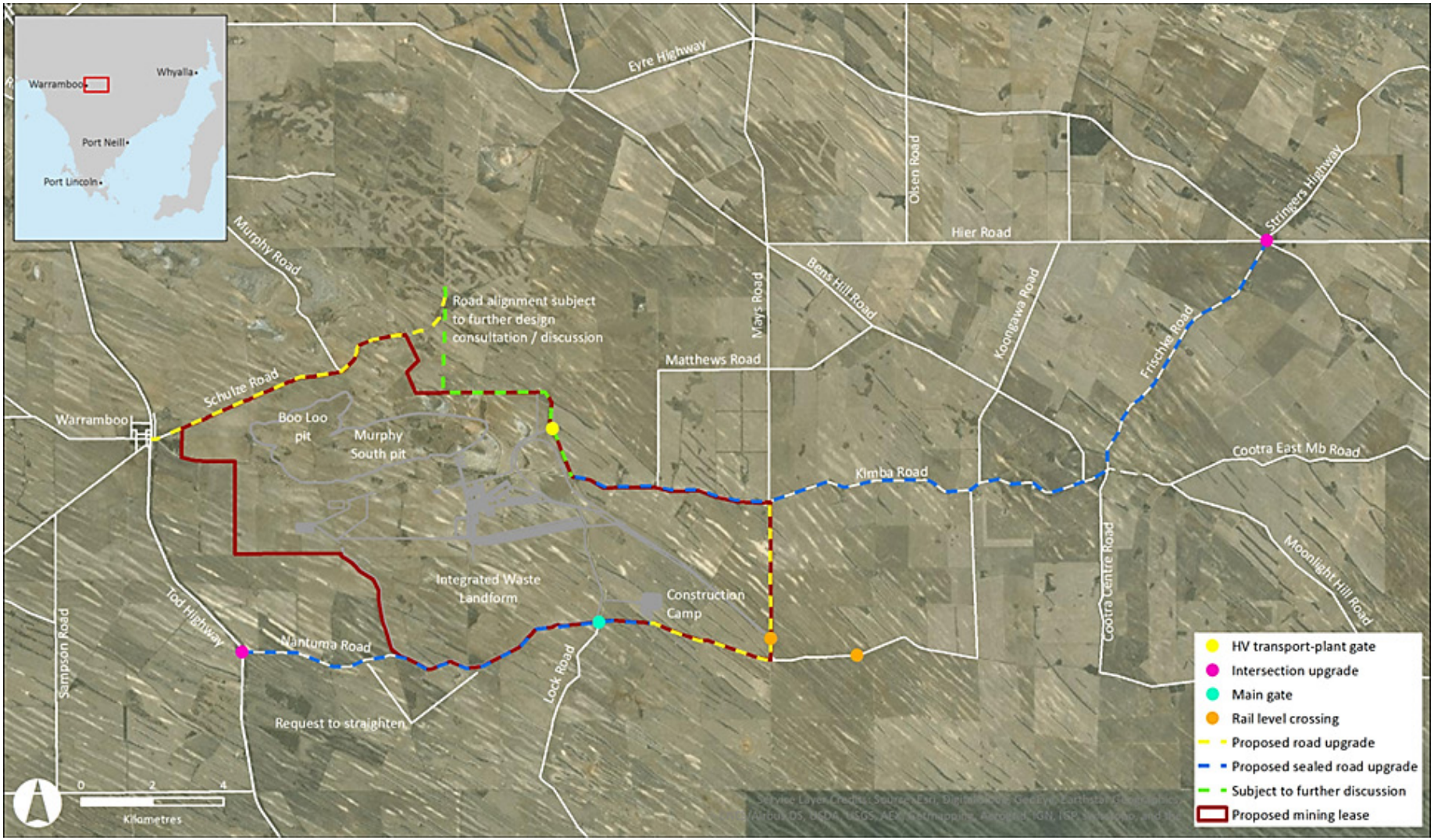


Figure 8-10: Proposed Road Closures and Upgrades

None of the roads proposed to be closed are identified as carrying large volumes of traffic and all are managed by Wudinna DC. The proposed road closures were assessed to determine the net effect on travel time and distance on the public road system. The assessment found that the greatest increase to travel times would be incurred by motorists travelling east from Waramboo. A motorist would likely use Nantuma Road as a replacement for the closed section of Kimba Road, resulting in an increased travel time of approximately eight minutes. As such, increased travel times as a result of road closures or realignments at the mine site are considered to represent a long-term negative change affecting local receivers and are therefore a **medium** impact.

The extent of road closures is known and is not expected to change. Any change would be expected to only have a **minor** consequence and would be **unlikely**. Consequently, the risk from any further road closures is considered to be **low**.

8.7.9 Summary of Impacts and Risk

All impacts and risks were considered to be ALARP and not warrant further control measures. A summary of each of the identified impacts and risks associated with traffic around the mine site is presented in Table 8-10.

Table 8-10 Impact and Risk Summary: Traffic

Impact ID	Impact Event	Level of Impact	Level of Risk
IM 10_01	Deterioration of roads and Increased road maintenance requirements as a result of mine traffic during construction	Low	Low
IM 10_02	Deterioration of roads and increased road maintenance requirements as a result of mine traffic during operation	Negligible	Low
IM 10_03	Road closures and realignments at mine result in increased travel times for local community	Medium	Low
IM 10_04	Dragout from mine traffic results in a safety hazard for local traffic	Negligible	Medium
IM 10_05	Transport of mine modules results in traffic delays for road users in the region	Low	Low
IM 10_06	Transport of mine modules results in safety risks for road users in the region	Negligible	Medium
IM 10_07	Mine traffic increases road safety risk for local residents and other road users	Negligible	High
IM 10_08	Impacts on existing Level of Service on roads and intersections as a result of increased road traffic from mine construction	Negligible	Low
IM 10_09	Impacts on existing Level of Service on roads and intersections as a result of increased road traffic from mine operation	Negligible	Low
IM 10_10	Delay to the operation of school bus routes as a result of increased traffic and road closures	Negligible	Low

8.8 Justification and Acceptance of Residual Impact and Risk

With the implementation of design and management measures, all residual impacts have been categorised as medium or lower. The risk of vehicle accident resulting in injury/fatality was considered the greatest risk. It is considered that the design and mitigation measures in place, including specific traffic management strategies at high risk locations and design of intersections in accordance with Australian Standards, will provide safe conditions for members of the public. Additionally, it is noted that the risk of catastrophic consequences are present at railway and road crossings and along roads across Australia and the risk assessment of a vehicle accident applied here is not sensitive to the additional traffic generated by the project (i.e. the same risk rating would still apply to public safety if the project did not occur). Management measures will be implemented to minimise the likelihood of an accident occurring, however due to the significance of the consequences the residual risk remains high.

8.9 Proposed Outcome(s) and Criteria

In accordance with the methodology presented in Chapter 6, outcomes have been developed for all impact events with a confirmed linkage between source, pathway and receptor. Each outcome is supported by measureable assessment criteria that will be used to assess compliance against the proposed outcomes during the relevant phases (construction, operation, closure) of the project. Whilst outcomes may be the same for multiple impact events, separate measurement criteria and leading indicators are proposed to demonstrate compliance. Proposed outcomes and measurement criteria have been developed for each of the impact events identified with a confirmed linkage and these are presented in Table 8-11. Outcomes for the entire project are presented along with all impact events in Appendix I.

Table 8-11 Outcomes and Assessment Criteria: Traffic

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
No unauthorised damage to public infrastructure (e.g. pavement damage) as a result of mining operations.	IM 10_01, IM 10_02	Deterioration or wear of road pavements as a result of mine site traffic during construction and operations.	Evidence that agreements are in place with DPTI and/or Council requirements regarding pavement or other infrastructure damage.	None proposed
Increased travel times for the public as a result of road closures and realignments are as low as reasonably practicable	IM 10_03	Road closures at mine site result in increased travel times for local community.	Review undertaken in consultation with Wudinna Council confirms all road closures are necessary for mine safety and security and that all agreed upgrades of existing roads have been completed in the required timeframe	None proposed
No significant public amenity impacts of the mine site caused by noise, dust and/or dragout associated with mine site-related traffic.	IM 10_04	Dragout from mine site traffic results in a safety hazard for local traffic.	Compliance with dust and noise criteria as set out for relevant outcome. Weekly inspection of entry/exit points demonstrates no build-up of dragout material is occurring.	None proposed

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
Transport of mine site modules complies with DPTI permit requirements.	IM 10_05	Transport of mine site modules results in traffic delays for road users in the region.	Evidence that the relevant permit/approval has been obtained.	None proposed
No traffic accidents occur involving the public and mine traffic that could have been reasonably prevented	IM 10_06	Transport of mine modules results in safety risks for road users in the region	Independent investigation of all traffic accidents involving the public are completed in 14 days, or as agreed with the Director of Mines and demonstrate that the mine operator could not have reasonably prevented the accident from occurring.	None proposed
	IM 10_07	Mine site traffic increases road safety risk for local residents and other road users.		
All road and intersection upgrades are conducted in accordance with technical standards provided in writing by the Department for Planning Transport and Infrastructure.	IM 10_08, IM 10_09	Impacts on existing Level of Service on roads and intersections as a result of increased road traffic from mine construction and operation	Independent audit within three months of completion of work confirms technical standards met.	None proposed
	IM 10_10	Delays to school buses due to increased traffic or road diversion as a result of the mine site.		None proposed

8.10 Findings and Conclusion

Impacts to traffic movement on both main highways and local roads throughout the study area are expected as part of the proposed development. Impacts include delays to third party motorists resulting from the movement of modules and construction equipment, increased wear on existing public roads and the closure of public roads within the mine site. All of the identified impacts are considered to be low or negligible with the exception of the longer travel times resulting from road closures, which have been classified as a medium impact as it would be a long-term change impacting the local area.

Risks to traffic will be alleviated wherever possible through the implementation of control and management strategies. One high risk was identified in relation to the potential for the increased traffic travelling on roads generated by the construction or operation of the mine to result in a vehicle accident and an injury or fatality to a member of the public or an Iron Road employee, despite management measures and the proposed upgrade of intersections in accordance with the Austroads Guide to Road Design (Part 4). This high risk is considered ALARP as the specific traffic management strategies at high risk locations and the road upgrades are expected to provide safe conditions for members of the public.

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