

17

Traffic and transport

17. Traffic and transport

17.1 Introduction

This chapter describes the existing transport infrastructure (road and rail) and traffic conditions in the study area, and describes the potential impact on the public road network and on rail freight services arising from the Nolans Project during operation. Mitigation measures that will be implemented to minimise the impact of the project on transport networks are also discussed.

The level of risk to transport networks posed by each source of impact was assessed using standard qualitative risk assessment procedures, which have been described in Chapter 5 (Risk assessment). The risk associated with each potential impact is detailed in the risk matrix, which is contained in Appendix F.

Section 5.9.1 of the Terms of Reference for the preparation of an environmental impact assessment issued by the NT EPA for the Project in particular provided the following environmental objective in relation to transport:

Potential transport impacts will be effectively identified and avoided/mitigated/minimised to the greatest practicable extent.

A detailed transport study is provided in Appendix V.

17.2 Methodology

The following tasks were undertaken to complete the transport assessment:

- Review of existing transport conditions.
- Review of the proposed development in terms of location, access and the amount of material being imported and exported.
- Assessment of the impacts on the road network. This includes an analysis of the amount of traffic the project is expected to generate and how it will use the road network. Impacts are described in terms of reductions in spare capacity, based on published capacity guidelines.
- Assessment of impacts on the rail network. This includes an examination of current rail services and the ability of the rail network to handle additional freight, together with an assessment of how existing services will be affected.
- Selection of mitigation measures to offset or reduce the identified impacts. These are generally physical changes to the road network to enhance capacity and/or road safety.

17.3 Existing environment

17.3.1 Existing road network

The Nolans site is located approximately 135 kilometres north-northwest of Alice Springs and 10 kilometres to the west of the Stuart Highway at Aileron Station, in the Northern Territory.

The site access alignment, five kilometres south of the Aileron Roadhouse, currently exists as an unsealed station track which would be upgraded to a two lane, two way sealed road during the construction phase of the project. It is located at an intersection with the Stuart Highway, within a section of open speed limit.

Key roadways within the study area are the Stuart Highway, Whittaker Street and Smith Street and are shown in Figure 17-1.

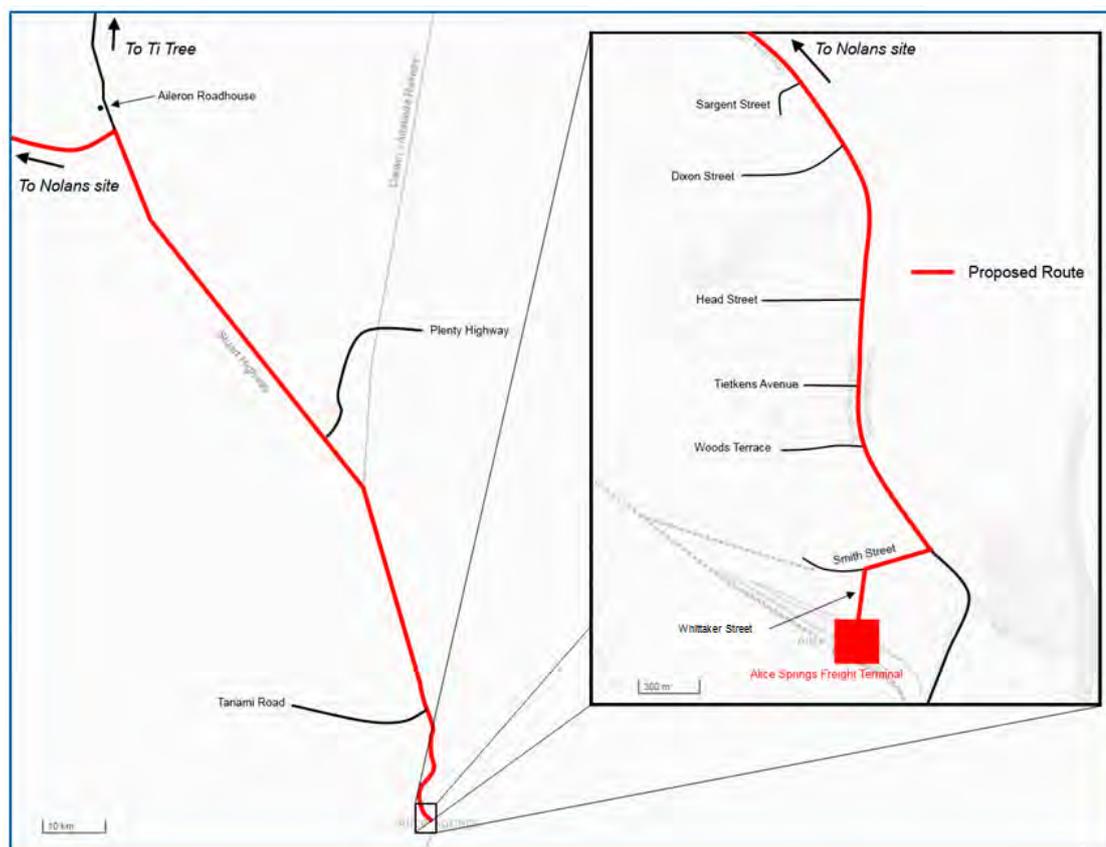


Figure 17-1 Study area and proposed access route from Alice Springs

Whittaker Street

Whittaker Street comprises of two sections – an east-west undivided road that provides access to local traffic, and a north-south divided road which is the primary access to the Alice Springs freight rail terminal. Both sections have one lane in each direction and the default speed limit (i.e. not signposted) of 60 km/h applies.

Smith Street

Smith Street is a generally light industrial, east-west single carriageway road with one lane in each direction. It is linked to the north-south section of Whittaker Street via a four-leg roundabout, which has a large overrun area for long vehicles in the central island. The east end of Smith Street connects with the Stuart Highway via an unsignalised T-junction, thereby forming the main route for vehicles accessing the Alice Springs freight terminal from the Stuart Highway. A default speed limit of 60 km/h applies to Smith Street.

Stuart Highway

Stuart Highway (National Route 1/National Route 87) is a national highway connecting Darwin, Katherine, Daly Waters, Tennant Creek, Alice Springs and Port Augusta in South Australia. Throughout the study area it is a sealed, approximately 7 m wide, generally two lane, single carriageway road with one lane in each direction. The maximum posted speed limit is 130 km/h, except for a 204 km section directly north of the Tanami Road intersection, where open speed limit trials commenced in 2014 and have since been made permanent. The intersection with the proposed site access will be located within this open speed limit section.

In Alice Springs, the Stuart Highway is a dual carriageway north of Smith Street through to Dixon Road. There are two lanes in the north bound direction until just north of Head Street, and two lanes in the south bound direction from Tietkens Avenue. At Dixon Road, the Stuart Highway reverts to a single carriageway, still with one lane in each direction, and remains in this configuration through to the site access near Aileron Roadhouse. From the city centre to Bitzer Road, the speed limit varies from 60 km/h to 70 km/h, gradually increasing to 110 km/h leaving Alice Springs. North of the Tanami Road, the open speed limit zone commences as described above.

Traffic volumes

Traffic volume information collected by the Department of Transport (DoT) has been provided for the study area for 2014. The records present annual average daily traffic (AADT) volumes at permanent counter locations.

The existing traffic volumes along each road section have been summarised in Table 17-1. These include both heavy vehicles and light vehicles.

Average daily traffic volumes vary significantly along the Stuart Highway, ranging from 13,522 vehicles per day (vpd) in Alice Springs to 381 vpd close to the project site access. No data was available for Whittaker and Smith streets.

Table 17-1 2014 AADT volumes within the study area

Survey location	AADT volumes (2014)
Whittaker Street	Unknown
Smith Street	Unknown
Stuart Highway, between Smith Street and Woods Terrace, Alice Springs	13,522
Stuart Highway, between Dixon Road and Sargent Street, Alice Springs	6,974
Stuart Highway, 3.0 kilometres north of Alice Springs	978
Stuart Highway, 1.5 kilometres north of Tanami Road	608
Stuart Highway, 8 kilometres north of Aileron	381

Road closures

According to DoT records, for the years 2003 through 2014, the Stuart Highway between Tanami Road and Aileron Roadhouse was closed twice due to flooding. In both cases, the closure was in effect for less than 24 hours.

There is no practical alternative route between the Alice Springs and the Nolans site.

17.3.2 Rail

Genesee Wyoming Australia (GWA) operates the rail corridor from Tarcoola (in South Australia) to Berrimah (in Darwin) under long-term lease agreement with the AustralAsia Railway Corporation who are the government owners of the infrastructure. GWA maintain and operate the track and provide rail access to other rail companies, including the Great Southern Railway. GWA also operate regular freight trains on the network.

The Tarcoola to Alice Springs railway is approximately 65 kilometres to the east of the Nolans site with limited direct roadway access and services. Access to rail services is more appropriate at Alice Springs with highway connections for linking road services.

Regular rail traffic from Adelaide to Darwin and return includes the intermodal containerised freight service operated by GWA six days a week and the Ghan tourist train one or two times weekly (seasonal). Other trains carrying bulk mining outputs from the Northern Territory operate to ports in South Australia or Darwin depending on transport costs and requirements. Recent changes in commodity prices have resulted in a reduction of services on the rail freight network. There is currently significant capacity available on the corridor as a result.

The rail corridor is a single line with passing loops at various intervals relative to the demand requirements on the corridor.

GWA access information indicates freight train access is available with axle weight capacities as follows:

- Northgate (South Australia) to Alice Springs: 21 tonne axle load up to 110 km/h
- Alice Springs to Darwin: 23 tonne axle load up to 115 km/h.

The rail line provides access to the intermodal facilities at the Alice Springs Freight Terminal (see Figure 17-2).

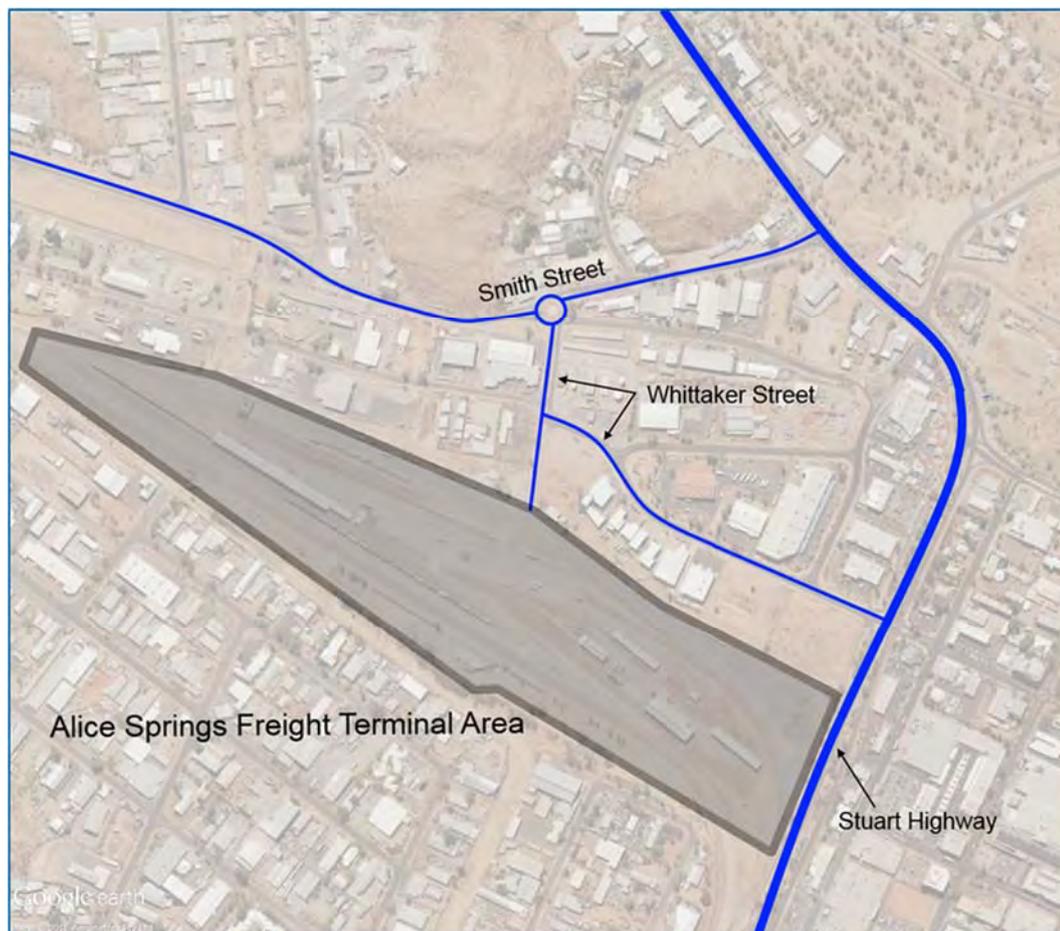


Figure 17-2 Alice Springs Freight Terminal

The rail corridor connects to the Port of Darwin at Berrimah with direct access onto port for unloading of containerised freight. Bulk unloading facilities are also available outside port environs although a further transport movement is required for loading to ship.

The northern end of the rail corridor at Berrimah (Darwin) is adjacent to the Port of Darwin East Arm Wharf facility which is the location of commercial port operations for containerised and bulk products. The rail corridor connects from the rail terminal to the port past a bulk fuel terminal operated by Vopak (also relevant to the supply chain) and directly onto the port berths.

17.3.3 Port facilities

The closest port facilities are located in Darwin (approximately 1,430 kilometres north of the Alice Springs Rail Terminal which would be used as a rail connection) and Adelaide (approximately 1,570 km to the south of this location).

Shipping options are available with rail connectivity at both Darwin (East Arm Wharf) and Port Adelaide. The East Arm Port at Darwin can provide access for the movement of containerised products, bulk materials and liquid bulk through the adjacent Vopak bulk liquids terminal and is the port favoured by the project.

17.3.4 Airport facilities

Alice Springs Airport is located approximately 145 kilometres south of the proposed site access road on Stuart Highway. A large number of domestic flights depart from and arrive at Alice Springs Airport each day from capital cities and smaller regional airports in the Northern Territory.

17.4 Potential impact on the transport network

The project is expected to generate operational traffic as a result of the following:

- Imports of consumables/reagents to the site
- Exports of RE products from the site
- Transportation of workers to/from the site.

Operation of the project will require the following resources to be transported to and from the Nolans site:

- Import of a range of products to the site such as fuel, bulk imported sulfur, sulfuric acid and reagents sourced internationally through the Port of Darwin. Other raw materials may be sourced locally if competitively priced. The majority of these products would be transported by rail to Alice Springs Freight Terminal and then by road to the Nolans site
- Other supplies such as diesel fuel would be brought to the Nolans site by rail and/or road, mostly via Alice Springs
- Rare earth intermediate products (outbound product) would be trucked by road from the Nolans site to Alice Springs Freight Terminal via the Stuart Highway, where they would be transported to Darwin Port via freight trains
- Transportation of workers between Alice Springs (or other nearby communities) and the Nolans site by road.

In addition, a number of vehicle movements would be required within the Nolans site. As these vehicles would not be on public roads, these have not been considered in the assessment.

17.4.1 Traffic generation

Imports of consumables

Demand for some minor consumables is expected to fluctuate over the life of the operation, however the majority of the consumables required are fixed quantities and do not vary. These are provided in Appendix V.

The summary results presented in Table 17-2 are based on the following assumptions:

- Each TEU (twenty-foot equivalent container unit) can carry 25 tonnes of solid consumables
- Each ISO (international standards organisation size tanks) can carry 20 tonnes of liquid consumables
- Quadruple road trains are to be used for each trip (i.e. four TEU/ISO per truck)
- The Nolans site is operational for 365 days per year.

Table 17-2 shows the number of TEU/ISO to be delivered to the site is forecast to remain relatively steady throughout the project's operational phase, fluctuating by less than one per cent to a maximum rate of 8,126 TEU/ISO per annum. Consequently, the number of return trips generated is also relatively constant from year to year at around 2,000 annual trips, or six return trips per day (or 12 one way trips on average per day).

Table 17-2 Trip generation from delivery of mine site consumables

	Yearly ISO/TEU demand	Yearly return trip generation	Average return trips per day
Lowest demand (year 1)	7,994	1,999	6
Highest demand (year 10 to 25)	8,126	2,032	6

Exports of products

Rare earth intermediate products would be exported by road to the Alice Springs Freight Terminal, where they would be transported to Darwin Port via freight trains. Incoming road trains delivering consumables to the Nolans site would return empty to Alice Springs, so it is likely that the available capacity on these returning road trains would be used to transport outbound product.

The volume of inbound consumables would far exceed the volume of outbound product. Therefore, the export of RE products from the site is not expected to generate any additional traffic.

Transportation of site workers

Operations workforce is expected to be in the range of 250-300.

Workers at the mine will be based on site in a 300-person accommodation village, and would rotate shifts according to a fly-in/fly-out (FIFO) or bus-in/bus-out (BIBO) roster. It is anticipated that FIFO workers will be flown into Alice Springs and taken by bus to the Nolans site via the Stuart Highway. Other local workers could come from a range of locations in the surrounding

area, but generally no further away than Alice Springs and will likely also be bussed to the project site.

An indicative breakdown of the workforce is as follows:

- 70% FIFO (for the purposes of this assessment this means they originate at Alice Springs, as that is where their road journey starts);
- 10% relocated interstate workers (Alice Springs based);
- 10% local (effectively Alice Springs based); and
- 10% regional communities (based elsewhere in the NT).

Assuming that 10% of the 300 workers will be rotated each weekday (i.e. a full rotation occurs every fortnight), 30 workers will depart the site and 30 more will arrive at the accommodation village each day. This demand would likely require no more than two buses (one to service Alice Springs, one to regional areas north or west of Aileron), resulting in four trips per day for the purpose of transporting workers to and from the site (i.e. two daily departures and two daily arrivals).

To provide a robust analysis, it is assumed that bus movements occur during the peak hour; however, in reality at least half of these would likely be timed to coincide with aircraft arrivals and departures at Alice Springs Airport (which may or may not occur during peak hour).

In addition to rostered employees, external local contractors are expected to access the Nolans site in their own vehicles. These trips are expected to originate in or near Alice Springs and not exceed five arrivals and departures per day at the site. In instances when the accommodation village is fully occupied, staff may stay at the Aileron Roadhouse, near the access road intersection with Stuart Highway.

Summary of trip generation from project operations

Table 17-3 summarises the daily trip generation resulting from the project operations. Note that this includes only those trips made on the public road network. It does not include internal vehicle movements such as to and from the accommodation village or the Woodforde carbonate quarry.

Table 17-3 Daily trip generation from site

Trip purpose	No. of daily trips	Peak hour proportion	No. of peak hour trips
Imports of consumables (road train)	12	10%	2
Exports of products (road train)	0	10%	0
Transportation of site workers from Alice Springs (bus)	2	100%	2
Transportation of site workers from north of Aileron (bus)	2	100%	2
External contractors' vehicles (small vehicles/4WDs)	10	100%	10
Total	26 (24)	-	16 (14)

17.4.2 Contribution to the road network

Access to the site will be restricted to authorised commercial vehicles only, via the upgraded site access road connecting with the Stuart Highway approximately five kilometres south of Aileron Roadhouse.

Austrroads publishes guidance on the capacity of roads and traffic lanes (Austrroads 2009). Table 17-4 compares the estimated capacity remaining in the road network in year 1 both with and without the Nolans Project.

For the purposes of assessing traffic capacity, the highest traffic volume collected within each section has been considered in this report. An annual growth rate was applied to the 2014 background AADT volumes based on average historical increases between 2005 and 2014.

Table 17-4 Comparison of overall peak hour volumes

Road section		Capacity (vph)	Projected year 1 peak hour without Nolans Project		Projected year 1 peak hour with Nolans Project	
			Volume (vph)*	Remaining capacity	Volume (vph)	Remaining capacity
Stuart Highway, 2.2 km between Smith Street and Dixon Road**	North bound	900	667	26%	674	25%
	South bound	900	705	22%	712	21%
Stuart Highway, 400 m between Dixon Road and Sargent Street	North bound	900	472	48%	479	47%
	South bound	900	348	61%	352	61%
Stuart Highway, 16.5 km between Sargent Street and Tanami Rd	North bound	1,800	31	98%	38	98%
	South bound	1,800	36	98%	43	98%
Stuart Highway, 109 km between Tanami Rd and Aileron	North bound	1,800	18	99%	25	99%
	South bound	1,800	20	99%	27	99%

* Vehicles per hour

** Approximately 75% of this section has two lanes in one or both directions. To be conservative, the assessment has been made on the one-lane section.

Project traffic will not increase over time during operations, but background traffic volumes will; and therefore, as a proportion of total traffic, the Nolans contribution to traffic volumes will represent less and less each year. On this basis it is reasonable to consider the impact of the Nolans Project in its first year of operation (e.g. 2019).

Overall the project is unlikely to have a significant impact on the capacity of the key roads in the surrounding road network. It is anticipated that there would be only a very small increase in overall traffic volumes as a direct result of the Nolans Project (Table 17-4).

Intersections within Alice Springs

The intersections of Smith Street/Stuart Highway and Smith Street/Whittaker Street, as well as Smith and Whittaker streets themselves, are on an established truck access route into the Alice Springs Freight Terminal. Table 17-4 shows that the Stuart Highway in Alice Springs is expected to have at least 25 per cent spare capacity in 2019 with or without the Nolans Project.

Stuart Highway (rural)

Nolans Project traffic would form a larger proportion (approximately five per cent) of overall vehicles on the less trafficked sections of the Stuart Highway in close proximity to the Nolans site. However, this also demonstrates that the remaining capacity in these areas is abundant and the Nolans Project would have a negligible impact on the Stuart Highway.

17.4.3 Intersection assessment

At the location of the proposed Nolans site access road five kilometres south of Aileron Roadhouse, traffic associated with the project is forecast to comprise less than 4% of peak hour traffic along Stuart Highway in year 1.

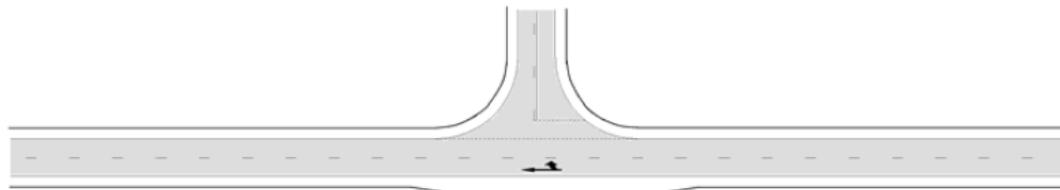
Section 4.8 of the *Austrroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections* specifies for various left and right turn treatments leaving a major road, considering the number of vehicles making the turning movement, the volume of through traffic in one or both directions, and the design speed of the major road.

No more than 52 vehicles are expected to use the Stuart Highway during the year 1 peak hour, assuming that the peak hour traffic volume is equal to 10% of the daily volume (refer Appendix V).

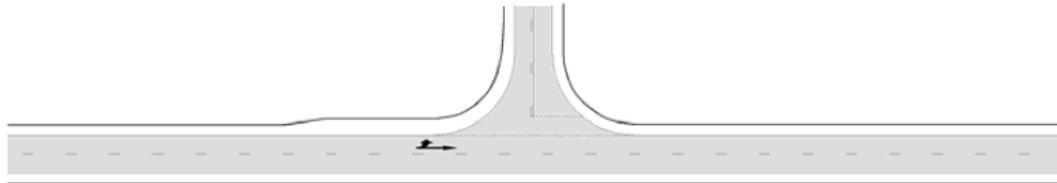
For a design speed equal to or greater than 100 km/h, the Austrroads specify that a basic auxiliary left/right treatment is suitable if there are less than 100 vehicles per hour travelling along the major road, or if there are less than five vehicles turning right or left onto the minor road. A basic auxiliary left/right treatment (“BAL” or “BAR”) is a localised road widening to allow a through vehicle to pass a turning vehicle, as shown in Figure 17-3.

However, the type of turning treatment provided should also consider other elements of the actual intersection location, such as steepness of grades, sight distances and speed limit. In particular, Austrroads suggests that a BAL treatment would not be appropriate where numerous heavy vehicles travel quickly down a steep grade, and that a channelised left turn is a more suitable treatment in such instances. It is also considered that the open speed limit in this location potentially makes a BAL/BAR treatment unsafe.

Thus, although the BAR/BAL treatment is sufficient in terms of intersection capacity, it is considered that the open speed limit warrants the provision of a channelised treatment to improve road safety. An example of a channelised treatment is shown in Figure 17-4.

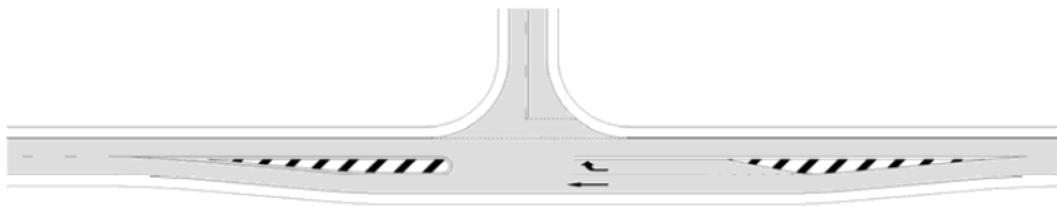


**Basic Right Turn (BAR)
on the Major Road (Two-Lane, Two-Way Road)**

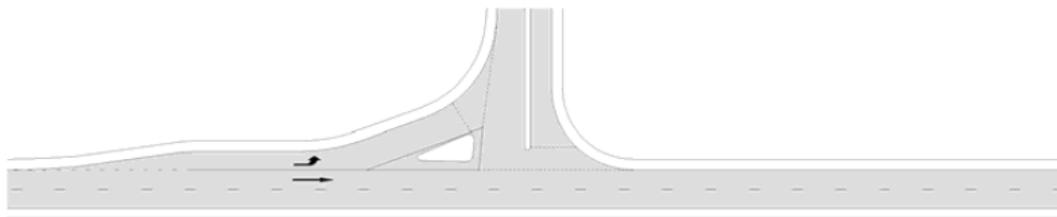


**Basic Left Turn (BAL)
on the Major Road**

Figure 17-3 BAR and BAL treatments (reproduced from Austroads)



**Channelised Right Turn (CHR)
on the Major Road**



**Channelised Left Turn (CHL)
on the Major Road**

Figure 17-4 Channelised turn treatments (reproduced from Austroads)

17.4.4 Other potential road impacts

Road pavements are normally designed to withstand a certain number of heavy axle repetitions over a certain design life (e.g. 30 years). The addition of 26 vehicles per day over the life of the Nolans Project is significantly less than that added by background growth in that time (depending on the section of Stuart Highway in question). Consequently, it is considered that the Nolans Project will have a negligible impact on the condition of the road surface on Stuart Highway.

It is considered that the addition of 24 vehicles per day (14 vehicles per hour in the peak periods) would be an imperceptible increase that would not limit the ability of members of the public from accessing essential services.

The expected frequency of road closures due to flooding (i.e. twice within an eleven year period, for less than 24 hours) is considered not high enough to significantly affect the transport of materials and personnel to and from the Nolans site.

17.4.5 Contribution to the rail network

The volume of inbound materials to be carried on the Darwin to Adelaide railway is approximately 8,850 TEU (twenty-foot equivalent containers) per annum in total indicated as:

- Quicklime – 1,300 TEU, to be loaded at northern Freight Terminal for transport to Alice Springs Freight Terminal
- Bulk sulfur – 3,900 TEU, to be containerised by the rail operator GWA at Darwin Port or rail terminal and transported by rail to Alice Springs
- Containerised reagents – 1,650 TEU, Darwin Port to Alice Springs
- Containerised reagents and other – 2,000 TEU, Darwin Port to Alice Springs.

RE products Alice Springs to Darwin are included in outbound below. These inbound products are to be transported in intermodal containers or ISO tanks which can be handled with currently available rail resources and lifting equipment.

Bulk sulfur is estimated to arrive in four shiploads per year, assumed to be approximately three months apart. Storage of this product could be at the Darwin Port or the project site and a constant flow of products will generally fit with the use of common infrastructure and rail services on the railway. It is assumed product flows will be at a consistent level with some capability to ramp up or down to best meet transport opportunities.

Outbound rail loadings would be approximately 8,950 TEU per annum including outbound containers to the East Arm Wharf in Darwin and empty containers returning to Darwin and Katherine for the next loads. As this total varies from the indicative incoming task there is likely to be some balancing of containers in line with the month by month task. This variance is minor (two containers per week) and is not likely to alter the general level of demand or impacts. The outbound task is indicated as:

- Empty quicklime containers – 1,300 TEU Alice Springs to northern Freight Terminal for reloading
- Empty sulfur containers – 3,900 TEU Alice Springs Freight Terminal to Darwin Terminal for reloading of bulk materials
- Empty containers local supply – 50 TEU Alice Springs to Darwin
- Intermodal containers – 3,700 TEU Alice Springs to Darwin Port including:
 - RE intermediate products – 2,000 TEU
 - Empty containers/ISO tanks – 1,700 TEU.

17.4.6 Rail capacity impacts

The GWA container trains operate six days a week to Darwin with return journeys on alternative days. The northern loadings to Darwin are quite high but vary according to days of the week and times of the year. The south bound loadings include a number of empty containers and significantly lower tonnages, and allow capacity to cater for many of the needs of the Nolans Project. Intermodal traffic on the line is continuing to grow and GWA is prepared to employ an additional train on Sundays (or other days) if demand increases.

The Nolans rail freight movements of 17,800 TEU per annum for containerised products would add approximately 1,480 TEU per month to the GWA Intermodal task (an increase of approximately 55-60 %), although half of this increase would be on the lightly used return trip southwards from Darwin. The additional rail freight movements heading north from Alice Springs would supplement some empty container slots on the trains where existing containers between Adelaide and Alice Springs are unloaded. There are also likely to be some opportunities to balance the additional loadings on lesser used daily services and increased train size.

The rail corridor allows for passing loops up to two kilometres long and this allows for increases in the length of trains on days where demand is high. An additional train service could add additional capacity in the range of 200 to 250 TEU per trip or in excess of 20,000 TEU per annum based on a weekly return trip, dependent on load type, weight and rolling stock applied. Dependent on other freight loadings, this may be required to accommodate the level of traffic generated by the Nolans Project.

The rail corridor has ample capacity to increase the current number of services and provides capability to increase the train capacity to meet indicated needs.

GWA as the rail network operator requires no further approvals or changes to add services to meet this demand. In addition, the Nolans Project has the option of consolidating loadings from the bulk sulfur imports on specific lower utilised trains (or even a stand-alone train) if required, reducing the regular consistent demand for intermodal services by 44 per cent. This is an option for further detailed discussion with GWA although consolidation may result in the use of additional containers.

The use of the existing rail freight services will not impede the availability of this service for other customers or create a situation of capacity overload on the line. Rather, support for the efficiency of the existing services and the provision of demand which may at some point drive an additional service on a rail corridor with available capacity.

Alignment with road transport

The GWA intermodal trains currently include capacity for a range of ISO and domestic rail based containers and ISO tanks aligned to the needs of the Nolans Project, ensuring that relevant lifting equipment is in place at all locations and all necessary safety and management processes are already in place.

The Darwin Terminal at Berrimah does not currently load bulk materials into containers as a separate service, however, GWA have indicated they are prepared to develop a facility for this need. This enables direct transfer of loaded containers to intermodal trains to Alice Springs. The Nolans transport task will add to the current throughput at some locations but should not impact the needs or practices in terminals and on train.

Loading of quicklime containers at Katherine and unloading on the return journey is directly aligned to current practices and should not alter current operations at this terminal.

17.5 Summary

The Nolans site is located 135 km north-northwest of Alice Springs and approximately 10 km to the west of the Stuart Highway at Aileron Station, NT. Access to the site will be restricted to authorised commercial vehicles only, via a site access road connecting with the Stuart Highway approximately 5 km south of Aileron Roadhouse.

The site access alignment currently exists as an unsealed track, which will be upgraded to a two lane two way sealed road during the construction phase of the project. Project consumables and REO products will be imported and exported respectively from/to Darwin via Alice Springs, using the Darwin to Adelaide railway and the Stuart Highway.

Based on the quantity of consumables required to be imported, the trip generation of the site is expected to be an average of 26 daily one-way-trips. The forecast total daily generation of 26 vehicles and peak hour generation of 16 vehicles indicate that operations at the site are likely to result in low impacts on the existing road network.

An assessment of the requirements for the intersection of the site access road with the Stuart Highway indicates that basic auxiliary left/right treatments would be sufficient from a traffic capacity perspective. However, it is considered that the open speed limit on this section of the highway warrants a channelised treatment from the Stuart Highway into the site access road to improve road safety.

It is concluded that the Nolans Project will have minimal impacts on the existing road network (including on the road pavement and the ability of the public to access essential services). No upgrades or modifications are required to support the Nolans development, aside from the upgrade of the site access intersection with the Stuart Highway.

It is further concluded that the rail transport task will not adversely impact capacity on the Alice Springs to Darwin rail freight line, nor will it impede the availability of existing services to other users.