CHAPTER 18
TRAFFIC AND TRANSPORT

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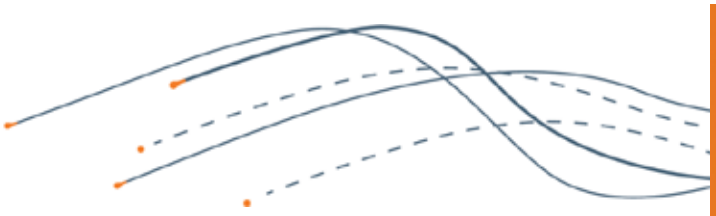

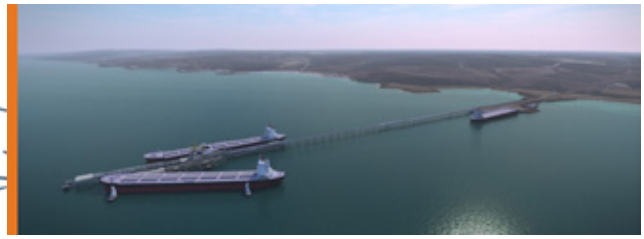

18 Traffic and Transport

The construction and operation of the proposed CEIP Infrastructure will generate traffic above existing levels which may impact the existing traffic and transport environment on the Eyre Peninsula. The CEIP Infrastructure will generate new rail movements on the proposed railway line and also includes proposed changes to the local road network. This chapter assesses the impact to the existing traffic and transport environment as a result of the CEIP Infrastructure, taking into account the existing transport network and proposed design modifications to the Project. Further information is provided in the Traffic Impact Assessment Report in Appendix W.

18.1 Applicable Legislation and Standards

The traffic and transport assessment has been undertaken in accordance with industry practice using current standards and guidelines, including:

- Austroads Guide to Traffic Management
- Highway Capacity Manual (HCM) volume 2, chapter 15 methods for analysis of two lane highways (TRB 2010)
- Australian Standard AS1742 Manual of uniform traffic control devices, Part 7 – Railway crossings

The Austroads Guide to Traffic Management includes definitions for 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 drivers perception of those conditions. These are defined in Table 18-1.

Table 18-1 Level of Service Definitions

Level of Service	Definition
A	LOS 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	LOS 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	LOS 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	LOS 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.
E	LOS E occurs when traffic volumes are at or close to capacity, and there is virtually no freedom 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.

Level of Service	Definition
F	LOS 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)

18.2 Assessment Methods

The assessment methodology for the traffic and transport impact assessment is outlined in the Traffic Impact Assessment Report in Appendix W. 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.
- Quantifying operations stage activities impacting the road network by calculating consumable delivery loads based on operational details and workforce traffic based on manning schedules provided by Iron Road and estimated workforce draw from surrounding Eyre Peninsula towns. The duration and frequency of railway level crossing closures was calculated using information made available in the rail operations report, developed as part of the engineering design for the DFS.
- 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 for highways in the study area 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 9.
- Where required, to reduce the severity of impacts to an acceptable level, control measures were developed. These include road/intersection upgrades, traffic management procedures and signing strategies.

The study area (refer to Figure 18-1) 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 18-1 Transport Assessment Study Area

18.3 Existing Transport Environment

This section provides a summary of the existing transport network within the study area as relevant to the CEIP Infrastructure, including highways, local roads, road safety, existing rail and public transport. The existing transport network on the Eyre Peninsula is shown in Figure 18-2.

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.

18.3.1 Eyre Peninsula Highway Network

There are four highways across the Eyre Peninsula that would be utilised in some way by the proposed CEIP Infrastructure, 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 18-2. 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 1989). The Lincoln Highway is located approximately 2.5 km west of the proposed port development. 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 proposed infrastructure corridor crosses both the Lincoln Highway and the Birdseye Highway. The Tod Highway is located approximately 17.5 km from the northern extent of the infrastructure corridor where it enters the proposed CEIP mine.

The Annual Average Daily Traffic (AADT) of each of the highways varies over segments between towns and major intersections. Table 18-3 details the varying AADT and percentage of heavy vehicles 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 18-3 also contains a projection of likely future traffic volumes anticipated during 2017 without the proposed CEIP Infrastructure. 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.

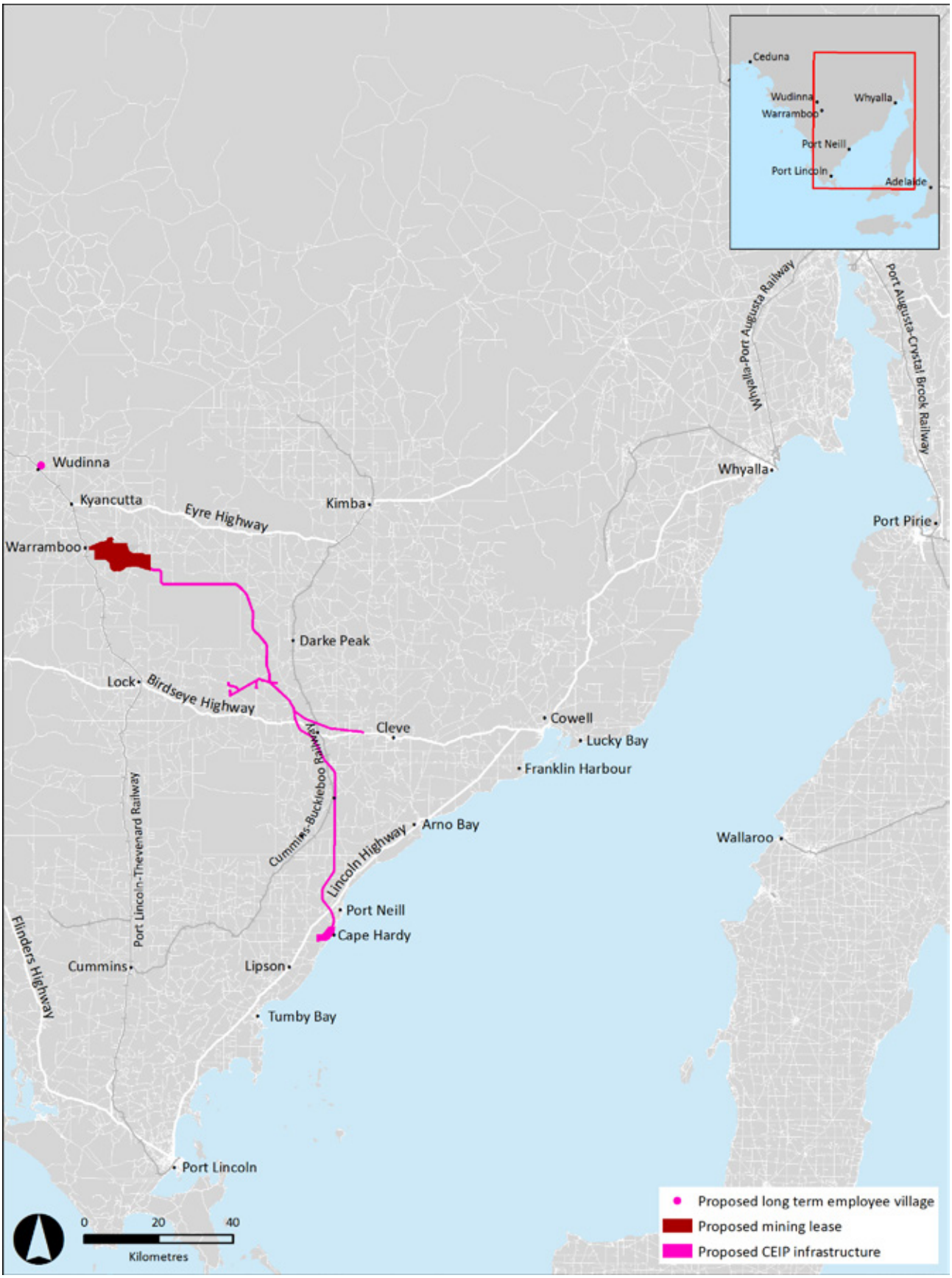

Figure 18-2 Eyre Peninsula Transport Network

Table 18-2 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 18-3 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

18.3.2 Local Road Network

The local road network in the study area includes the local roads in Wudinna, approximately 28 local roads crossed by the proposed infrastructure corridor and Port Neill Access Road, North Coast Road, Brayfield Road and Kiandra Road in close proximity to the port site. The local road networks for Wudinna and the port site are shown on Figure 18-3 and Figure 18-4 respectively. The local road network along the proposed infrastructure corridor is shown on Figures 4-6 to 4-8 in Chapter 4.

Vehicles accessing the port site will use the local road network once exiting off the Lincoln Highway, turning on to Port Neill Access Road, travelling along North Coast Road to the port site entrance. North Coast Road traverses through the middle of the port site from north to south. Brayfield Road crosses the port site from the west before ending in a T-intersection with North Coast Road. Brayfield Road will provide access to the construction camp at the port site during the Construction phase. A third local road, Kiandra Road is located at the southern boundary of the port site. A description of each of these local roads is provided in Table 18-4.

Figure 18-3 Wudinna Local Road Network

Figure 18-4 Port Site Local Road Network

Table 18-4 Port Site Local Road Network

Name	Class	Description	Photo
North Coast Road	4	North Coast Road is a single carriageway two way mostly unsealed road. It runs parallel to the Lincoln Highway from Port Neill to Kiandra Road and caters mostly for local farming movements and connection to Port Neill township. It is maintained by Tumby Bay Council and is approximately 7.5 m in width.	
Kiandra Road	4	Kiandra Road is a single carriageway two way unsealed road running parallel with Brayfield Road and perpendicular to the Lincoln Highway. It provides access to Cowleys Beach as well as for local farming movements.	
Brayfield Road	4	Brayfield Road is an Austroads class 4 road running perpendicular to the Lincoln Highway to the port site which mostly caters for local farming movements. It is maintained by Tumby Bay Council and is a single carriageway two way unsealed pavement approximately 8 m wide.	
Port Neill Access Road	4	Port Neill Access Road is a two way sealed road and serves as the main link from the Lincoln Highway to Port Neill. Port Neill Access Road is approximately 6 m wide.	

18.3.3 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 18-5. 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 18-5 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.

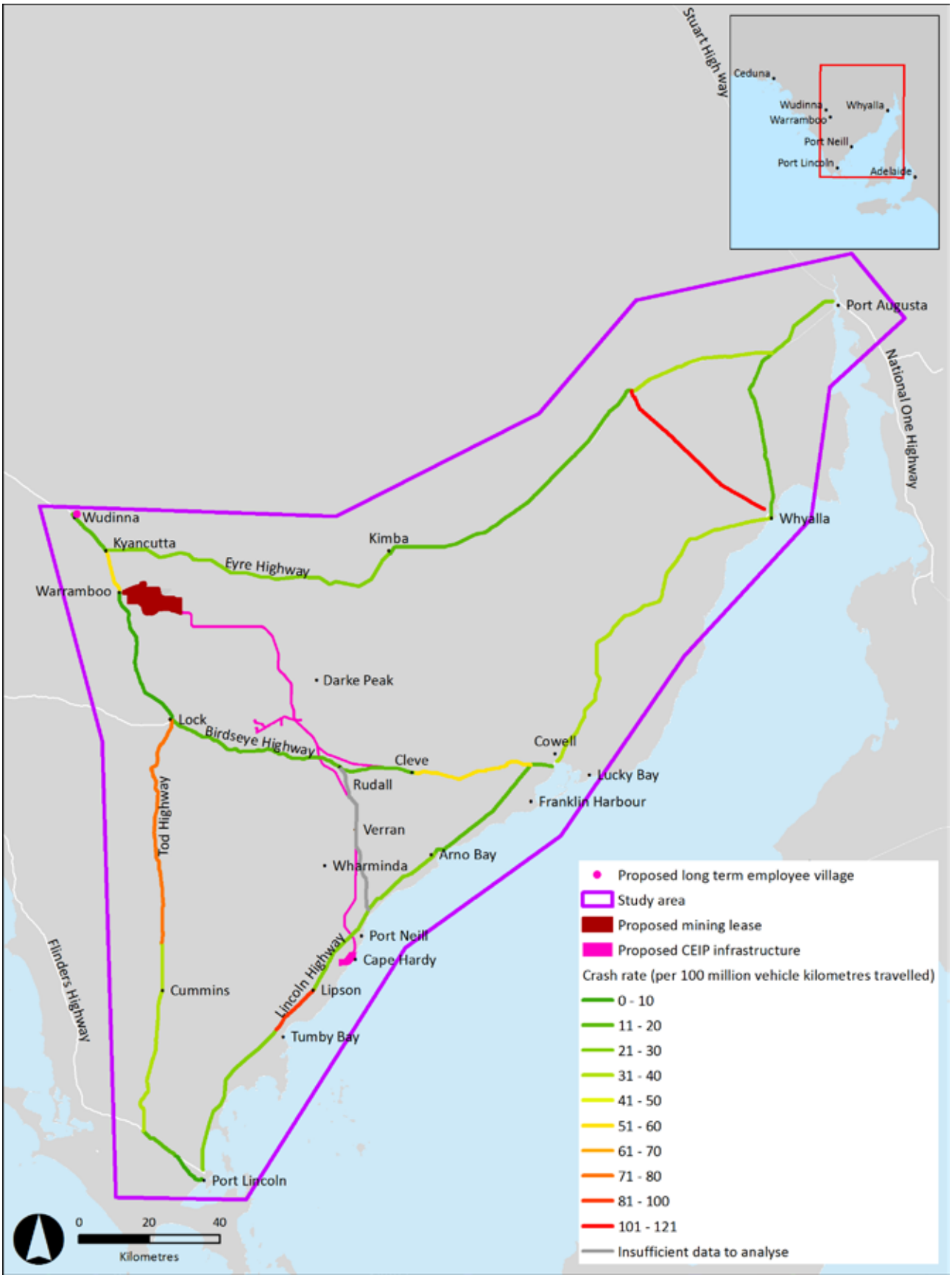

Figure 18-5 Crash Rate per 100 Million Vehicle Kilometres Travelled (for selected sections of roads)

18.3.4 Rail Network

There is an existing isolated rail network on the Eyre Peninsula that is operated by Genesee and Wyoming Australia Pty Ltd. The rail network is shown on Figure 18-2. 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.

18.3.5 School Bus Routes

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

18.3.6 Public Transport

Public transport on the Eyre Peninsula is limited. 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.

18.4 Design Modifications to Protect the Transport Network

A number of design measures have been included in the concept design for the project to maintain functionality of the existing transport network, including the following:

- The use of modularised construction methods which will reduce the overall volume of construction traffic for the CEIP.
- The proposed rail maintenance track along the infrastructure corridor to provide access for project vehicles.
- A combination of road realignments, level crossings and grade separated crossings are proposed along the infrastructure corridor to maintain the connectivity of the road network following construction of the proposed railway line (refer to Chapter 4.2.1). This includes a road bridge at the intersection of the proposed railway line and the Lincoln Highway so vehicles travelling on the highway do not need to stop for trains, and road diversions of part of Phelps Road and Wudinna-Darke Peak Road to avoid the need for level crossings in these locations.
- During detailed design each of the proposed level crossings 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 (refer to Table 18-5).
- During construction of the proposed Lincoln Highway road bridge, a parallel temporary road detour will be installed around the construction area in consultation with DPTI to maintain traffic flows.
- The proposed railway line will be constructed over the existing Cummins-Buckleboo rail line, to allow the existing railway line to maintain functionality (refer to Chapter 4.2.1).
- Construction of a new road bridge over the proposed railway line to maintain the connectivity of North Coast Road at the north-western port site boundary.

- Upgrade of Brayfield Road between North Coast Road and Lincoln Highway intersection.
- Minor realignment, slight lengthening and improvement of the physical standard of sections of the existing Brayfield Road as the primary access point to the port site.
- Upgrade of North Coast Road to be suitable as a secondary access point for heavy vehicles accessing the port site.
- Upgrade of the Lincoln Highway / Port Neill Access Road intersection.

Table 18-5 Level Crossing Detailed Design Commitments

Level Crossing Location	Road Gazetted for B-Doubles / Road Trains	Design Commitment
Wills Road	No	During detailed design sight distances will be confirmed with sight clearance works, road realignment or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Mount Hill Coomba Road	Yes	During detailed design sight distances and traffic volume will be confirmed with either sight clearance works or active crossing controls proposed if traffic volumes exceed the trigger threshold or if sight distances required by AS1742.7 cannot be met.
Ottens Road	No	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Wharminda Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Pipe Road / Pahls Hill Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Baker Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Nield Road	No	During detailed design sight distances will be confirmed with sight clearance works, road realignment or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Swaffer Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Birdseye Highway	Yes	The level crossing design will include active crossing controls including flashing lights.
Pederson Road (Brooks Road)	No	During detailed design sight distances will be confirmed with sight clearance works, road realignment or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Kilroo-Kielpa Road	Yes	During detailed design sight distances will be confirmed with sight clearance works, road realignment or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Dog Fence Road	Yes	During detailed design sight distances and traffic volume will be confirmed with either sight clearance works or active crossing controls proposed if traffic volumes exceed the trigger threshold or if sight distances required by AS1742.7 cannot be met.

Level Crossing Location	Road Gazetted for B-Doubles / Road Trains	Design Commitment
MacGowan Road	No	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Wickstein Road	No	During detailed a road realignment or other design alternative will be investigated in order to meet sight distances required by AS1742.7.
Rangeview Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Nantuma Road	No	During detailed design sight distances will be confirmed with either road realignment or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.
Mays Road	Yes	During detailed design sight distances will be confirmed with either sight clearance works or active crossing controls proposed if sight distances required by AS1742.7 cannot be met.

18.5 Impact Assessment

Impacts on the transport network as a result of the CEIP Infrastructure have been assessed in the Construction phase and in the Operational phase in accordance with the impact assessment methodology outlined in Chapter 9 and Section 18.2. The traffic and transport impacts arising as a result of generated traffic or changes to the transport environment have been identified as:

- Traffic capacity impacts during construction and operations
- Changes or disruption to school bus routes
- Pavement condition and wear
- Intersection capacity
- Impacts to the operation of the existing Cummins-Buckleboo Railway
- Traffic delays at level crossings
- Changes to local access from road closures and road realignments

Each of these impacts are discussed in the below sections, with a summary table of key impacts provided in Section 18.5.11.

18.5.1 Traffic Generated 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 within the proposed infrastructure corridor, port site or long-term employee village. For example, movements of plant modules for the port site have not been included as these will be delivered directly to the port site through the Module Offloading Facility.

The distribution of vehicle trips within the study area was determined by assigning origin and destinations for each vehicle. The estimated total two-way traffic-generated movements during the construction period are summarised in Table 18-6. Further detail on the traffic generation methodology is provided in the Traffic Impact Assessment Report in Appendix W.

Table 18-6 Total Two-Way Traffic Movements Generated Over 3 Year Construction Period

Destination or Origin[1]	Port Site	Long Term Employee Village	Infrastructure Corridor
Port Augusta	8,440	640	8,888
Wudinna	594	0	5,436
Whyalla	5,858	0	0
Port Lincoln	24	0	272
Port site	0	0	2,728

[1]For vehicles travelling from outside the study area, the origin is the closest town or city to the vehicles entry point to the study area i.e. vehicles travelling from the Stuart and Princess Highways north and east of the study area were assigned to Port Augusta as the origin point.

The volume of traffic generated over the three year construction period for the CEIP Infrastructure 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 18-6 while Figure 18-7 and Figure 18-8 show the vehicle movements attributed to the proposed infrastructure corridor and port site respectively. The traffic generated by construction of the long-term employee village will peak in the third year of construction and these traffic figures are shown on Figure 18-9.

Two way vehicle movements by each road - Construction	Stage 1 - 1st Year	
	Total	Daily
Arno Bay to Lincoln Hwy/Balumbah-Kinnard Rd Intersection	8802	25
Cleve to Rudall	1592	5
Cowell to Arno Bay	8802	25
Cowell to Cleve	1592	5
Cummins to Lock	0	0
Eyre Hwy/Lincoln Hwy Int. to Iron Knob	0	0
Eyre Hwy/Lincoln Hwy Int. to Whyalla	4536	13
Iron Knob to Kimba	0	0
Kimba to Kyancutta	0	0
Kyancutta to Warramboo	108	1
Kyancutta to Wudinna	108	1
Lincoln Hwy/Balumbah-Kinnard Rd Intersection to Port Neill Turno	8910	25
Lock to Rudall	108	1
Mine Site Turnoff to Lock	108	1
Port Augusta to Eyre Hwy/Lincoln Hwy Int.	4536	13
Port Lincoln to Tod Hwy/Flinders Hwy Int.	0	0
Port Lincoln to Tumby Bay	296	1
Port Neill Turnoff (Lincoln Highway) to Port	8934	25
Rudall to Balumbah-Kinnard Rd/Lincoln Hwy Int.	380	2
Tod Hwy/Flinders Hwy Int. to Cummins	0	0
Tumby Bay (Eyre Hwy) to Port Neill Turnoff	296	1
Warramboo to Mine Site Turnoff	108	1
Whyalla to Cowell	10394	29
Whyalla to Iron Knob	0	0

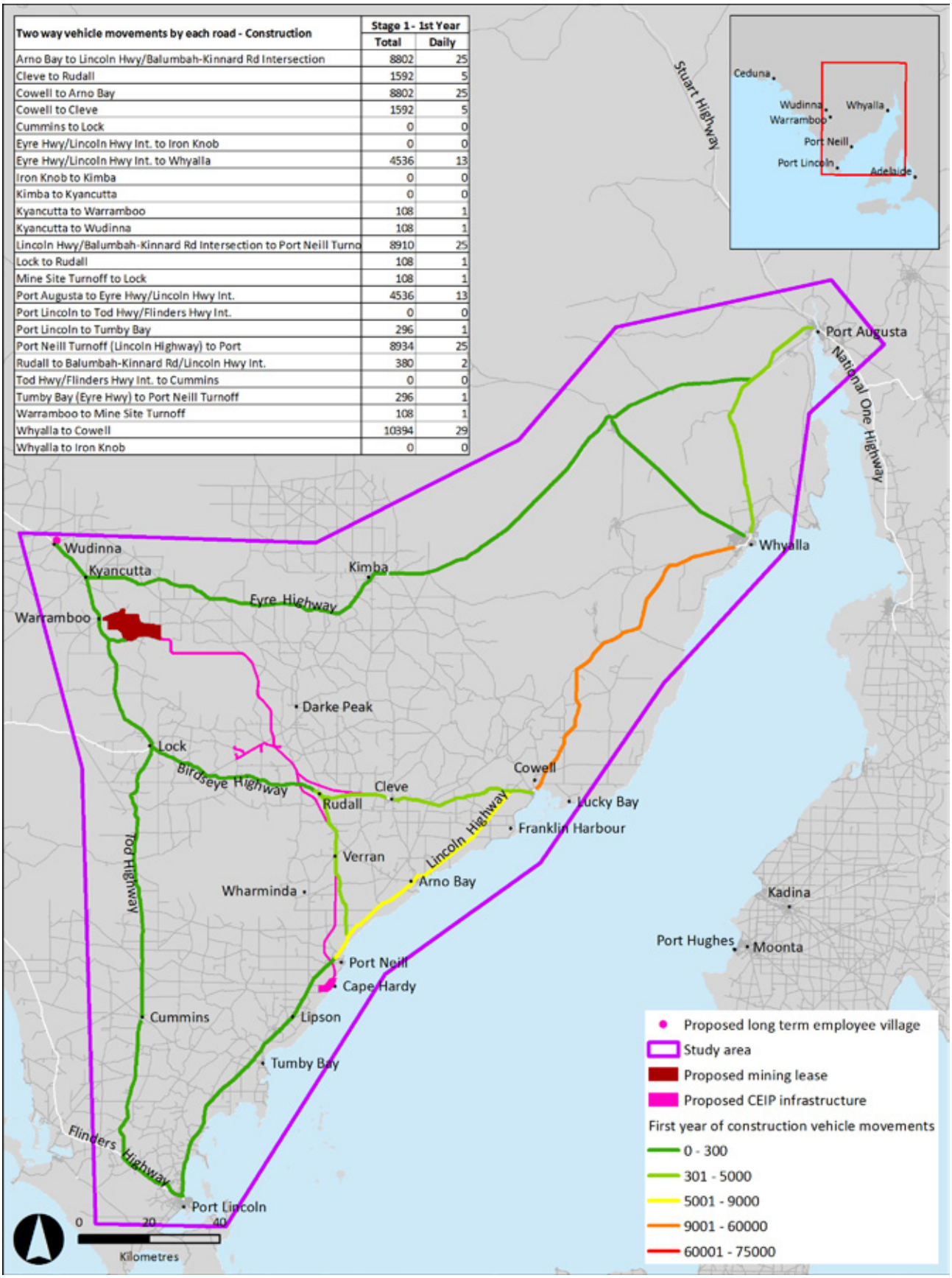

Figure 18-6 Total Two-Way Vehicle Movements for CEIP Infrastructure, Construction Year 1

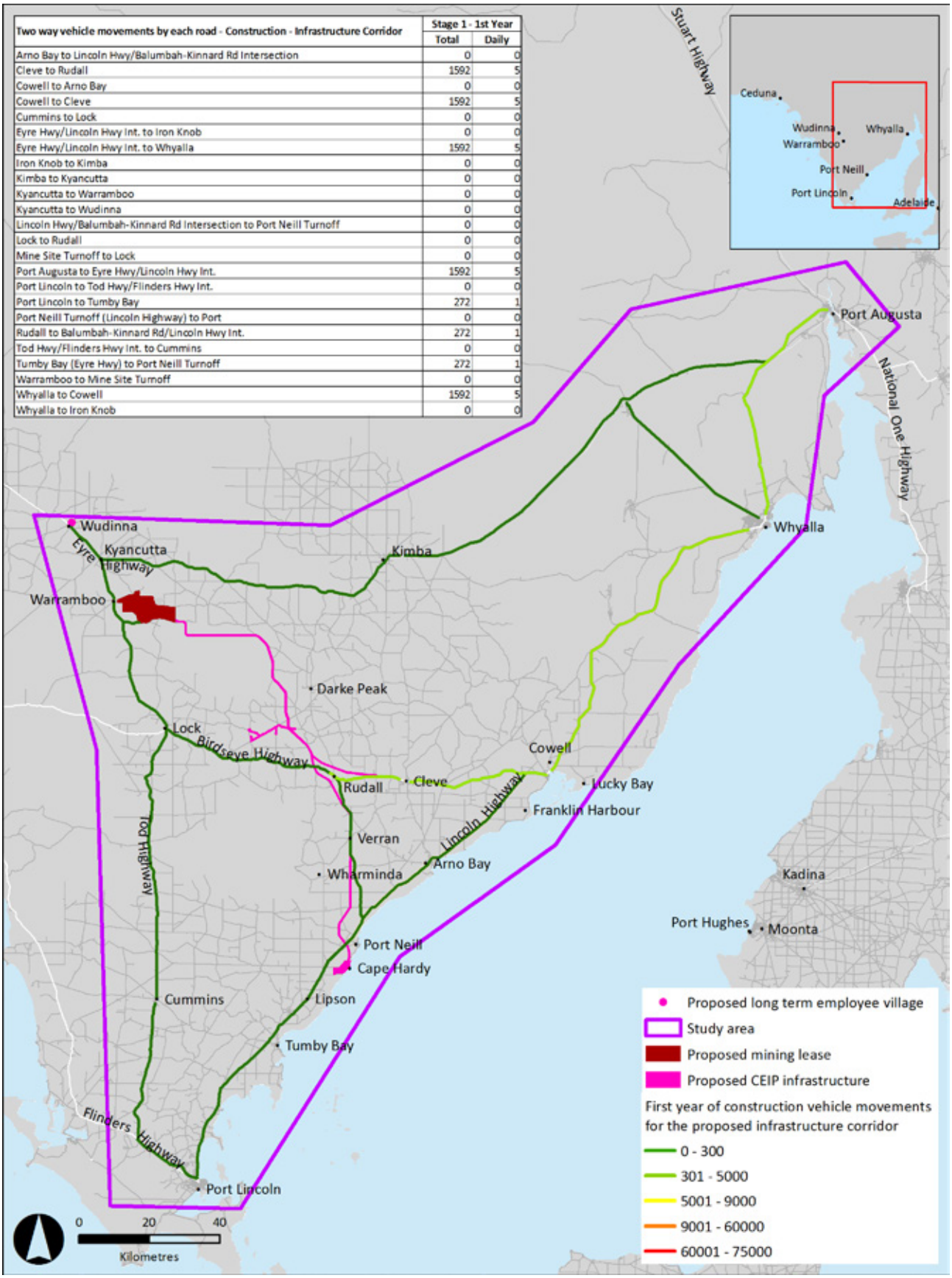

Figure 18-7 Total Two-Way Vehicle Movements for Proposed Infrastructure Corridor, Construction Year 1

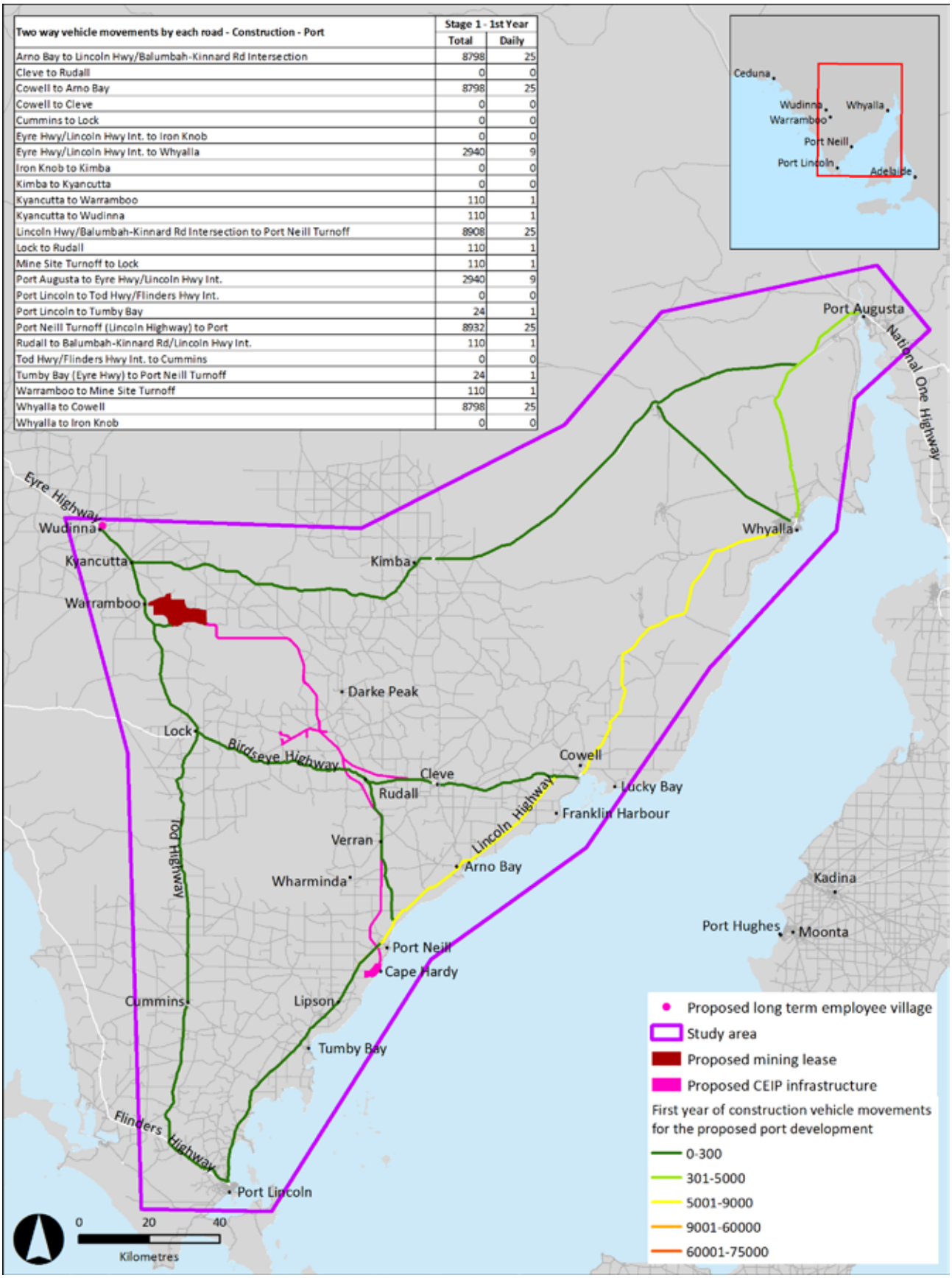

Figure 18-8 Total Two-Way Vehicle Movements for the Proposed Port Site, Construction Year 1

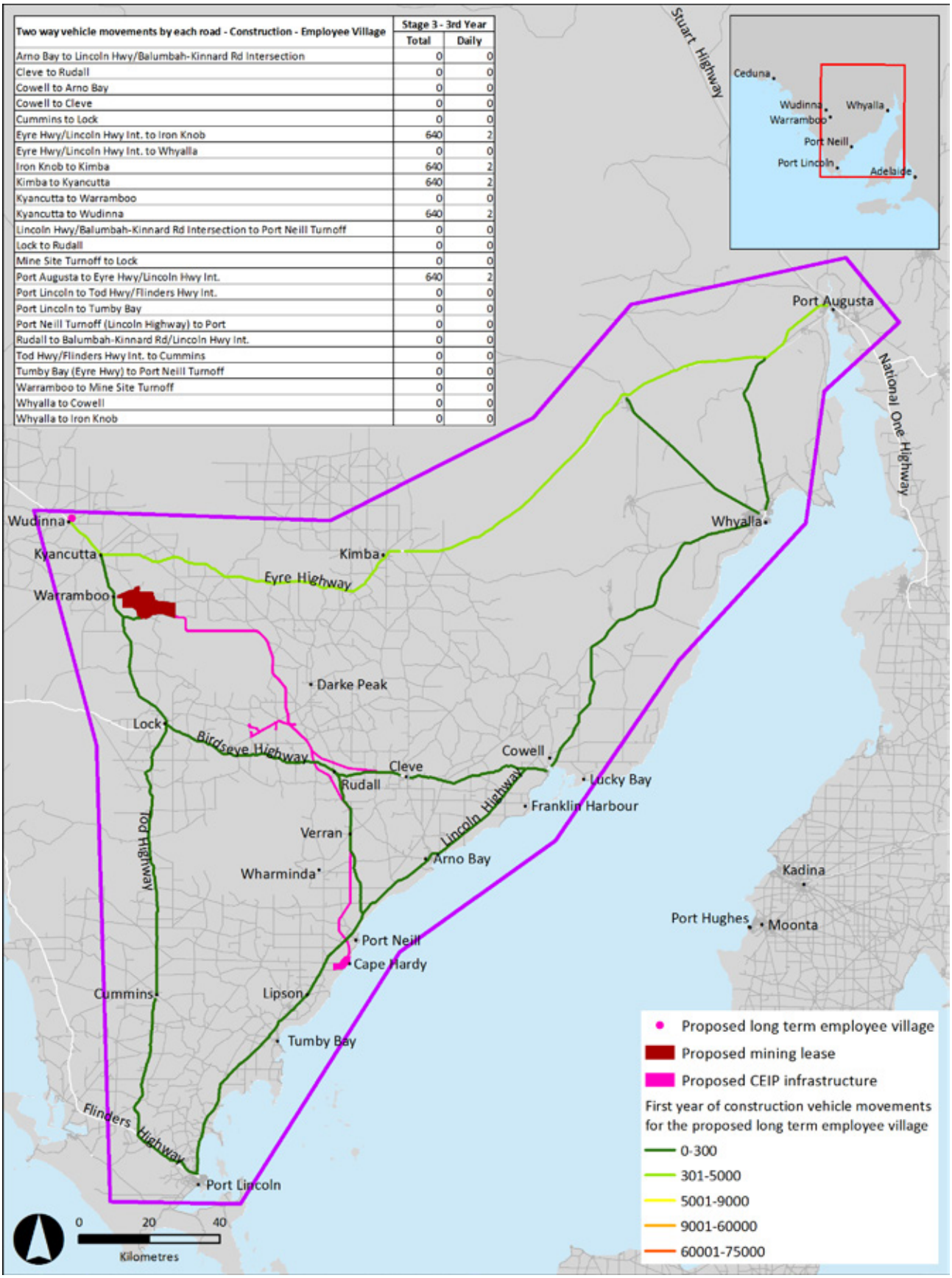

Figure 18-9 Total Two-Way Vehicle Movements the Proposed Long-Term Employee Village, Construction Year 3

18.5.2 Traffic Capacity Impacts During Construction

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 18-1, 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 driver's 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 18-7 predict no change to the current (2013) level of service as a result of the construction of the CEIP Infrastructure. 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 18-7 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 Road (Balumbah-Kinnard Road – Arno Bay)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Hwy (Arno Bay – Cowell)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Hwy (Cowell – Ash Rd)	Eastbound	A	B	A	B	A	B	A	B
	Westbound	A	A	A	A	A	A	A	A
Lincoln Hwy (Ash Rd – Kimba-Whyalla Rd)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	A	A	A	A	A	A	A	A
Lincoln Hwy (Kimba – Whyalla Rd – Whyalla)	Eastbound	A	A	A	A	A	A	A	A
	Westbound	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
Lincoln Hwy (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 – Warramboo)	Northbound	A	A	A	A	A	A	A	A
	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
Port Neill Access Road[1]	Northbound	A	A	A	A	A	A	A	A
	Southbound	A	A	A	A	A	A	A	A
North Coast Road[1]	Northbound	A	A	A	A	A	A	A	A
	Southbound	A	A	A	A	A	A	A	A

[1]Data was not available for Port Neill Access Road or North Coast Road, however, both roads are assumed to have lower AADTs than the Lincoln Highway nearby (which has an AADT of 700) and therefore would also have a LOS of A for all scenarios.

18.5.3 Traffic Generated During Operations

Operation of the CEIP Infrastructure will generate traffic from activities including:

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

Traffic generated on public roads from the operation of the proposed infrastructure corridor will be negligible as maintenance and operational vehicles will travel along the proposed rail maintenance track within the corridor.

Traffic generated for the maintenance and servicing of the rail wagons and locomotives has been in the proposed CEIP Mine traffic forecasts as these facilities will be located on the proposed mine site. Impacts from the proposed CEIP Mine are reported separately in Iron Road's Mining Lease Proposal, which is being assessed by DSD under the *Mining Act 1971*. Further detail on the traffic generation methodology is provided in the Traffic Impact Assessment Report in Appendix W.

The predicted traffic distribution for annual traffic during project operations for the proposed port and long-term employee village are shown in Figure 18-11 and Figure 18-12 respectively.

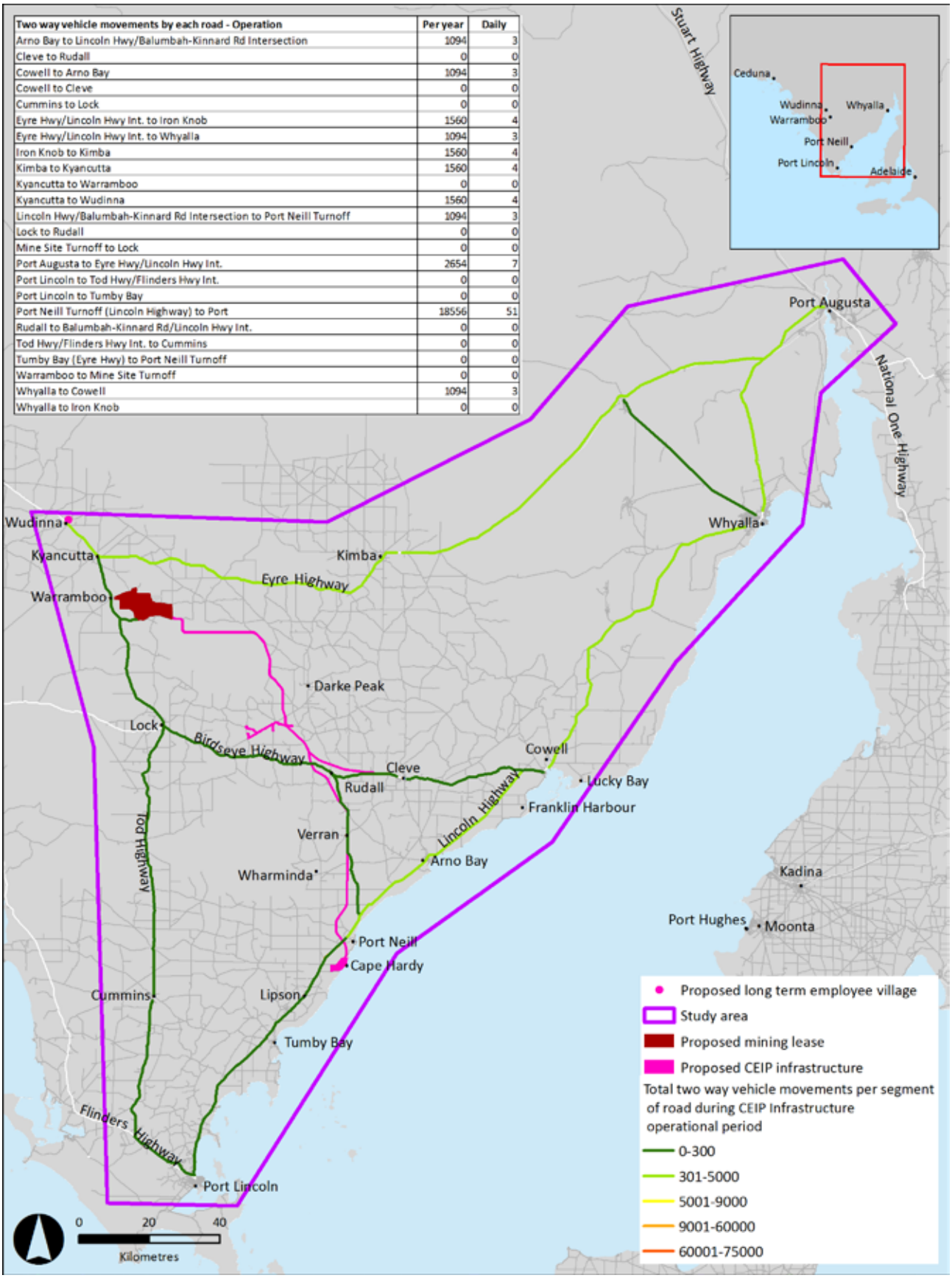

Figure 18-10 Total Two-Way Vehicle Trips per Year per Segment of Road During Operation Phase

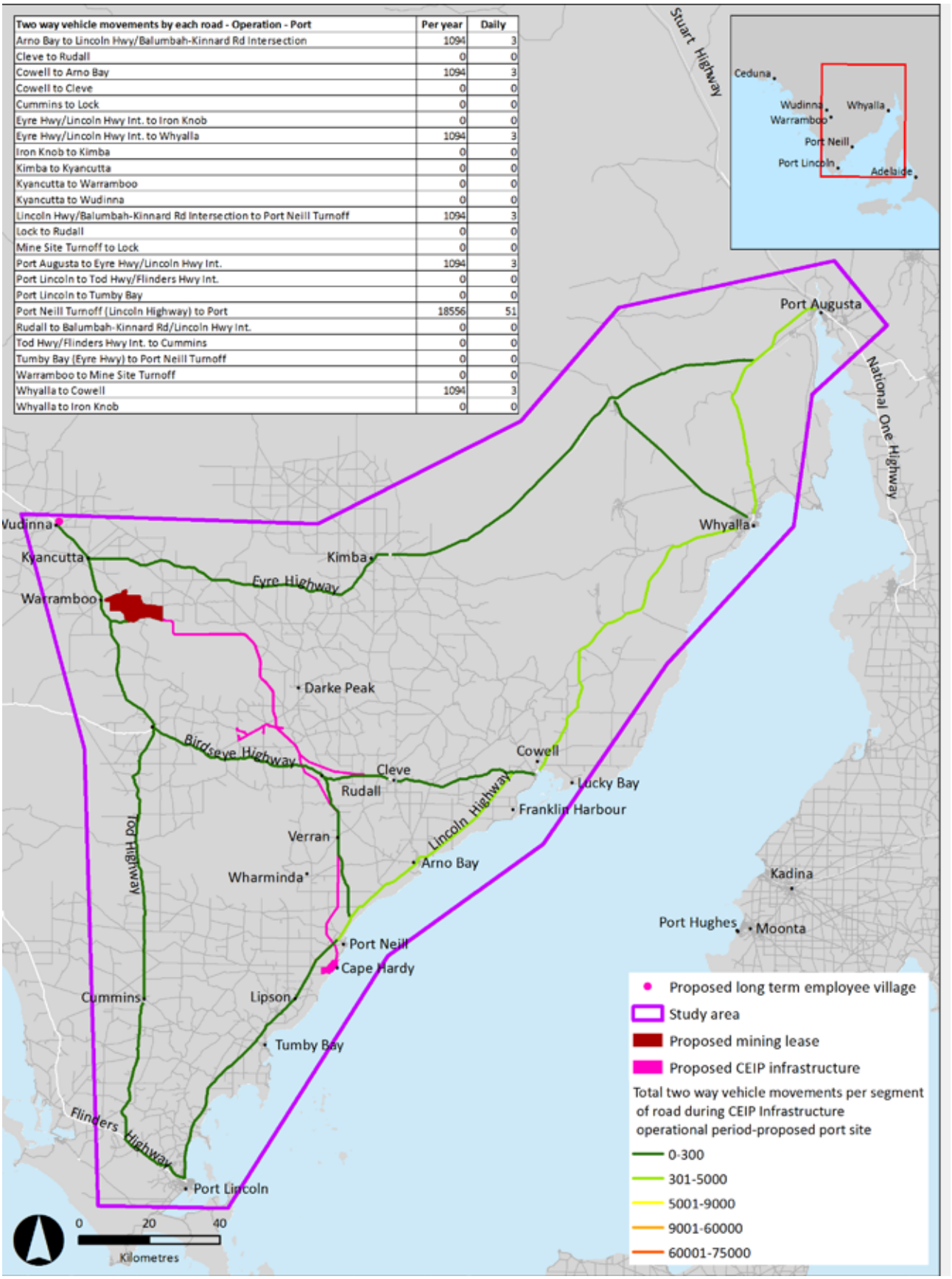

Figure 18-11 Total Two-Way Vehicle Movements per Segment of Road During Operation: Port Operation

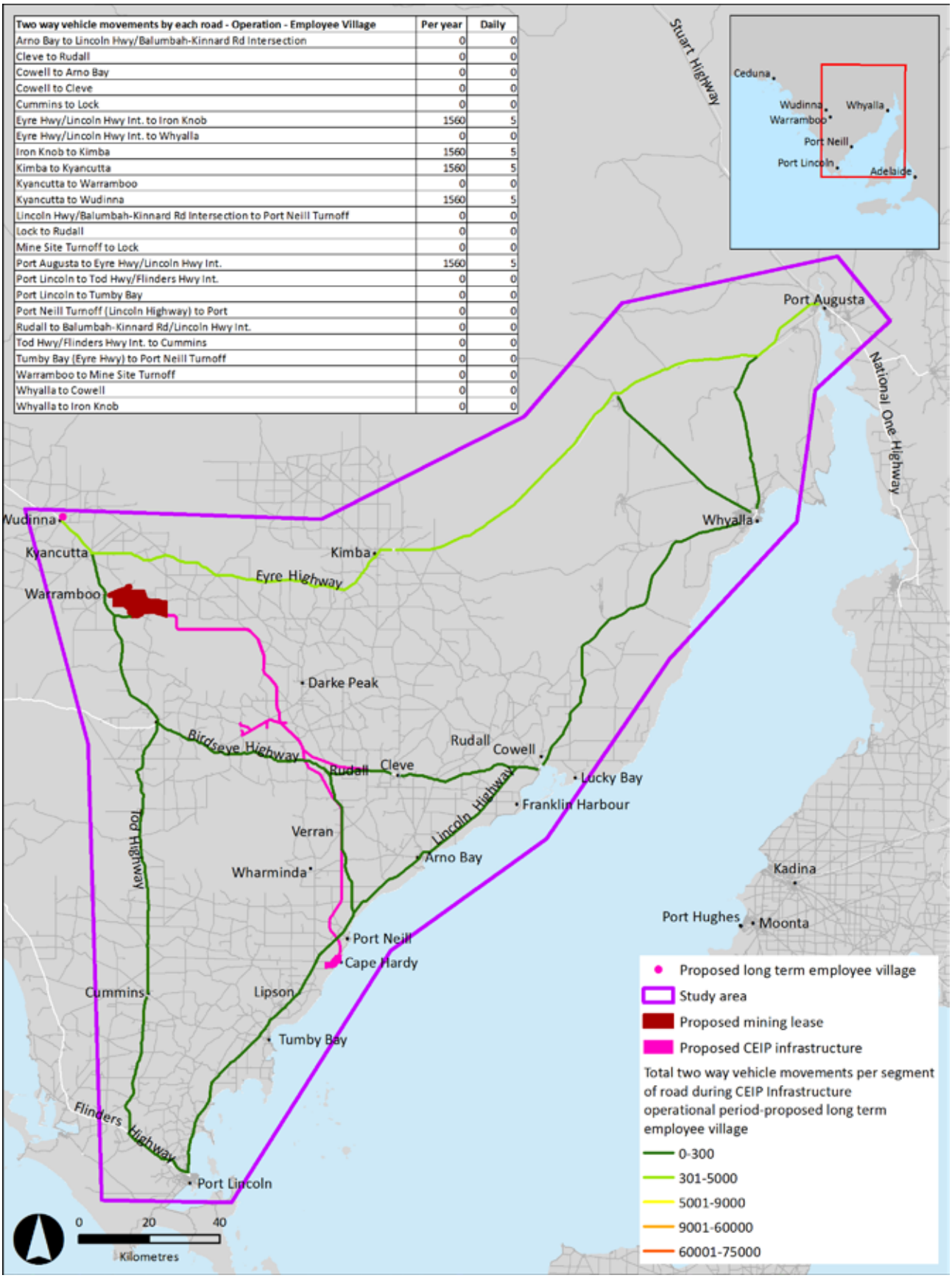

Figure 18-12 Total Two-Way Vehicle Movements per Segment of Road During Operation: Long-Term Employee Village

18.5.4 Traffic Capacity Impacts from Operational Traffic

As discussed in Section 18.5.2, 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 CEIP Infrastructure for Average Travel Speed (ATS) and Percentage Time-Spent Following (PTSF). The results, shown in Table 18-8, predict no change to the 2013 level of service as a result of the operation of the CEIP Infrastructure. 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**.

Table 18-8 Level of Service within the Study Area: Operation

Road Name	Direction	Base Case (No Project Vehicles)		CEIP Infrastructure Operation	
		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 Road (Balumbah – Kinnard Road – Arno Bay)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Hwy (Arno Bay – Cowell)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Hwy (Cowell – Ash Rd)	Eastbound	A	B	A	B
	Westbound	A	A	A	A
Lincoln Hwy (Ash Rd – Kimba-Whyalla Rd)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Hwy (Kimba – Whyalla Rd – Whyalla)	Eastbound	A	A	A	A
	Westbound	A	A	A	A
Lincoln Hwy (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

Road Name	Direction	Base Case (No Project Vehicles)		CEIP Infrastructure Operation	
		ATS	PTSF	ATS	PTSF
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
Port Neill Access Road[1]	Northbound	A	A	A	A
	Southbound	A	A	A	A
North Coast Road[1]	Northbound	A	A	A	A
	Southbound	A	A	A	A

[1]Data was not available for Port Neill Access Road or North Coast Road, however, both roads are assumed to have lower AADTs than the Lincoln Highway nearby (which has an AADT of 700) and therefore would also have a LOS of A for all scenarios.

18.5.5 Impacts to School Bus Operations

The CEIP Infrastructure 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.

Delays to school bus routes due to traffic generated during construction or operation of the CEIP Infrastructure are not anticipated as there is sufficient road capacity to accommodate CEIP Infrastructure vehicles and no changes to the existing level of service are predicted. However 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 CEIP Infrastructure is considered to be **negligible.**

The current (2015) school bus routes for Cleve Area School cross the proposed infrastructure corridor at Rangeview Road, Birdseye Highway, Swaffer Road and Pipe Road. Minor changes and disruptions to these school bus routes are expected to occur during construction of the proposed railway line at these locations. Iron Road will liaise with local schools to plan suitable alternative routes where required. Level crossings are proposed at these locations which will enable the bus routes to continue during operation of the proposed railway line.

The impact on school bus operations during construction of the railway line from temporary road closures is considered to be **low** as it will be short term and restricted to the project area. The impact on school bus routes during operation of the proposed railway line is expected to be **negligible** as level crossings will enable the existing bus routes to continue.

18.5.6 Pavement Condition and Wear

Traffic generated by the CEIP Infrastructure has the potential to increase the wear and tear on the road network, over and above what would be expected without the project traffic, from the additional axle loading on the road pavement. To manage this impact, Iron Road will implement a pavement monitoring, management and rehabilitation plan 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.

However, during operation of the CEIP Infrastructure 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 mitgaition measures planned where required) and the impact on pavement condition during the Operation phase is anticipated to be **negligible** as a result of CEIP Infrastructure-generated traffic.

18.5.7 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 which CEIP Infrastructure construction or operational traffic would pass through were analysed to determine the likely increase in traffic volumes as a result of the CEIP Infrastructure. The intersections analysed (refer to Figure 18-13) were:

- Eyre Highway/Lincoln Highway
- Whyalla-Iron Knob/Lincoln Highway
- 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 CEIP Infrastructure in a given hour was one, with the exclusion of operational traffic travelling between Wudinna (proposed long-term employee village) and the proposed mine site turn off at Warramboo. The peak hour operational traffic between the proposed long-term employee village and the proposed 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 W.

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**.

18.5.8 Impacts on the Cummins-Buckleboo Railway Operations

The proposed railway line would be constructed over the existing Cummins-Buckleboo railway line, operated by G&W, enabling the existing railway line to maintain functionality. Impacts to train movements on the Cummins-Buckleboo railway line during construction of the proposed infrastructure corridor will be reduced through the proposed construction technique of using a corrugated steel arch for the existing line to pass through. The plated steel arch will be assembled off the alignment and then craned into position during operational windows of time when the track is not in use, which will be managed through direct contact with the existing rail train controller. A defined rail safety management procedure will be in force during the entire construction period. Due to the short duration of these works, construction impacts to the Cummins-Buckleboo Railway are anticipated to be **low**. No impacts to the operation of the Cummins-Buckleboo Railway are anticipated once the proposed railway line is operational.

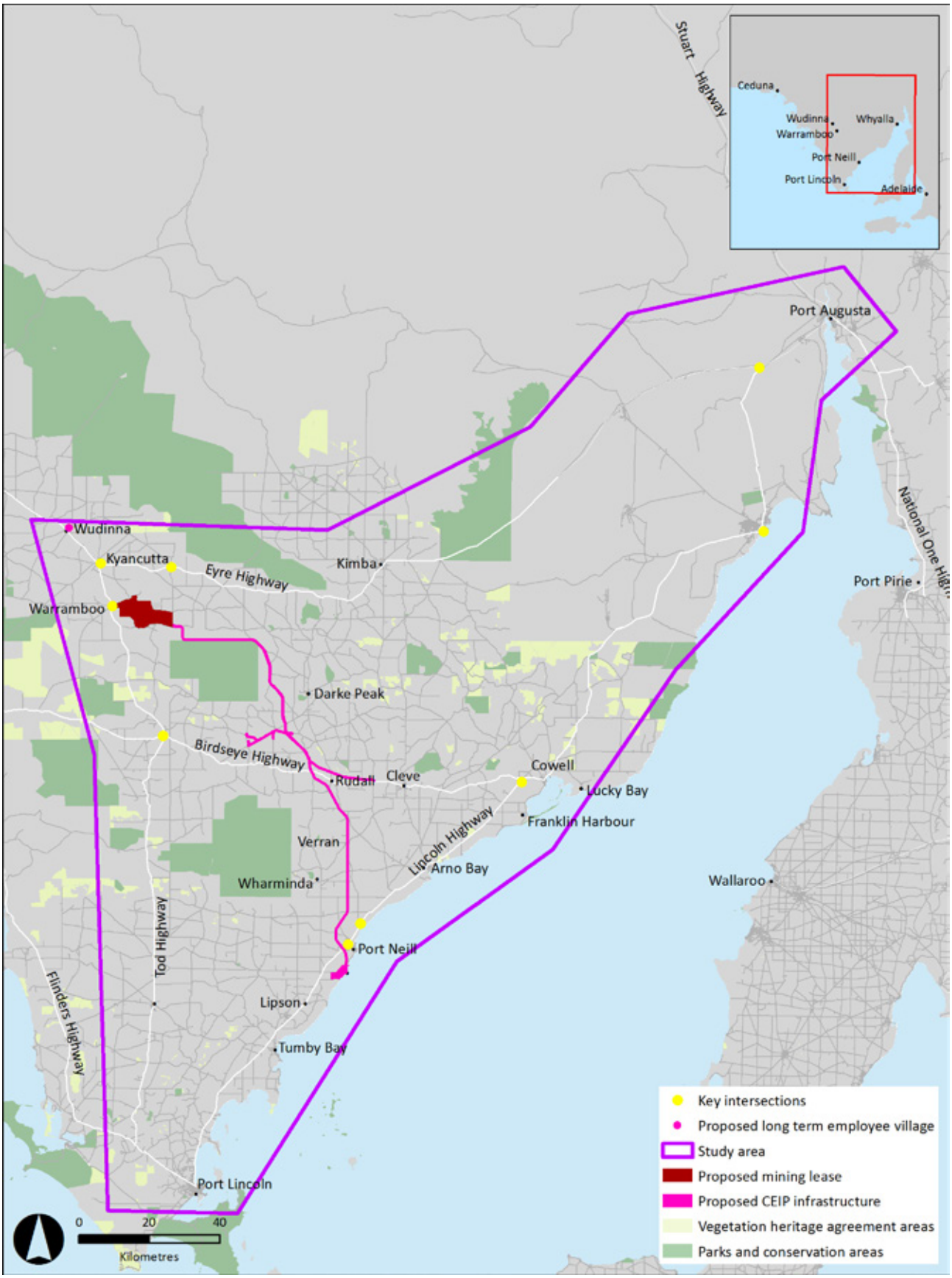

Figure 18-13 Key Intersections Analysed

18.5.9 Rail Movements and Traffic Delays at Level Crossings

The operation of the proposed railway line will cause some minor delays in the transport network as vehicles will be required to stop at the level crossings and give way to trains. As described in Chapter 4, 16 passive level crossings and one active level crossing (at the Birdseye Highway) are proposed as part of the infrastructure corridor to maintain connectivity in the road network. The maximum delay for a vehicle at a level crossing will occur when a vehicle approaches the crossing at a similar time as the train and therefore has to wait for the full 1.3 km train to pass.

The maximum potential delay time for a vehicle at the passive level crossings and the Birdseye Highway active level crossing will be approximately 60 seconds and 100 seconds respectively. The maximum delay time is longer for the active crossing as additional time is required for closing and opening the boom gates prior to and after a train passes through.

The likelihood of vehicles being delayed at the level crossings was assessed based on conservative assumptions of traffic volumes. The assessment found that there is a low probability (approximately 1%) of a vehicle being delayed at a level crossing along the proposed infrastructure corridor.

Table 18-9 Vehicle Delay at Level Crossings

Crossing Type	Train Crossings Per Day	Maximum Delay at Level Crossing (Seconds)	Vehicles Passing Through Crossing Per Hour[1]	Probability of Being Delayed
Active (signalised)	12	100	11	1.39%
Passive (unsignalised)	12	60	11	0.83%

[1] Conservative assumption based on DPTI AADT data of 130 vehicles per day on the Birdseye Highway between Lock and Rudall, assuming that these vehicles all travel within the 12 hour daytime period. The actual traffic volume on the local roads travelling though the passive level crossings is likely to be much lower; hence this assessment is based on a worst case scenario.

Although only minor traffic delays are expected at the proposed level crossings, this delay will be noticeable to drivers using the roads and will occur over the long term. It is also acknowledged that even when a train is not approaching a passive level crossing, there will be a very minor delay (above current travel times) for drivers to assess the introduced crossings and determine whether it is safe to proceed. As such the impact of traffic delays at level crossings has been assessed as **medium**.

18.5.10 Changes to Local Access from Road Closures and Road Realignments

Changes to the existing road network from the closure and realignment of roads can impact motorists through longer travel times. The proposed road closures and realignments that will be required for the CEIP Infrastructure were assessed to determine the net effect on travel time and distance on the public road system. The assessment found that the impact to travel time would be less than one minute for most trips, with a shorter travel time for some journeys using the local road network surrounding the port site. As such the impact on travel times as a result of road closures or realignments has been assessed as **negligible** as a result of the CEIP Infrastructure.

18.5.11 Summary of Impacts

A summary of the identified traffic impacts as a result of the Construction phase of the CEIP Infrastructure is shown in Table 18-10 and similarly for the Operation phase in Table 18-11.

Table 18-10 Summary of Impacts: Traffic and Transport (Construction)

Impact	Comment	Level of Impact
Reduction in road capacity (level of service) due to construction traffic.	Construction of the CEIP Infrastructure will generate additional traffic on the road network; however there is sufficient capacity on the existing road network to accommodate this additional traffic.	Negligible
Changes to school bus routes due to construction road closures.	Minor changes and disruptions to school bus routes are expected to occur during construction of the proposed railway line. Iron Road will liaise with local schools to plan suitable alternative routes where required.	Low
Delays to school bus routes due to construction traffic.	Delays to school buses are not anticipated as there is sufficient road capacity to accommodate CEIP Infrastructure construction vehicles. However construction traffic will be timed to avoid school bus services where possible.	Negligible
Deterioration of pavement due to vehicle movements generated by project.	Wear and tear on the road network in the study area as a result of the additional axle loading from CEIP Infrastructure construction generated traffic will be managed through a pavement monitoring, management and rehabilitation plan in consultation with DPTI. As such the impact will be short term only.	Low
A reduction in capacity of intersections to function efficiently due to construction traffic.	The maximum number of vehicles making the same turn through an intersection as a result of the CEIP Infrastructure construction is predicted to be one per hour, which will not impact on the capacity of the intersections within the study area.	Negligible
Disruption to operation of the existing Cummins-Buckleboo Railway during construction of the proposed railway line.	Short term disruption to the operation of the Cummins-Buckleboo Railway will occur while the overpass for the proposed railway line is created; however this will be reduced through construction management techniques.	Low

Table 18-11 Summary of Impacts: Traffic and Transport (Operation)

Impact	Comment	Level of Impact
Reduction in road capacity (level of service) due to operational traffic.	Construction of the CEIP Infrastructure will generate additional traffic; however there is sufficient capacity on the existing road network to accommodate the additional vehicles.	Negligible
Deterioration of pavement due to vehicle movements generated by project.	The impact of additional loading on pavement condition from CEIP Infrastructure operational vehicles should not significantly affect the condition and remaining life of the pavement within the study area due to the negligible increase in axle loading.	Negligible
A reduction in capacity of intersections to function efficiently due to operational traffic.	Operational traffic generated by the CEIP Infrastructure will not reduce the capacity of intersections to function effectively.	Negligible

Impact	Comment	Level of Impact
Traffic delay at level crossings due to operation of the proposed railway line.	Minor traffic delays are expected at the proposed level crossings along the infrastructure corridor as drivers wait for trains to pass. This delay will be noticeable to drivers using the roads and will occur over the long term.	Medium
Changes to school bus routes due to operation of the proposed railway line.	Changes to school bus routes are not anticipated as level crossings will continue to provide access across the railway line.	Negligible
Delays to school bus routes due to traffic from project operations.	Delays to school buses are not anticipated as there is sufficient road capacity to accommodate CEIP Infrastructure vehicles.	Negligible
Increased travel times due to road closures and road diversions created as a result of the CEIP Infrastructure.	The impact to travel time as a result of road closures and re-alignments will be less than one minute for most trips, with a shorter travel time for some journeys using the local road network surrounding the port site.	Negligible

18.6 Control and Management Strategies

In order to minimise the impact on, and potential risks to, the existing traffic and transport environment of the project area during construction and operation, a series of control strategies and management approaches will be incorporated into the Construction Environmental Management Plan (CEMP) or Operation Environmental Management Plan (OEMP) for the project and implemented for each project component. Implementation of a traffic management strategy and road maintenance plan for public roads used by the CEIP will also ensure that:

- Transport operations of Iron Road are consistent with the assumptions made in this report and hence traffic impacts in practice are as predicted and acceptable.
- Impacts as a result of CEIP transport operations during both the Construction and Operation phases are monitored and managed so that there is no project-related deterioration in the condition of the public roads used.

These control and management strategies are summarised for the Construction and Operation phases in Table 18-12 with further detail included in the Draft CEMP and OEMP (Appendix AA and BB respectively) and the environmental management framework presented in Chapter 24.

Table 18-12 Control and Management Strategies: Traffic and Transport

Control and Management Strategies	EM ID
Construction	
The proposed road closures and alignments will be reviewed and confirmed in consultation with the District Council of Tumby Bay, District Council of Cleve and Wudinna District Council as detailed design progresses.	TG_C1
Slow-moving heavy equipment deliveries would be scheduled to arrive outside peak traffic periods and avoid potential conflict times identified during harvest season.	TG_C3
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.	TG_C4
Liaison with local schools to discuss any impacts to bus routes due to road closures or traffic movements. Where possible construction traffic will be timed to avoid school bus services.	TG_C5
Use of accredited traffic controllers to manage intersection priority during heavy materials and equipment deliveries.	TG_C6

Control and Management Strategies	EM ID
Signage warning motorists to expect slow-moving heavy vehicles and delays would be erected at the Lincoln Highway between Port Neill and Tumby Bay and Brayfield Road between Lincoln Highway and the port site.	TG_C7
Use of pilot vehicles and temporary speed restrictions for the segments of road with high crash rates (Warramboo to Kyancutta on the Tod Highway; Cleve to Cowell on the Birdseye Highway; and Iron Knob to Lincoln Highway intersection on the Eyre Highway).	TG_C8
Development of pavement monitoring, management and rehabilitation plan in consultation with DPTI. This will identify different types of possible road and pavement damage, 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 construction. Inspections should identify the following: · Rutting · Corrugations · Significant cracking · Potholing	TG_C9
Operation	
Schedule shift changeovers away from current peak traffic hours.	TG_O1
Designated delivery transport routes for heavy vehicle and light vehicles accessing the port site.	TG_O2
Implementation of incident reporting system for the management and implementation of traffic improvement measures.	TG_O3
Development of pavement monitoring, management and rehabilitation plan in consultation with DPTI. This will identify different types of possible road and pavement damage, inspection frequencies, intervention levels and required treatments.	TG_O4

18.7 Residual Risk Assessment

This section identifies and assesses risks to the transport network that would not be expected as part of the normal construction or operation of the CEIP Infrastructure, but could occur as a result of faults, failures and unplanned events. Although the risks may or may not eventuate, the purpose of the risk assessment process was to identify management and mitigation measures required to reduce the identified risks to a level that is as low as reasonably practicable and therefore acceptable.

A summary of the residual environmental risks after management and control strategies are applied is presented in Table 18-13. The traffic control and mitigation measures identified are presented in Section 18.6 and form the basis of the Environmental Management Framework presented in Chapter 24.

18.7.1 Construction Traffic and Transport Risks

During the construction of the CEIP Infrastructure, residual risks to traffic and transport include:

· *Vehicle accident due to the increased traffic travelling on roads as a result of the CEIP Infrastructure project.*

  A vehicle accident may cause serious injury, resulting in a consequence rating of **major**. It is considered **unlikely** that the increased traffic due to the CEIP infrastructure will cause vehicle accidents that result in serious injury, as a traffic management strategy will be implemented in the identified high risk areas to respond to the altered traffic conditions. It is also acknowledged that vehicle accidents also have the potential to lead to multiple fatalities which would result in a consequence rating of **catastrophic.** Such vehicle accidents (as a result of increased traffic from

the CEIP Infrastructure) are considered to be **rare.** In both of these incidents, given the extremity of the potential worst case consequences of an accident, the overall risk rating of a vehicle accident is considered to be **high**, despite management measures.

- *Road capacity is reduced due to construction traffic leading to travel time increases which are greater than expected.*

  Estimates of traffic generated by the CEIP Infrastructure are based on conservative assumptions of traffic generation and trip-destination origin as described in the Traffic Impact Assessment Report (Appendix W). Should traffic 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**.

- *Release of fuel or hazardous substances during road or rail transport due to failure of containment systems or accident, resulting in harm to members of the public or contamination of soils/water resources.*

  Transport of fuels and hazardous substances will be undertaken by appropriately accredited contractors and containment systems will accord with Australian Standards. A consequence rating of **minor** has been assigned, reflecting the potential for medical treatment and/or potential for localised contamination to occur which can be remediated. As previously identified, a traffic management strategy will be implemented in the identified high risk areas to respond to the altered traffic conditions. As such, it is considered **unlikely** that this risk event would eventuate during construction. Therefore, fuel or hazardous substance release is considered to be a **low** risk.

18.7.2 Operation Traffic and Transport Risks

The Construction phase traffic and transport risks are also considered to apply to the Operation phase of the project, as reflected in Table 18-13. In addition, during the operation of the CEIP Infrastructure, residual risks to traffic and transport include:

- *Traffic generated by the CEIP Infrastructure is greater than predicted, leading to long delays at level crossings.*

  A consequence rating of **minor** has been assigned, reflecting an ongoing social issue if longer traffic delays are experienced. Estimates of traffic generated by the CEIP Infrastructure are based on conservative assumptions of traffic generation and trip destination/origin as described in the Traffic Impact Assessment Report (Appendix W). In addition, it has been identified that there is substantial capacity in the existing road network and that scheduling will be managed to reduce peak traffic generation to minimise delays to the public. Therefore, it is considered **unlikely** that long delays will be experienced at level crossings due to queueing. As such, delays that are longer than predicted are considered to be a **low** risk.

- *Collision between train and member of the public due to inadequate warning of oncoming train or driver inattention.*

  It is acknowledged that such a collision could credibly lead to death or serious injury, and as such a consequence rating of **catastrophic** has been assigned. Rail crossings will be designed and constructed in accordance with Australian Standards, with active treatments applied at intersection points with key highways (higher trafficked areas) and passive crossings at localised intersections. The likelihood of a collision between a train and member of the public has been assessed as **unlikely**, reflecting that exceptional circumstances would need to arise for this risk to eventuate. As a result of the extreme worst case consequences, the overall risk of a train collision with a member of the public is considered to be **high**.

- *Bottom-dumping wagons fail or leak during transport to port resulting in loss of concentrate in rural or agricultural areas.*

  A localised loss of concentrate can be readily remediated, as the concentrate is non-toxic and magnetic. As such a consequence rating of **insignificant** has been assigned. It is also considered **unlikely** that significant concentrate loss will occur during transport from mine site to the port as bottom-dumping rail wagons are an established means of commodity transport and a specialised purpose-built wagon design will be utilised. Additionally, the wagons will be regularly monitored and maintained as it is Iron Road's key objective to maximise the amount of product delivered to the port for export. Therefore, the loss of concentrate in a rural or agricultural area is considered a **low** risk.

- *Collision of stock/fauna with train due to infrastructure corridor security failure, such as a breach in the stock fence.*

  The consequence of a train colliding with stock or fauna has been assessed as **minor** reflecting a localised impact and no lasting effects on fauna populations. It is **possible** that the operating railway line could result in a collision with stock or fauna. As such this represents a **low** risk.

18.7.3 Summary of Risks

The key traffic and transport risks due to construction and operation of the project are presented in Table 18-13. Through the adoption of design modification or specific mitigation measures, all except three identified risks were reduced to levels of low, which is considered to be as low as reasonably practicable and therefore acceptable. Three of the risks have a residual rating of high, reflecting the credible serious consequences associated with traffic accidents and collisions. It is considered that the design and mitigation measures in place, including specific traffic management strategies at high-risk locations and design of rail crossings 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). As such, these risks are considered to be as low as reasonably practicable (ALARP), and are therefore acceptable. The key risks would be monitored through the CEIP Environmental Management Framework.

Table 18-13 Summary of Residual Risks: Traffic and Transport

Risk Event	Pathway	Receptor	Project Phase[1]	Likelihood	Consequence	Residual Risk
Vehicle accident between CEIP Infrastructure-related vehicle and member(s) of the public.	Increased traffic from the CEIP Infrastructure travelling on roads with high crash rates. Driver inattention.	Member(s) of the public	C, O	Unlikely	Major	High
Significant vehicle accident between CEIP Infrastructure-related vehicle and member(s) of the public.	Increased traffic from the CEIP Infrastructure travelling on roads with high crash rates. Driver inattention.	Member(s) of the public	C, O	Rare	Catastrophic	High
Road capacity is reduced leading to travel time increases which are greater than expected.	Traffic generated by the CEIP Infrastructure is greater than predicted.	Member(s) of the public	C, O	Unlikely	Minor	Low

Risk Event	Pathway	Receptor	Project Phase[1]	Likelihood	Consequence	Residual Risk
Release of fuel or hazardous substance during road or rail transport.	Failure of containment systems or accident.	Member(s) of the public Soil / water resources	C, O	Unlikely	Minor	Low
Long traffic delays at level crossings.	Traffic generated by the CEIP Infrastructure is greater than predicted.	Member(s) of the public	O	Unlikely	Minor	Low
Collision between train and member of the public.	The driver of the vehicle fails to stop at the level crossing due to inadequate warning of oncoming train or driver inattention.	Member(s) of the public	O	Unlikely	Catastrophic	High
Commodity loss in rural or agricultural area during rail transport to port.	Bottom-dumping wagons fail or leak during transport.	Rural or agricultural values	O	Unlikely	Insignificant	Low
Collision of stock/fauna with train.	Security of rail line fails (fenceline breach).	Stock/fauna	O	Possible	Minor	Low

[1]C = Construction, O = Operation

18.8 Findings and Conclusion

The traffic and transport assessment of the CEIP Infrastructure demonstrated that the Construction and Operation phase impacts and risks to the existing transport system on the Eyre Peninsula are ALARP, with the following conclusions noted:

- All planned Construction and Operation phase traffic impacts are comfortably within the capacity of the existing road system and will not reduce the existing level of service.
- Delays induced by CEIP construction traffic and by operation of the proposed railway line will be minor.
- All proposed CEIP transport operations are not expected to significantly increase traffic accidents and will not change the existing level of risk for road traffic on public roads.
- Iron Road will implement a traffic management strategy and road maintenance plan for public roads as part of the CEMP and OEMP.

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