# Appendix F

Traffic Impact Assessment Report

Powerlink Queensland

# Meandu Mine Transmission Line Relocation Project

## Traffic Impact Assessment

November 2022

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# Meandu Mine Transmission Line Relocation Project Traffic Impact Assessment

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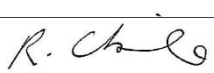
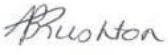
| Reviewed by: | Rachael Christie | 25/11/2022 |  |
| Approved by: | Allison Rushton | 25/11/2022 |  |

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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# Abbreviations

| | |
|---|---|
| AADT | Average Annual Daily Traffic |
| AUL | Auxiliary Left Turn |
| AUR | Auxiliary Right Turn |
| CHR | Channelised Right Turn |
| DOS | Degree of Saturation |
| ESA | Equivalent Standard Axles |
| EWP | Elevated Working Platform |
| GTIA | Guide to Traffic Impact Assessment |
| HV | Heavy Vehicle |
| km | Kilometre |
| LOS | Level of Service |
| MID | Ministerial Infrastructure Designation |
| NB | Northbound |
| SAR | Standard Axle Repetition |
| SCR | State Controlled Road |
| SB | Southbound |
| TIA | Traffic Impact Assessment |
| TMR | Department of Transport and Main Roads |

# 1 Introduction

## 1.1 Project background

Powerlink Queensland (Powerlink) owns, operates and maintains Queensland's high voltage electricity transmission network as a Transmission Network Service Provider in the national electricity market. A section of Powerlink's high voltage electricity transmission network, approximately 5 kilometres (km) of Feeder 831 (the transmission line between the Tarong and Middle Ridge substations), is proposed to be relocated (The Project). The preferred alignment will be located further to the east of the existing Feeder 831 transmission line, crossing sections of the Yarraman State Forest.

The Project is located (as shown in Figure 1.1) within the Darling Downs region, approximately 130 km north-west of Brisbane, between the regional centres of Yarraman and Nanango. The Project extent is shown in Figure 1.2.

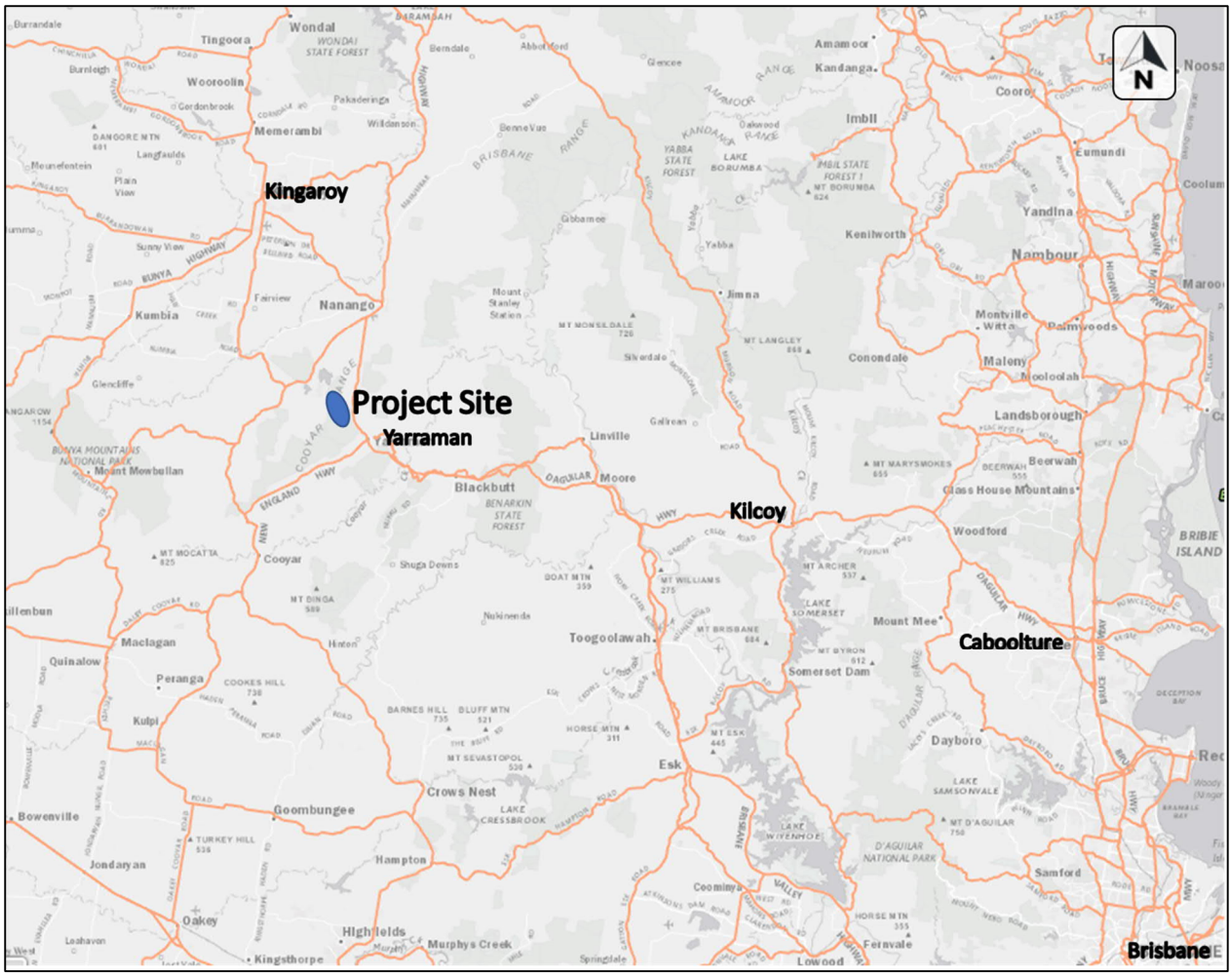


Figure 1.1 Project location (source Queensland Globe)

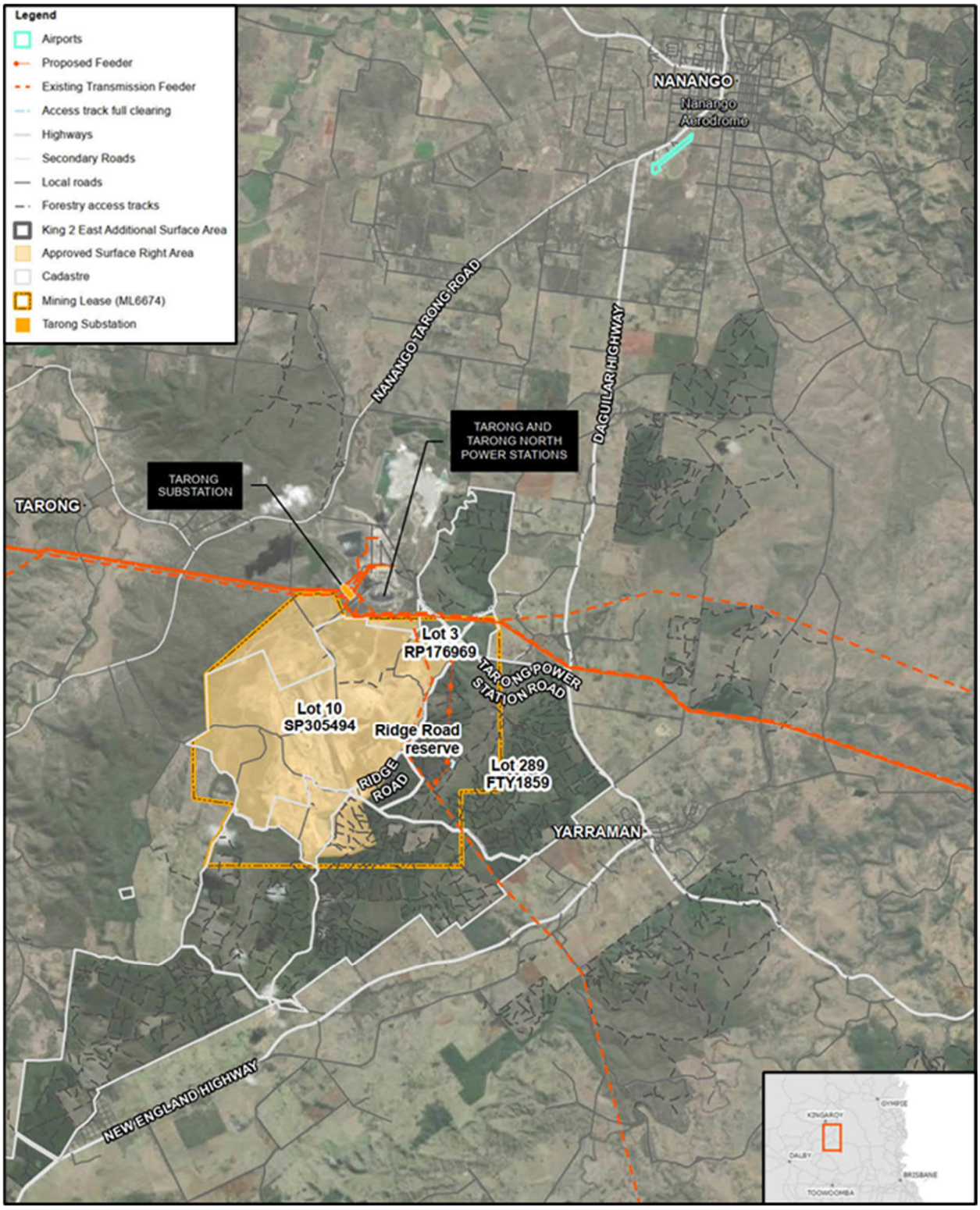


Figure 1.2 Project extent and surrounds

## 1.2 Purpose of this report

This report presents the Traffic Impact Assessment (TIA) undertaken to investigate the impacts of the transmission line construction and operation on the surrounding State-controlled road (SCR) network. The report considers:

- Traffic generating characteristics of The Project (construction and operation phases)
- Existing transport network environment on access routes to The Project site including:
  - key roads and intersections and associated traffic demands
  - crash history
  - heavy vehicle routes
  - public and active transport.
- Anticipated impacts of The Project (construction and operation phases) on the surrounding SCR network including:
  - link capacity and pavement damage
  - intersection delay
  - heavy vehicle routes
  - public and active transport networks
  - road safety.

### *1.2.1 Legislative framework*

Approval for The Project is being sought via the Ministerial Infrastructure Designation Process (MID) under the *Planning Act 2016* (Planning Act). Infrastructure Designation is a planning process that allows the Minister to designate premises for a type of infrastructure. The Infrastructure Designation will affirm The Project as a site for electricity operating works and provide a streamlined, considered whole-of-government response which avoids the need for later approvals under the Planning Act. As detailed in the *Guide to Traffic Impact Assessment* (GTIA) (TMR 2018) this TIA will provide support to the designation of this infrastructure.

## 1.3 Methodology

This TIA follows the methodology detailed in the GTIA which provides information about the processes to assess traffic-related impacts created by a proposed development, such as construction and operation of The Project in this case. In line with the GTIA, the following methodology has been adopted:

- Review of transport networks to establish existing conditions (i.e., no project)
- Site visit (on 13 July 2022) to observe existing SCR conditions and traffic operations
- Identification of access routes to The Project site
- Estimation of the traffic generation for the construction and operation phases of The Project and assignment of this traffic to the identified access routes
- Assessment of impacts resulting from The Project-generated traffic to the SCR network in relation to:
  - road link capacity
  - intersection operation
  - pavement damage

  - other transport facilities
  - road safety
- Identification of mitigations measures.

### 1.3.1 Reference materials and supporting data sources

The reference resources and datasets listed below were used to guide and inform this assessment:

- *Guide to Traffic Impact Assessment* (TMR 2018)
- *Guide to Traffic Impact Assessment Practise Note: Pavement Impact Assessment* (TMR 2018)
- *Guide to Traffic Impact Assessment Case Studies* (TMR 2017)
- *Austroads Guide to Traffic Management: Part 6 – Intersections, Interchanges and Crossings Management* (Austroads 2020)
- traffic survey of Tarong Power Station Road / Ridge Road undertaken by ATC Engineers for Saturday 14, Tuesday 17 and Wednesday 18 September 2019 between 7:30 AM and 4:30 PM
- TMR Annual Average Daily Traffic (AADT) traffic census data (2020)
- Queensland Globe:
  - Heavy vehicle routes
  - Principal cycle routes
  - Crash data
- The Project construction and operations activities and traffic generation (provided by Powerlink).

# 2 Development Profile

## 2.1 Project description

The Project activities consist of the construction (and subsequent maintenance) of a transmission line followed by the demolition of the existing Feeder 831 transmission line being replaced. Details of the construction and operation of The Project are presented in the following sections.

### *2.1.1 Construction*

The Project construction will occur across three stages:

1. Clearing and access of the alternative transmission line corridor
2. Construction (15 sites):
    a. Foundations
    b. Assembly and erection of transmission line structures
    c. Stringing
3. Demolition - redundant asset decommissioning (10 sites).

These construction (and demolition) activities are expected to occur over a nine-month period from January 2023 to September 2023. Key construction milestones are shown in Table 2.1. Construction activities are proposed to occur six days a week (Monday to Saturday) over a 12-hour day (6:30 AM to 6:30 PM).

Table 2.1 Indicative Project construction milestones

| Construction Stage | Work element | Milestone Date |
|---|---|---|
| Clearing and access construction | Site access works | February 2023 |
| Transmission line construction | Foundations | March 2023 |
| | Assembly and erection of transmission line structures | April 2023 |
| | Stringing | July 2023 |
| Transmission line demolition | Redundant asset decommissioning | September 2023 |

### *2.1.2 Operation*

After completion of construction and commissioning of the transmission line, the amount of activity associated with The Project decreases substantially. During operation, normal practice will be for maintenance staff to carry out regular scheduled inspections of the line, easement and access tracks. These inspections (patrols) are undertaken either by vehicle or helicopter.

In addition, upkeep of access tracks will be required to ensure that vehicular access to structure sites is maintained for inspections and maintenance. Further unscheduled access may be required periodically to perform such activities as emergency repairs.

## 2.2 Access routes

For The Project construction and operations, access to each transmission line structure location will be either from existing forestry plantations tracks or new purpose cleared tracks. These tracks will be accessed via Ridge Road > Tarong Power Station Road > D'Aguilar Highway.

### *2.2.1 Construction*

Workers are expected to be locally sourced and/or accommodated. For the purpose of this assessment the following origins and proportions have been assumed:

- From / to the north (via D'Aguilar Highway)
  - Nanango – 25%
  - Kingaroy – 25%
- From / to the south (via D'Aguilar Highway)
  - Yarraman – 50%.

These trips are expected to occur around workday start and end times with peak hour periods of 6:00 to 7:00 AM and 6:00 to 7:00 PM.

All heavy vehicles (plant, equipment and deliveries) are expected to originate from a variety of locations in the south (Brisbane) and access The Project site via the D'Aguilar Highway. These construction access routes are shown in Figure 2.1.

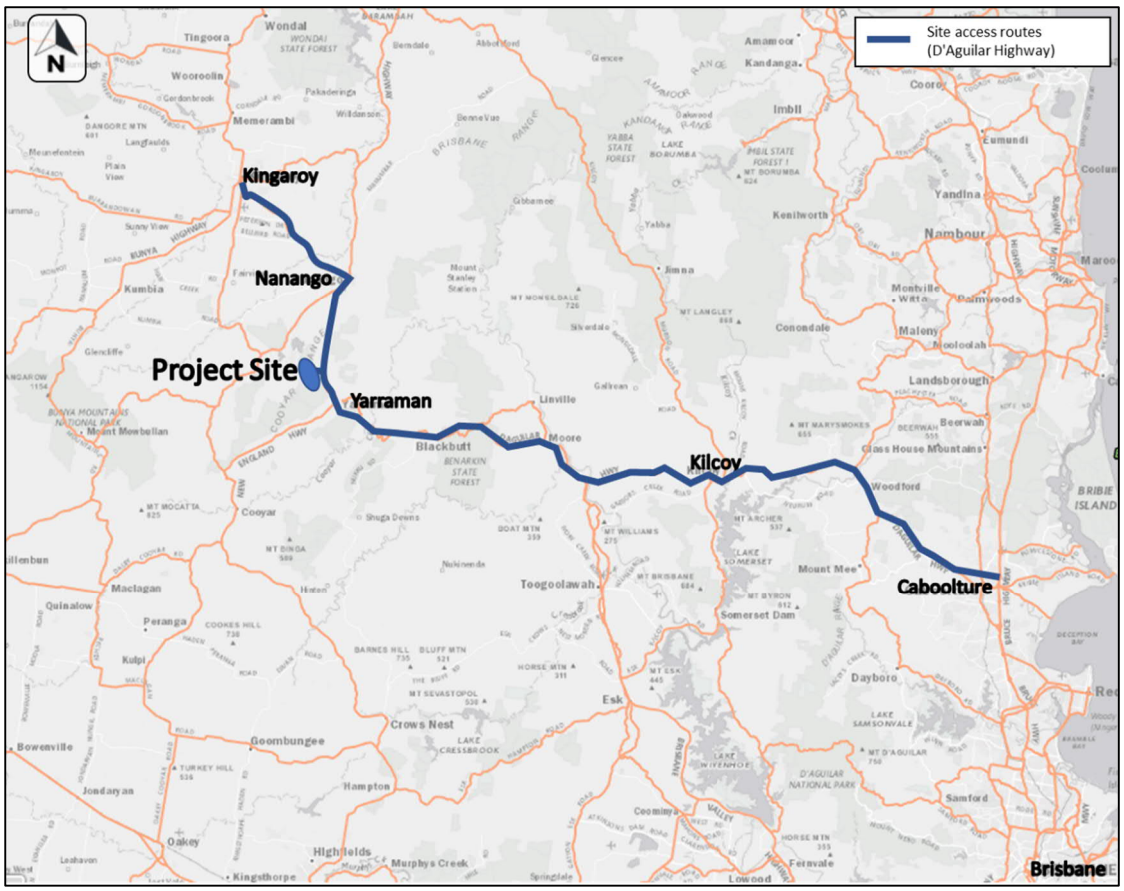


Figure 2.1 Project access routes (D'Aguilar Highway)

### 2.2.2 *Operation*

Access for inspections and maintenance activities are expected to have local origins in the surrounding regional townships, and operational workforce and heavy vehicles will access The Project site by the same routes as those detailed for construction.

## 2.3 Traffic generation

### 2.3.1 *Construction*

#### 2.3.1.1 Workforce

The anticipated peak construction workforce will be approximately 45 persons (an average of 25 persons), occurring over a one to two month peak period during the transmission line construction stage. Accommodation camps for the Project workforce are not proposed rather the use of local workers, or if required, accommodation needs being met in nearby regional towns (i.e. Yarraman, Nanango, Kingaroy).

Construction personnel will travel to The Project site in private vehicles generating light vehicle trips for worker movements during each stage of the project as detailed in Table 2.2 below. For the purposes of this assessment a car occupancy of 1.2 people per vehicle has been assumed. Worker vehicle trips "to" the site are expected to occur between 6:00 and 7:00 AM and "from" the site between 6:00 and 7:00 PM.

Table 2.2 Workforce numbers and generated trips by project stage

| Construction Stage | Workforce (Maximum) | Peak Daily Return Trips (in and out) |
|---|---|---|
| Clearing and access construction | 8 | 7 |
| Transmission line construction | 45 | 38 |
| Transmission line demolition | 18 | 15 |

#### 2.3.1.2 Heavy vehicles

All of The Project related heavy vehicle (HV) trips are assumed to have originated from the south (Brisbane) and access the construction site via the D'Aguilar Highway (constituting an assessment of worst-case distribution). It is noted that if some HV trips do originate from the north, this would reduce the potential impacts of heavy vehicles in relation to assessed link capacity and pavement impacts. Expected HV fleet composition and trip generation for each of The Project construction stages for the northbound (NB) and southbound (SB) directions is detailed in Table 2.3 to Table 2.5 with the total HV trips generated shown in Table 2.6. For the calculation of The Project related SARs (Standard Axle Repetitions) the D'Aguilar Highway has been assumed to have a granular pavement and therefore the SAR4 damage value has been used to convert Equivalent Standard Axles (ESAs) to SARs as per Table 1 of the *Guide to Traffic Impact Assessment Practise Note: Pavement Impact Assessment* shown in Figure 2.2.

| Pavement type | | TMR pavement type | Type of damage | Load damage exponent | Damage unit |
|---|---|---|---|---|---|
| Granular pavement with thin bituminous surfacing | Granular pavement (GN) | Sprayed seal over flexible pavement, including cement modified and lime stabilised layer types C4 and C5 | Overall pavement damage | 4 | ESA / SAR4 |

Figure 2.2 Pavement types and load damage exponent

Table 2.3 Clearing and access construction stage generated heavy vehicles

| Vehicle | Class - SAR4s (Loaded/Unloaded) | Comments | Stage Total Return Trips (in & out) | Stage Total SAR4s in (NB) | Stage Total SAR4s Out (SB) |
|---|---|---|---|---|---|
| Water Truck | Class - 4: SAR4s 3.57/0.5 | Four unloaded vehicles will enter The Project site at the beginning of this stage and remain in the construction corridor using internal site dam for water collection and exit at the end of this stage. | 4 | 2 | 2 |
| Single Tipper 12m3 | Class - 4: SAR4s 3.57/0.5 | 20 loads per site (15 sites) - 1/2 will be external trip fill/spoil movements, 1/2 internal corridor cut/fill movements. | 150 | 305 | 305 |
| Low loader (float) delivering Plant | Class - 6: SAR4s 4.43/0.6 | Ten vehicles will enter and exit The Project site at the beginning and end of this stage. | 22 | 111 | 111 |
| | | **Total** | **176** | **418** | **418** |

Table 2.4 Transmission line construction stage generated heavy vehicles

| Vehicle | Class - SAR4s (Loaded/Unloaded) | Comments | Stage Total Return Trips (in & out) | Stage Total SAR4s in (NB) | Stage Total SAR4s Out (SB) |
|---|---|---|---|---|---|
| 8x8 Truck | Class - 5: SAR4s 4.09/0.41 | Ten vehicles will enter The Project site at the beginning of the transmission line construction stage and exit at the end of the demolition stage. | 10 | 41 | 0 |
| SR 30 Soilmec or Similar | Class - 8: SAR4s 5.61/0.52 | One vehicle (assumed five axle articulated truck) will enter The Project site at the beginning of the transmission line construction stage and exit at the end this stage. | 1 | 6 | 6 |
| Bobcat | Class - 6: SAR4s 4.43/0.6 | Two vehicles (assumed three axle trucks) will enter The Project site at the beginning of this stage and exit at the end of the demolition stage. | 4 | 20 | |

| Vehicle | Class - SAR4s (Loaded/Unloaded) | Comments | Stage Total Return Trips (in & out) | Stage Total SAR4s in (NB) | Stage Total SAR4s Out (SB) |
|---|---|---|---|---|---|
| Telehandler | Class - 8: SAR4s 5.61/0.52 | One vehicle (assumed five axle articulated truck) will enter The Project site at the beginning of this stage and exit at the end this stage. | 1 | 6 | 6 |
| Concrete Agitator | Class - 5: SAR4s 4.09/0.46 | Six vehicles to each of the 15 tower sites. | 90 | 368 | 41 |
| 50T Crane | Class - 10: SAR4s 6.3/0.53 | One vehicle (assumed B Double equivalent) trip in and out to each of the 15 tower sites. | 15 | 95 | 95 |
| 130T Crane | Class - 10: SAR4s 6.3/0.53 | One vehicle (assumed B Double equivalent) trip in and out to each of the 15 tower sites. | 15 | 95 | 95 |
| 8x8 mounted EWP | Class - 5: SAR4s 4.09/0.41 | Four vehicles (assumed four axle trucks loaded) trip in and out to each of the 15 tower sites. | 60 | 245 | 245 |
| 4x4 Hino Winch Truck | Class - 3: SAR4s 2.98/0.54 | Two vehicles (assumed two axle trucks loaded) will enter The Project site at the beginning of the transmission line construction stage and exit at the end of the demolition stage. | 2 | 6 | 6 |
| Franna | Class - 5: SAR4s 4.09/0.46 | One vehicle (assumed four axle trucks loaded) trip in and out to each of the 15 tower sites. | 15 | 61 | 61 |
| Semi low loader - | Class - 6: SAR4s 4.43/0.6 | Five vehicles (assumed three axle articulated truck) in loaded and out unloaded. | 5 | 22 | 3 |
| Semi low loader | Class - 6: SAR4s 4.43/0.6 | Conductor delivery: five vehicles (assumed three axle articulated truck) in loaded and out unloaded. | 5 | 22 | 3 |
| Semi low loader | Class - 6: SAR4s 4.43/0.6 | Line materials delivery: Four vehicles (assumed three axle articulated truck) in loaded and out unloaded. | 4 | 18 | 2 |
| | | **Total** | **227** | **1,005** | **564** |

Table 2.5 Demolition stage generated heavy vehicles

| Vehicle | Class / SAR4s (Loaded/Unloaded) | Comments | Stage Total Return Trips (in & out) | Stage Total SAR4s in (NB) | Stage Total SAR4s Out (SB) |
|---|---|---|---|---|---|
| 8x8 Truck | Class - 5: SAR4s 4.09/0.41 | Same ten 8x8 trucks as transmission construction stage – vehicles only exit site at end of stage. | 10 | 0 | 41 |
| 4x4 Hino Winch Truck | Class - 5: SAR4s 4.09/0.41 | Same two Hino Winch as transmission construction stage – vehicles only exit site at end of stage. | 2 | 0 | 8 |
| 8x8 mounted EWP | Class - 5: SAR4s 4.09/0.41 | Four vehicles (assumed four axle trucks loaded) trip in and out to each of the 10 tower sites. | 60 | 245 | 245 |
| Excavator | Class - 8: SAR4s 5.61/0.52 | One vehicle (assumed five axle articulated truck) in loaded and out unloaded at start of stage and in unloaded and out loaded at end of stage. | 2 | 12 | 12 |
| Excavator Shearer | Class - 8: SAR4s 5.61/0.52 | One vehicle (assumed five axle articulated truck) in loaded and out unloaded at start of stage and in unloaded and out loaded at end of stage. | 1 | 6 | 6 |
| Tip Truck | Class - 4: SAR4s 3.57/0.5 | One truck load (in unloaded, out loaded) to remove tower steel from each of the 10 tower sites | 10 | 5 | 36 |
| 50T Crane | Class - 10: SAR4s 6.3/0.53 | One vehicle (assumed B Double equivalent loaded each way) trip in and out to each of the 10 tower sites. | 10 | 63 | 63 |
| 130T Crane | Class - 10: SAR4s 6.3/0.53 | One vehicle (assumed B Double equivalent loaded each way) trip in and out to each of the 10 tower sites. | 10 | 68 | 68 |
| Bobcat | Class - 6: SAR4s 4.43/0.6 | Same two Bobcats as transmission construction stage – vehicles only exit site at end of stage. | 4 | 0 | 20 |
| | | **Total** | **109** | **400** | **500** |

Table 2.6 All stages generated SAR4s

| Stage | Total Return Trips (in & out) | Stage SAR4s in (NB) | Stage SAR4s Out (SB) |
|---|---|---|---|
| Clearing and Access | 176 | 418 | 418 |
| Construction | 227 | 1,005 | 564 |
| Demolition | 109 | 400 | 500 |
| **Total** | **512** | **1,823** | **1,482** |

An estimate of the highest expected day and peak hour heavy vehicle movements has been made as shown in Table 2.7. This peak heavy vehicle generation is expected to occur during the transmission line construction stage (which also has the highest expected workforce numbers) of The Project. The estimate is based on all required plant, all off road vehicles and a single sites concrete delivery arriving in a single day. This estimation is expected to be higher than actual providing a "worst case" scenario for assessment, as it is unlikely that concrete pouring would occur simultaneous as elevated working platforms (EWP) arrivals. The peak hour factor for The Project related heavy vehicles has been assumed at 20% of daily, which is considered conservative in relation to a 12-hour workday.

Table 2.7 Highest day / peak hour HV trips

| Vehicle | Movements in | Movements out |
|---|---|---|
| 8x8 Truck | 5 | 0 |
| SR 30 Soilmec or Similar | 1 | 1 |
| Bobcat | 2 | 2 |
| Telehandler | 1 | 1 |
| Concrete Agitator | 6 | 6 |
| 50T Crane | 1 | 0 |
| 130T Crane | 1 | 0 |
| 8x8 mounted EWP | 4 | 0 |
| 4x4 Hino Winch Truck | 2 | 0 |
| Franna | 1 | 1 |
| **Total** | **24** | **11** |
| **Peak hour (assumed 20% of Daily)** | **5** | **2** |

### *2.3.2 Operations*

The operation of The Project does not require any workers to be present on-site on a regular basis. Operational traffic will be generated by periodic maintenance of the transmission line and access easement. The expected trips to The Project site during operation of the transmission line have been quantified in Table 2.8.

Table 2.8 Operation activities traffic generation

| Operational element | Frequency | Vehicles per visit | Vehicles per year |
|---|---|---|---|
| Aerial inspection | 1 aerial inspection per year | N/A | N/A |
| Transmission line tower maintenance | 1 on-ground visit per year | 2 | 2 |
| Easement & access vegetation maintenance | 1 visit per 2 years | 2 | 1 |

# 3 Existing Environment

The existing SCR transport networks in the vicinity of The Project site expected to support movements of The Project related construction and operations vehicles are detailed in the following section. This information is based on publicly available data, supplemented by observations made during the site visit undertaken on 13 July 2022.

## 3.1 Road network

### *3.1.1 Key road links*

**D'Aguilar Highway (40A-C):** The D'Aguilar Highway is a state-controlled highway extending from Caboolture in the southeast to Kingaroy in the north-west. It is typically a two-lane formation (with passing lanes provided in some locations) with sealed shoulders and edge line marking. The D'Aguilar Highway is primarily located in a rural environment with occasional urban areas (normally small towns). It predominantly has a posted speed limit of 100km/hr with speed reductions in some locations due to road geometry and urban centres. Indicative images of the D'Aguilar Highway corridor in the vicinity of The Project are shown in Figure 3.1 and Figure 3.2.

Figure 3.1 D'Aguilar Highway between Yarraman and Tarong Power Station Road facing north

Figure 3.2 D'Aguilar Highway between Nanango and Tarong Power Station Road facing north (source: Google Maps)

**Tarong Power Station Road:** Tarong Power Station Road is privately owned and maintained with no general public access permitted. Tarong Power Station Road provides a secondary access to the Tarong Power Station and to the surrounding forestry plantations.

As Tarong Power Station Road is not a SCR, potential impacts resulting from The Project construction and operational activities have not been assessed within this TIA. The intersection with the D'Aguilar Highway has been included to identify any impacts to the D'Aguilar Highway.

**Ridge Road:** Ridge Road is a Council owned road jointly managed by Toowoomba Regional Council and South Burnett Regional Council, with the local government area boundary located at the centre of the Ridge Road reserve. Ridge Road provides a north-east to south-west connection between the Tarong Power Station Road and Tarong-Yarraman Road (via an unnamed section of road). Whilst providing a link between these two roads, Ridge Road has very low utilisation and is used primarily for access to the State Forest for HQPlantations and recreational users. A 3-day traffic survey of the Tarong Power Station Road and Ridge Road intersection, undertaken by ATC Engineers on Saturday 14, Tuesday 17 and Wednesday 18 September 2019 (between 7:30 AM and 4:30 PM each day), observed a total of three vehicles using Ridge Road during this period, one of which was a Forestry vehicle.

It is understood that with the proposed future extension of the Meandu Mine surface rights area, a section of the existing Ridge Road corridor is proposed to be closed. Stanwell, who own and operate the Tarong Power Station and Meandu Mine have been in discussions with Council regarding the future status of Ridge Road.

As Ridge Road is not a SCR, potential impacts resulting from The Project construction and operational activities have not been assessed within this TIA.

### *3.1.2 Key intersections*

The key intersection expected to be used by traffic generated by The Project is D'Aguilar Highway / Tarong Power Station Road located approximately halfway between Yarraman and Nanango. The current configuration of the intersection is a priority-controlled T-intersection. The D'Aguilar Highway (major road) has a single through lane in each direction, with a 120 m Auxiliary Left Turn (AUL) lane on the southern approach and an Auxiliary Right Turn (AUR) arrangement on the northern approach. Tarong Power Station Road has a single approach and departure lane however has sufficient room to allow both a left and right turning vehicle to approach and queue at the stop line. This intersection is located approximately at chainage 4.50 on 40C - D'Aguilar Highway. This intersection is shown in Figure 3.3 and Figure 3.4.


Figure 3.3 D’Aguilar Highway / Tarong Power Station Road intersection (source: Google Earth)

Figure 3.4 D’Aguilar Highway / Tarong Power Station Road intersection (facing south)

### *3.1.3 Traffic demands*

#### 3.1.3.1 Link

AADT observed traffic volumes and HV percentages (TMR 2020 Traffic Census) for the D'Aguilar Highway are shown in Table 3.1 for the road segments between Kingaroy and Kilcoy for the Gazettal (G), Anti-Gazettal (A) and Both (B) directions. 2020 Traffic Census data has used as it is the most recent census year containing AADT segment reports. Due to the changing nature of the D'Aguilar Highway as it enters into more urban and heavily trafficked area east of Kilcoy, the transport environment considered in this assessment has been limited to this area.

Table 3.1 D'Aguilar Highway AADT Traffic volumes (2020)

| Site | Road (section) | Chainage (km) | Volumes (AADT) | | | HV % | | |
|---|---|---|---|---|---|---|---|---|
| | | | G | A | B | G | A | B |
| 20536 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 21.67km - 42.97km | 2,237 | 2,240 | 4,477 | 18% | 8% | 14% |
| 30092 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 17.65km - 21.67km | 2,546 | 2,610 | 5,156 | 18% | 8% | 14% |
| 30032 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 4.72km - 17.65km | 1,895 | 1,975 | 3,870 | 18% | 8% | 14% |
| 160028 | 40C - D'Aguilar Highway (Yarraman - Kingaroy | 0.00 km - 4.72km | 1,955 | 1,915 | 3,870 | 18% | 8% | 14% |
| 160044 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 58.19km - 68.76km | 1,968 | 1,957 | 3,925 | 18% | 8% | 14% |
| 30091 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 54.58km - 58.19km | 1,944 | 1,936 | 3,880 | 18% | 8% | 14% |
| 160050 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 45.34km – 54.58km | 1,781 | 1,586 | 3,367 | 18% | 8% | 14% |
| 30090 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 32.65km - 45.3km | 1,637 | 1,595 | 3,232 | 18% | 8% | 14% |
| 30009 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 23.46km - 32.65km | 1,823 | 1,840 | 3,663 | 18% | 8% | 14% |
| 30043 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 10.55km - 23.46km | 1,875 | 1,842 | 3,717 | 18% | 8% | 14% |
| 20534 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 6.48km - 10.55km | 1,829 | 1,809 | 3,638 | 18% | 8% | 14% |
| 20533 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 2.58km - 6.48km | 1,922 | 1,918 | 3,840 | 18% | 8% | 14% |
| 20053 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 0.00 km - 2.58km | 3,349 | 3,348 | 6,697 | 18% | 8% | 14% |

Hourly flow proportions of AADT traffic flows for a representative section of the D'Aguilar Highway (Site 30032 – 40C - D'Aguilar Highway (Yarraman - Kingaroy)) showing construction peak period percentages are shown in green (AM peak) and blue (PM peak) in Figure 3.5.

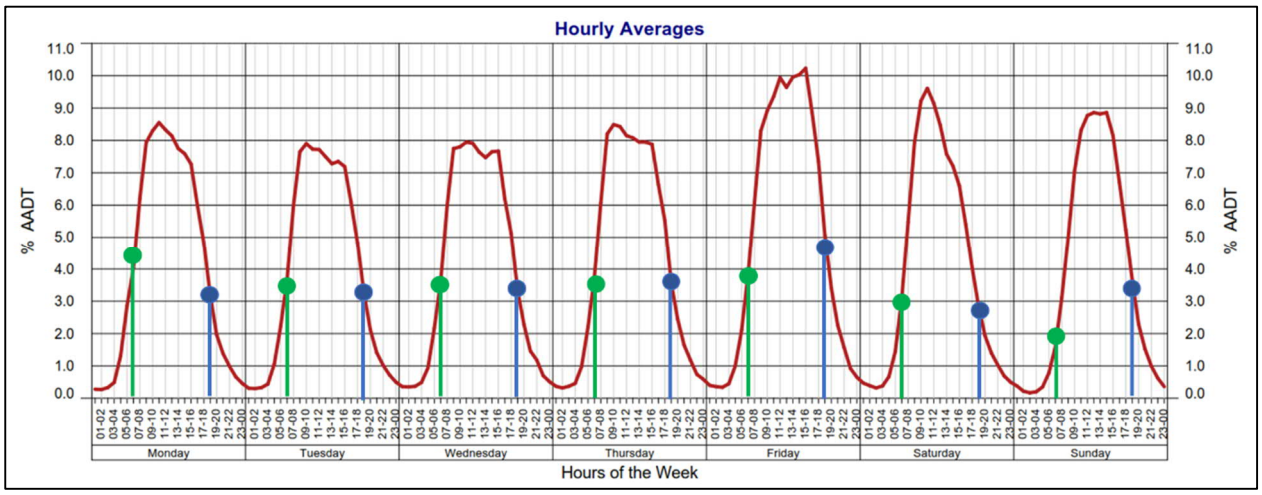


Figure 3.5 Indicative peak period (AM and PM) flow proportions (2020 AADT)

These flow proportions illustrate that during the expected AM and PM project traffic peak periods (6:00-7:00 AM and 6:00-7:00 PM) weekday background traffic flows are typically 3-5% of daily flows. To provide a higher end estimate of hourly traffic flows, a 5% proportion has been adopted for this study. Calculated project peak hour background link volumes on the D'Aguilar Highway are shown in Table 3.2. It is noted that the background peak period occurs during the middle of the day, typically between 10:00 AM and 4:00 PM.

Table 3.2 Project peak hour background traffic volumes (2020)

| Site | Road | Chainage (km) | (6-7 AM and 6-7 PM) background traffic volumes | | |
|---|---|---|---|---|---|
| | | | G | A | B |
| 20536 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 21.67km - 42.97km | 112 | 112 | 224 |
| 30092 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 17.65km - 21.67km | 127 | 131 | 258 |
| 30032 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 4.72km - 17.65km | 95 | 99 | 194 |
| 160028 | 40C - D'Aguilar Highway (Yarraman - Kingaroy | 0.00 km - 4.72km | 98 | 96 | 194 |
| 160044 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 58.19km - 68.76km | 98 | 98 | 196 |
| 30091 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 54.58km - 58.19km | 97 | 97 | 194 |
| 160050 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 45.34km – 54.58km | 89 | 79 | 168 |
| 30090 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 32.65km - 45.3km | 82 | 80 | 162 |
| 30009 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 23.46km - 32.65km | 91 | 92 | 183 |
| 30043 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 10.55km - 23.46km | 94 | 92 | 186 |
| 20534 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 6.48km - 10.55km | 91 | 90 | 182 |
| 20533 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 2.58km - 6.48km | 96 | 96 | 192 |
| 20053 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 0.00 km - 2.58km | 167 | 167 | 335 |

#### 3.1.3.2 Intersection

2020 peak hour intersection turn volumes (6:00-7:00 AM and 6:00-7:00 PM) for the intersection of D'Aguilar Highway / Tarong Power Station Road have been estimated based on:

- 5% of D'Aguilar Highway AADT volumes
- Application of daily HV proportions to the peak hour traffic volumes
- Traffic count data (2019) for the intersection of Tarong Power Station Road / Ridge Road showing traffic volumes (between 7:30AM and 4:30PM) on Tarong Power Station Road of:
  - 6 vehicles eastbound and 5 vehicles westbound on Saturday 14 September
  - 40 vehicles eastbound and 20 vehicles westbound on Tuesday 17 September
  - No vehicles on Wednesday 18 September
- Site observations of traffic flows on Tarong Power Station Road (a single vehicle turning into the road during a half hour period between 10:00 and 10:30 AM)
- Advice from Powerlink regarding traffic flows on Tarong Power Station Road.

The estimated 2020 AM and PM peak hour intersection turn volumes are shown in Figure 3.6.

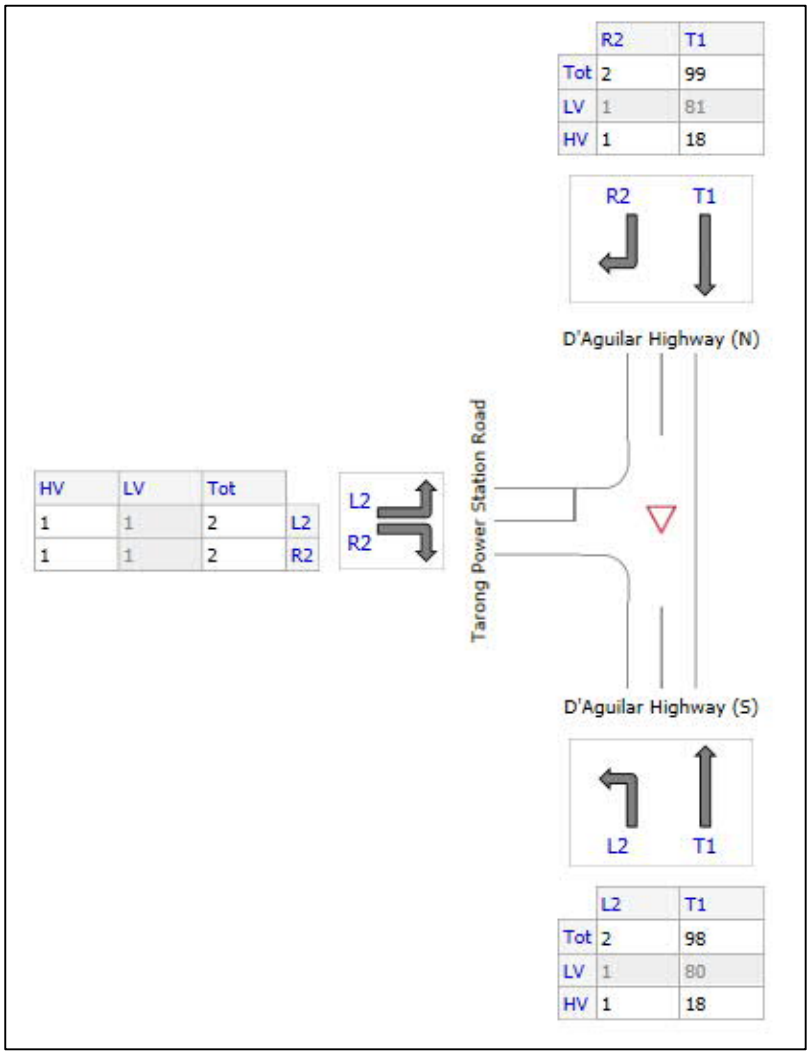


Figure 3.6 Estimated D'Aguilar Highway / Tarong Power Station Road AM and PM peak period intersection turn volumes (2020)

### 3.1.3.3 Growth rates

Historic AADT growth rates on the D'Aguilar Highway for a segment on each road section (taken from the 2020 AADT reports) are shown in Table 3.3.

Table 3.3 Historic growth rates (2020)

| Site | Road | Growth rate | | |
|---|---|---|---|---|
| | | 1 Year | 5 Year | 10 Year |
| 30032 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | -6% | 0% | 1% |
| 160050 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 0% | 1% | 1% |

Based on the above, a growth rate of 1% per annum has been adopted to extrapolate the observed 2020 traffic volumes to the construction year of 2023. It is noted that traffic growth rates may have been impacted in recent years by the advent of COVID, however due to the relatively low AADT volumes and short timeframe until year of construction (2023), the adopted growth rate is not expected to have a material effect on the outcomes of the construction impacts analysis undertaken in this TIA.

### 3.1.4 *Crash statistics*

Crash data for the 5-year period from July 2016 to June 2021 has been extracted from Queensland Globe for the D'Aguilar Highway in the vicinity of the intersection with Tarong Power Station Road and is presented in Figure 3.7 and detailed in Table 3.4.

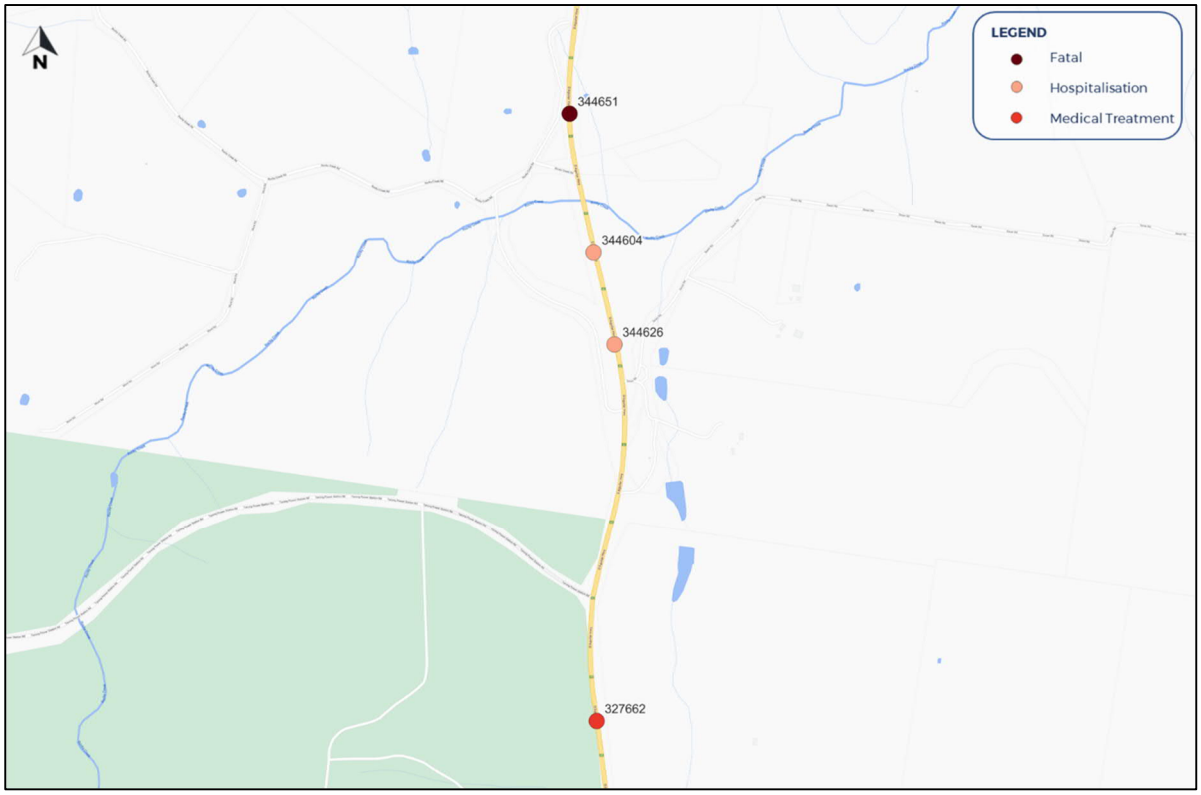


Figure 3.7 Crashes (2016 to 2021 in the vicinity of D'Aguilar Highway / Tarong Power Station Road intersection)

Table 3.4 Crashes (2016 to 2021) in the vicinity of D'Aguilar Highway / Tarong Power Station Road intersection

| Site | Crash Severity | Year of incident | DCA Code | Crash Nature | Number of Vehicles |
|---|---|---|---|---|---|
| 344604 | Medical treatment | 2019 | 703 | Off Path-Straight: Left Off Cway Hit Obj | Single Vehicle |
| 327662 | Hospitalisation | 2019 | 502 | Veh'S Overtaking: Out Of Control | Single Vehicle |
| 344626 | Medical treatment | 2020 | 704 | Off Path-Straight: Right Off Cway Hit Obj | Single Vehicle |
| 344651 | Fatal | 2021 | 803 | Off Path-Curve: Off Cway Rt Bend Hit Obj | Single Vehicle |

## 3.2 Heavy vehicle routes

Heavy vehicle routes in the vicinity of The Project site are shown in Figure 3.8. It is noted that the D'Aguilar Highway is a B25 Heavy Vehicle route between Caboolture and Kingaroy.

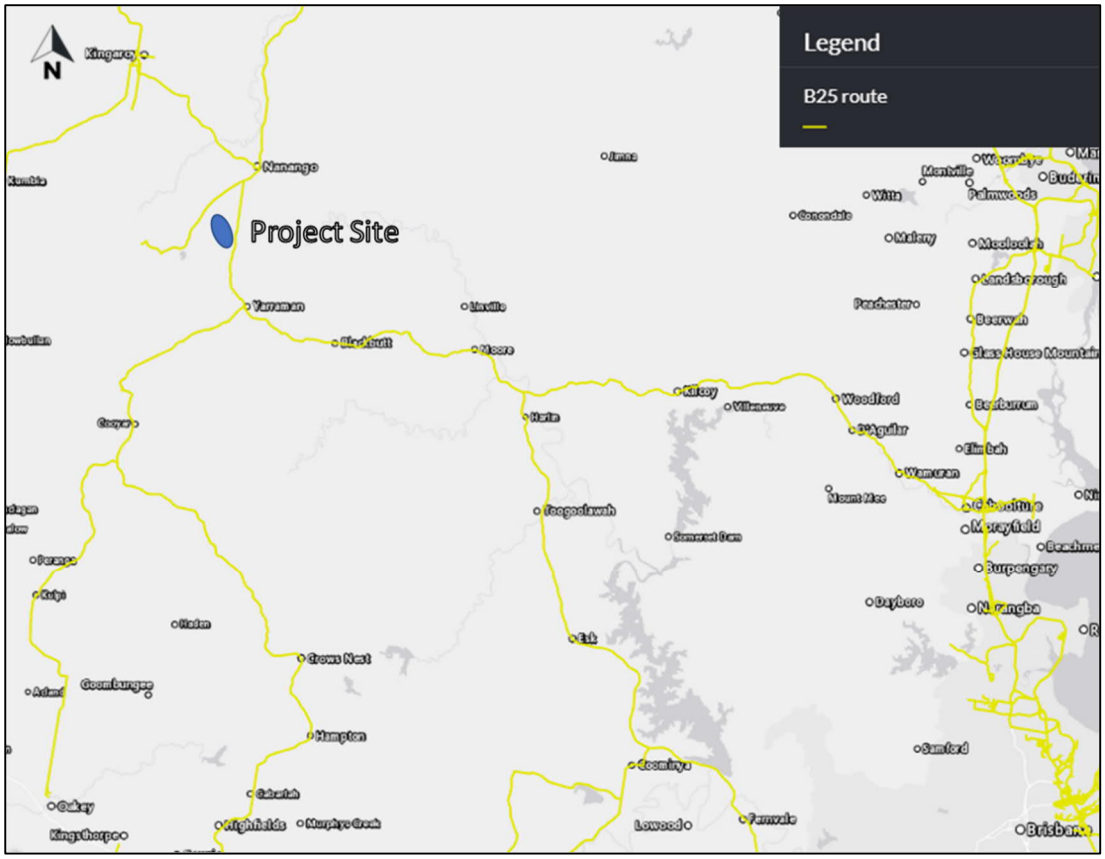


Figure 3.8 Heavy vehicle routes (source: Queensland Globe)

## 3.3 Public transport

There are no public transport services operating in vicinity of The Project site. Private long distance coach services operated by Pursers Coaches travel along the D'Aguilar Highway between Caboolture and Kingaroy at a frequency of three services per week. School bus services, operated by Pursers Coaches operate within the regional townships and surrounding regions and utilise the D'Aguilar Highway including between Nanango and Yarraman. These school bus services operate twice daily at school start and end times.

## 3.4 Active transport

Due to the rural nature of the area, no dedicated active transport infrastructure is located in vicinity of The Project site. Pedestrian and cycle facilities exist within some of the urban areas along the D'Aguilar Highway and existing road lanes or shoulders may be used by cyclists. Roads designated as part of the Principal Cycle network exist outside of the D'Aguilar Highway corridor within the urban centres of:

- Kingaroy
- Nanango
- Kilcoy.

# 4 Impact Assessment

## 4.1 Construction stage

### *4.1.1 Link capacity assessment*

An assessment of the increases to AADT traffic volumes on the D'Aguilar Highway as a result of The Project's construction traffic generation has been undertaken. This analysis represents a worst-case assessment for link capacity increases, investigating a day of peak construction workers (16 trips in and out from both the north and south) and peak heavy vehicles combined (24 trips in and 11 trips out from the south). As per Section 3.1.3.3 a growth rate of 1% has been applied to the observed 2020 AADT traffic volumes to extrapolate to the 2023 construction year.

The results of this analysis are presented in Table 4.1. They show that during the day of The Project's highest generated traffic volumes, development flows do not exceed 5% of the background AADT volumes in either direction on the D'Aguilar Highway (greatest increase of 2.0%). As such, The Project is not considered to have a significant impact on link capacity and no further analysis of link capacity impacts is required.

Table 4.1 Link Capacity Assessment (2023 – Construction year)

| Site | Road Link | Base AADT (G) | Construction Daily volume (G) | % increase (G) | Base AADT (A) | Construction Daily volume (A) | % increase (A) |
|---|---|---|---|---|---|---|---|
| 20536 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 2,237 | 16 | 0.7% | 2,240 | 16 | 0.7% |
| 30092 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 2,546 | 16 | 0.6% | 2,610 | 16 | 0.6% |
| 30032 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 1,895 | 16 | 0.8% | 1,975 | 16 | 0.8% |
| 160028 | 40C - D'Aguilar Highway (Yarraman - Kingaroy | 1,955 | 40 | 2.0% | 1,915 | 27 | 1.4% |
| 160044 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,968 | 24 | 1.2% | 1,957 | 11 | 0.6% |
| 30091 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,944 | 24 | 1.2% | 1,936 | 11 | 0.6% |
| 160050 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,781 | 24 | 1.3% | 1,586 | 11 | 0.7% |
| 30090 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,637 | 24 | 1.5% | 1,595 | 11 | 0.7% |
| 30009 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,823 | 24 | 1.3% | 1,840 | 11 | 0.6% |
| 30043 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,875 | 24 | 1.3% | 1,842 | 11 | 0.6% |
| 20534 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,829 | 24 | 1.3% | 1,809 | 11 | 0.6% |
| 20533 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 1,922 | 24 | 1.2% | 1,918 | 11 | 0.6% |
| 20053 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 3,349 | 24 | 0.7% | 3,348 | 11 | 0.3% |

### 4.1.2 Pavement assessment

An assessment to determine potential pavement impacts resulting from The Project's construction generated HV traffic has been undertaken. The initial assessment identifies any road links where the total development SARs are expected to exceed 5% of the background traffic SARs in either direction on the link's during the year of construction of each stage.

For the purpose of this assessment a SAR4 value has been adopted for the D'Aguilar Highway with an average SAR4 value of 3.2 (as per the *Guide to Traffic Impact Assessment Practise Note: Pavement Impact Assessment* (TMR 2018) "All other roads" SAR4s value) applied to background HV traffic volumes. The results of this analysis are shown in Table 4.2.

This analysis shows that the total SAR4s generated by The Project do not exceed 5% of the construction year background SAR4s in either direction on the D'Aguilar Highway. As such, The Project is not considered to have a significant impact on pavements and no further analysis of pavement impacts is required.

Table 4.2 Pavement impact assessment (2023 – Construction year)

| Site | Road Link | Base Daily HV (G) | Base Yearly SAR4 (G) | Construction Total HV (G) | Construction Total SAR4 (G) | % increase (G) | Base Daily HV (A) | Base Yearly SAR4 (A) | Construction Total HV (A) | Construction Total SAR4 (A) | % increase (A) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20536 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 407 | 475,271 | 0 | 0 | 0.00% | 179 | 209,044 | 512 | 1,482 | 0.00% |
| 30092 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 463 | 540,921 | 0 | 0 | 0.00% | 209 | 243,574 | 512 | 1,482 | 0.00% |
| 30032 | 40C - D'Aguilar Highway (Yarraman - Kingaroy) | 345 | 402,610 | 0 | 0 | 0.00% | 158 | 184,313 | 512 | 1,482 | 0.00% |
| 160028 | 40C - D'Aguilar Highway (Yarraman - Kingaroy | 356 | 415,358 | 512 | 1,823 | 0.44% | 153 | 178,714 | 512 | 1,482 | 0.44% |
| 160044 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 358 | 418,120 | 512 | 1,823 | 0.44% | 156 | 182,634 | 512 | 1,482 | 0.44% |
| 30091 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 354 | 413,021 | 512 | 1,823 | 0.44% | 155 | 180,674 | 512 | 1,482 | 0.44% |
| 160050 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 324 | 378,390 | 512 | 1,823 | 0.48% | 127 | 148,011 | 512 | 1,482 | 0.48% |
| 30090 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 298 | 347,796 | 512 | 1,823 | 0.52% | 127 | 148,851 | 512 | 1,482 | 0.52% |
| 30009 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 332 | 387,313 | 512 | 1,823 | 0.47% | 147 | 171,715 | 512 | 1,482 | 0.47% |
| 30043 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 341 | 398,361 | 512 | 1,823 | 0.46% | 147 | 171,901 | 512 | 1,482 | 0.46% |
| 20534 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 333 | 388,588 | 512 | 1,823 | 0.47% | 145 | 168,822 | 512 | 1,482 | 0.47% |
| 20533 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 350 | 408,347 | 512 | 1,823 | 0.45% | 153 | 178,994 | 512 | 1,482 | 0.45% |
| 20053 | 40B - D'Aguilar Highway (Kilcoy - Yarraman) | 609 | 711,526 | 512 | 1,823 | 0.26% | 268 | 312,446 | 512 | 1,482 | 0.26% |

### *4.1.3 Intersection assessment*

#### 4.1.3.1 Project generated turn volumes

The turn volumes generated by The Project in the AM and PM construction peak periods at the intersection of D'Aguilar Highway / Tarong Power Station Road are shown in Figure 4.1 and Figure 4.2. These volumes represent the combined highest peak hour of traffic generation for both light and heavy vehicles during the construction period.

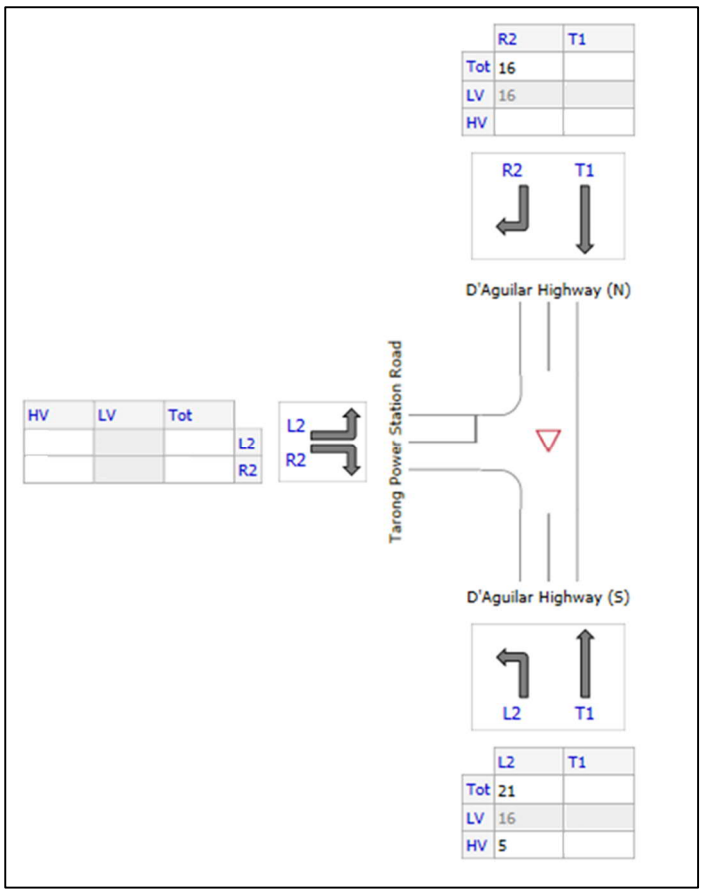


Figure 4.1 AM construction peak Project turn volumes - D'Aguilar Highway / Tarong Power Station Road

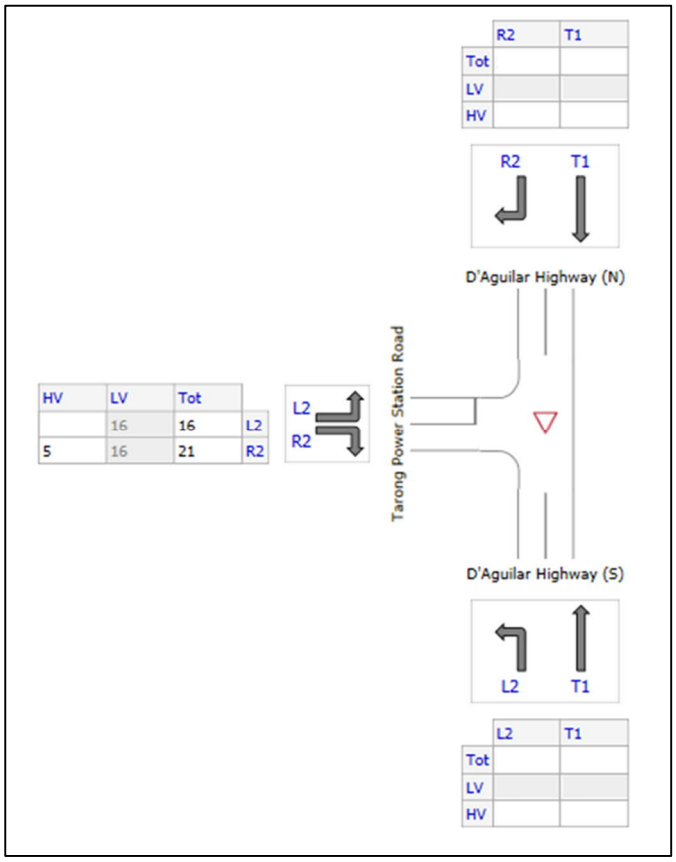


Figure 4.2 PM construction peak Project turn volumes - D'Aguilar Highway / Tarong Power Station Road

#### 4.1.3.2 Turn warrant assessment

A turn warrant assessment has been undertaken in line with Austroads Guide to Traffic Management: Part 6 for the with and without The Project construction traffic. Although this assessment is typically undertaken for new intersections or accesses, it has been developed to assist in understanding suitability of the current intersection configuration to accommodate the additional traffic volumes generate by The Project construction activities. As per Section 3.1.3.3 a growth rate of 1% has been applied to the estimated 2020 peak hour turn volumes to extrapolate to the 2023 construction year.

This assessment has been undertaken for the peak period of traffic generation for both light and heavy vehicles combined for the AM peak period (the construction stage and time period where turn volume into Tarong Power Station Road are the highest). The results of this assessment are shown in Figures Figure 4.3 and Figure 4.4.

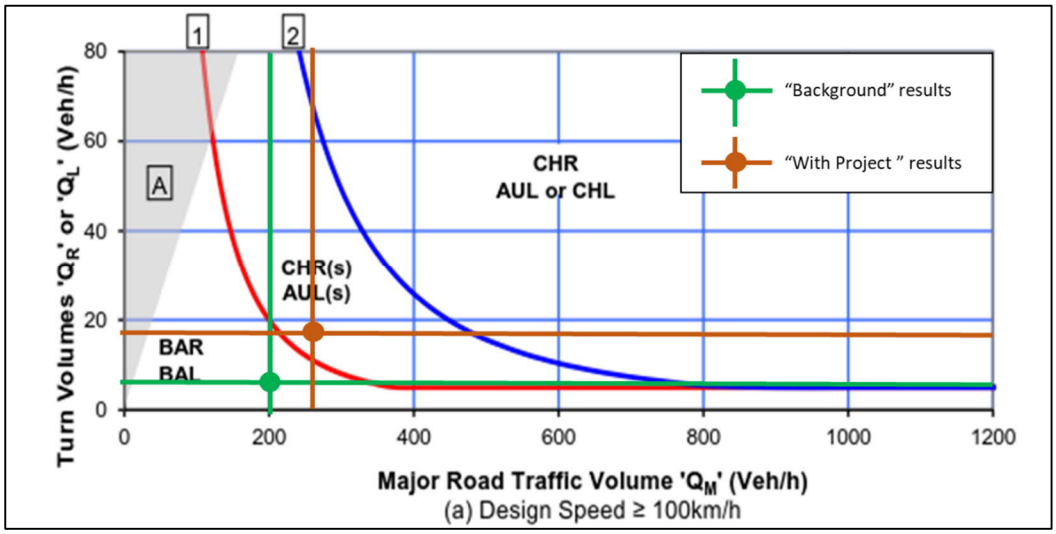


Figure 4.3 Left turn movement Turn Warrant assessment (AM peak)

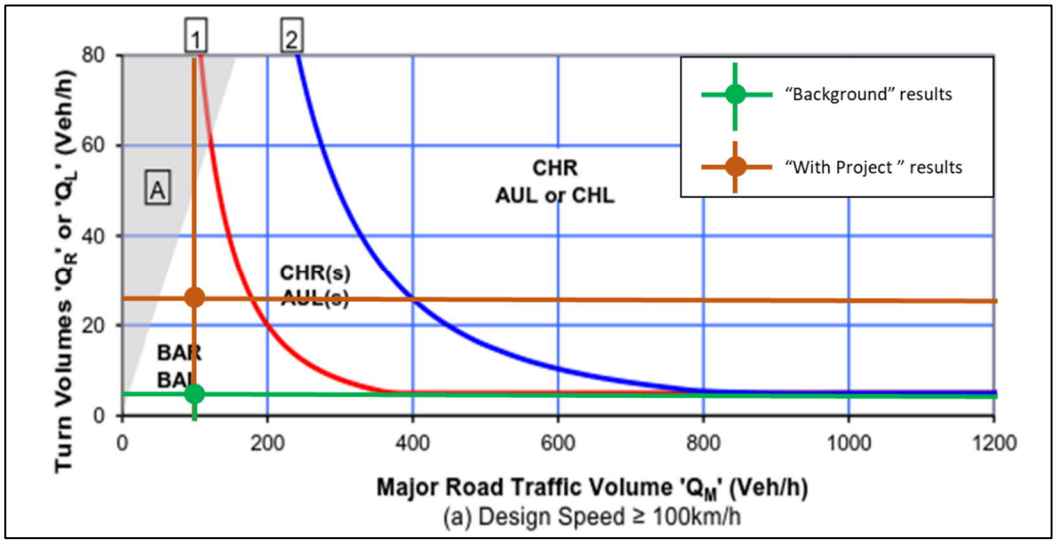


Figure 4.4 Right turn movement Turn Warrant assessment (AM peak)

These results show that with the addition of The Project's peak generated traffic, the current intersection left turn configuration (AUL) is suitable with the inclusion of The Project's peak generated traffic.

The turn warrant assessment for the right turn identified a Channelised Right Turn (CHR) treatment as the recommended intersection configuration based on the intersection turn volumes. The following elements should be considered in relation to this outcome:

- This turn warrant assessment has been made for the highest periods of traffic generation (both works force and HV), outside of this period, typical peak hour construction generated traffic is expected to be approximately half of that that assessed.
- It is only the AM peak period where the assessed volumes of construction related traffic would be making the turn movements into Tarong Power Station Road.
- The additional traffic volumes generated by The Project construction are temporary in nature with construction expected to occur over a nine month period.

Based on the above factors and the results of the intersection operation assessment (see Section 4.1.3.3) and safety assessment (see Section 4.1.5) the current intersection configuration is considered appropriate for the temporary increased traffic volumes during The Project construction activities.

#### 4.1.3.3 Intersection operation

Although The Project construction activities generate relatively low traffic volumes, it is expected to generate an increase of more than 5% of the base traffic for turn movements at the intersection of D'Aguilar Highway / Tarong Power Station Road in the AM and PM peak periods due to the very low (estimated at two vehicles per hour) background volumes.

To assess the resulting impacts, the intersection of D'Aguilar Highway / Tarong Power Station Road has been investigated in the 2023 AM and PM peak periods for without and with construction scenarios. As per Section 3.1.3.3 a growth rate of 1% has been applied to the estimated 2020 peak hour turn volumes to extrapolate to the 2023 construction year. This analysis was undertaken using SIDRA intersection software, reporting on the average delay, Degree of Saturation (DOS), delay-based Level of Service (LOS) and 95$^{th}$ percentile queues by approach.

Delay is defined in SIDRA as:

> *The additional (excess) travel time experienced by a vehicle or pedestrian relative to a base travel time, e.g. the free-flow travel time. Average delay considering all vehicles or pedestrians that are queued and not queued is a common performance measure used for intersection and network analysis.*

Degree of Saturation (DOS) is defined in SIDRA as:

> *The ratio of arrival (demand) flow rate to capacity during a given flow period. Also, known as the volume to capacity ratio (v/c ration), utilisation ratio, utilisation factor and traffic intensity.*

Level of Service (LOS) is defined in SIDRA as:

> *An index of the operational performance of traffic on a given roadway, traffic lane, approach, intersection, route or network, based on measures such as delay and degree of saturation etc. during a given flow period. This provides a quantitative stratification of a performance measure or measures that represent quality of service, measured on an A to F scale, with LOS A representing the best operation conditions from the traveller's perspective and LOS F the worst.*

95$^{th}$ Percentile Queue Length is defined in SIDRA as:

> *The 95$^{th}$ percentile queue length is the value below which 95 percent of all observed cycle queue lengths fall, or 5 per cent of all queue lengths exceed.*

The assessed intersection layout of D'Aguilar Highway / Tarong Power Station Road is shown in Figure 4.5 and the results of this assessment for the without and with construction generated traffic scenarios is shown in Table 4.3 to Table 4.6. Further detailed SIDRA outputs are provided in Attachment B.

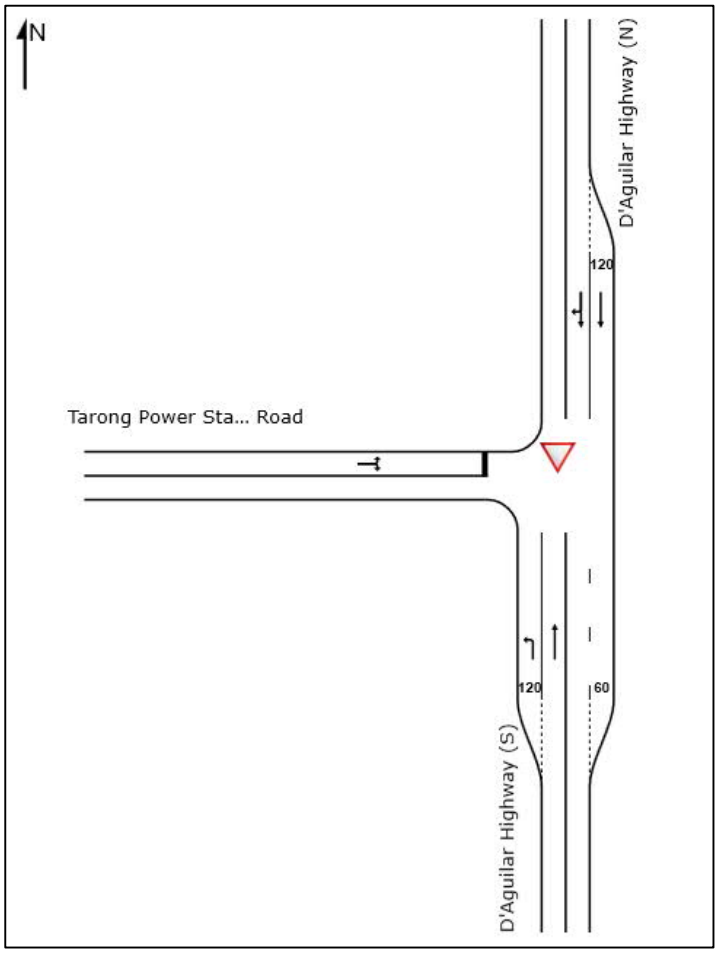


Figure 4.5 SIDRA intersection layout - D'Aguilar Highway / Tarong Power Station Road

The assessment of the operation of D'Aguilar Highway / Tarong Power Station Road intersection in the AM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- No change in intersection LOS
- Minimal changes to approach DOS (largest increase of 0.009)
- Minimal changes to delays (largest increase of 0.9s)
- Minimal changes to queue lengths (largest increase of 0.9 m).

Table 4.3 AM Peak – Base SIDRA results

| Approach | Volume | LOS | DOS | Delay (s) | Queue (95th %) (m) |
|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | 106 | N/A | 0.061 | 0.1 | 0.0 |
| North: D'Aguilar Highway (N) | 107 | N/A | 0.048 | 0.2 | 0.2 |
| West: Tarong Power Station Road | 4 | A | 0.006 | 11.8 | 0.2 |
| All Vehicles | 217 | N/A | 0.061 | 0.4 | 0.2 |

Table 4.4 AM Peak – Construction SIDRA results

| Approach | Volume | LOS | DOS | Delay (s) | Queue (95th %) (m) |
|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | 124 | N/A | 0.061 | 1.2 | 0.0 |
| North: D'Aguilar Highway (N) | 118 | N/A | 0.057 | 1.1 | 1.1 |
| West: Tarong Power Station Road | 4 | A | 0.007 | 12.0 | 0.2 |
| All Vehicles | 246 | N/A | 0.061 | 1.3 | 1.1 |

The assessment of the operation of D'Aguilar Highway / Tarong Power Station Road intersection in the PM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- No change in intersection LOS
- Minimal changes to approach DOS (largest increase of 0.053)
- Minimal increase in average delay across the intersection (1.5s)
- Minimal changes to queue lengths (largest increase of 1.7 m).

Table 4.5 PM Peak – Base SIDRA results

| Approach | Volume | LOS | DOS | Delay (s) | Queue (95th %) (m) |
|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | 103 | N/A | 0.061 | 0.1 | 0.0 |
| North: D'Aguilar Highway (N) | 104 | N/A | 0.048 | 0.2 | 0.2 |
| West: Tarong Power Station Road | 4 | A | 0.006 | 11.8 | 0.2 |
| All Vehicles | 211 | N/A | 0.061 | 0.4 | 0.2 |

Table 4.6 PM Peak – Construction SIDRA results

| Approach | Volume | LOS | DOS | Delay (s) | Queue (95th %) (m) |
|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | 103 | N/A | 0.061 | 0.1 | 0.0 |
| North: D'Aguilar Highway (N) | 104 | N/A | 0.048 | 0.2 | 0.2 |
| West: Tarong Power Station Road | 42 | A | 0.059 | 10.2 | 1.8 |
| All Vehicles | 249 | N/A | 0.061 | 1.9 | 1.8 |

### *4.1.4 Other transport impacts*

#### 4.1.4.1 Heavy vehicle routes

As a relatively low increase (<3%) in AADT traffic volumes is noted on the D'Aguilar Highway during the peak period of construction activities, it is not expected that construction heavy vehicle and workforce movements generated by the proposal would impact the operation of existing heavy vehicles movements on the D'Aguilar Highway 25 m B Double HV route.

#### 4.1.4.2 Public transport

No public transport in the vicinity of the site apart from occasional coach services (three per week) and the School bus services in operation in the regional centres and surrounding areas and along the D'Aguilar Highway. Due to the low traffic volumes generated by The Project construction activities (primarily worker force movements from Nanango, Yarraman, Kingaroy) it is expected to have a minimal impact on these services. In addition, it is noted that the heaviest time for construction movements is expected at the start and end of construction hours (6:30AM to 6:30PM) which is outside school bus service periods (e.g. immediately prior/post school times).

#### 4.1.4.3 Active transport

Given the surrounding land uses in the vicinity of The Project, the demand for cycling and pedestrian travel in the area is likely to be low. Although there would be increased traffic from construction vehicles in urban areas along the access routes, the increase is minor (<3% of AADT) and no impact to existing active transport movements are expected. It is noted that the largest hourly construction movements (workforce) would occur outside peak traffic periods (typically between 10:00 AM and 4:00 PM) and would have minimal impact to pedestrians and cyclists.

### *4.1.5 Road safety assessment*

A risk assessment of impacts resulting from The Project construction activities has been undertaken. This assessment has identified the following key risks associated with the construction of The Project

- Increases in traffic volumes
- Increases to left and right turn movements into and out of Tarong Power Station Road
- Increases to heavy vehicles volumes along the D'Aguilar Highway.

These risks have been assessed using the risk assessment framework as detailed in the GTIA with the results presented in Table 4.7.

Table 4.7 Risk Assessment

| Risk Item | Without Development | | | With Development | | | Mitigation measure | With Development and mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Likelihood | Consequence | Risk Score | Likelihood | Consequence | Risk Score | | Likelihood | Consequence | Risk Score |
| Increased left turn movement into Tarong Power Station Road, rear end collision through movement with left turn entry | 1 | 4 | M | 2 | 4 | M | Construction access warning signage | 1 | 4 | M |
| Increased right turn movement into Tarong Power Station Road, rear end collision through movement with right turn entry | 1 | 5 | M | 2 | 5 | M | Construction access warning signage | 1 | 5 | M |
| Increased right turn movement into Tarong Power Station Road, side collision of though movement with right turn entry | 1 | 5 | M | 2 | 5 | M | Construction access warning signage | 1 | 5 | M |

| Risk Item | Without Development | | | With Development | | | Mitigation measure | With Development and mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Likelihood | Consequence | Risk Score | Likelihood | Consequence | Risk Score | | Likelihood | Consequence | Risk Score |
| Increased right turn movement into D'Aguilar Highway, side collision of through movement with right turn exit | 1 | 5 | M | 2 | 5 | M | Construction access warning signage | 1 | 5 | M |

As The Project is a Planning Act development, and the D'Aguilar Highway has an AADT of less than 8,000 per day, but a posted speed limit greater than 80 km/hr, a road safety assessment of the increased turning volumes on the D'Aguilar Highway / Tarong Power Station Road intersection has been undertaken. This found:

- Following review of the current crash data it appears that the current intersection arrangement does not pose a significant safety risk under current traffic conditions. Furthermore, with no proposed change to the vertical or horizontal geometry of the intersection, no change in the existing sight lines is expected at the intersection.
- During the construction stage of this project, there will be an increase in the heavy vehicles utilising this intersection which will increase the risk profile at this location and as such increases the risk likelihood as reflected in Table 4.7 above.

To mitigate this increased safety risk, temporary warning signs will be introduced on the D'Aguilar Highway on the approaches to the intersection with Tarong Power Station Road to provide road users advanced warning. It should be noted that this is a temporary measure due to the fact the anticipated duration of the construction project is approximately nine months.

## 4.2 Operational stage

### *4.2.1 Traffic generation*

Due to the nature of The Project, minimal traffic is expected to be generated as a result of the operation of the transmission line. As detailed in Section 2.3.2 the expected traffic generated by the operation of The Project results from periodic inspection and maintenance activities and is estimated in the region of three vehicle trips on average per year.

### *4.2.2 Impacts*

As the construction activities were not found to have any significant impact on the transport network, and operational traffic is significantly less than that generated by construction activities, the operation of The Project is expected to have negligible impact on:

- Link capacity and pavement
- Intersection operation
- Heavy vehicle routes
- Active or public transport networks
- General road safety.

## 4.3 Mitigations

The following mitigations are recommended to be implemented to reduce and manage the potential impact to the D'Aguilar Highway resulting from The Project construction activities:

- Temporary warning signs to be introduced on the D'Aguilar Highway in the vicinity of the intersection with Tarong Power Station Road to provide road users advanced warning of turning construction vehicles.

Due to the low generated traffic volumes associated with The Project operational activities (an average of 3 vehicle trips per year), no mitigation measures are required during the operational phase.

# 5 Conclusion

This Traffic Report has defined The Project's activities and associated trip generation during its construction and operation phases, identified access routes, and collated road network traffic data. Based on this information the report provides an assessment as per the *Guide to Traffic Impact Assessment* (GTIA) (TMR 2018) of likely impacts of The Project on the SCR network during the construction and operations stages. The key findings of this assessment are summarised as:

- The Project is expected to generate:
  - A peak daily traffic generation of 24 heavy and 32 light vehicles trips (in and out) accessing the construction site with a maximum peak hour flow of 5 heavy and 32 light vehicles (in or out) movements.
  - During operations an average of 3 vehicle trips (in and out) per year are expected.
- Due to the low traffic volumes generated by the construction and operation of The Project, no impacts to the SCR network, intersections, pavement condition or public and active transport facilities are expected as:
  - Increases to link volumes on the D'Aguilar Highway are less than 5% increase to daily AADT
  - Increases to link SAR4s on the D'Aguilar Highway during the year of construction are less than 5% of annual SARs
  - Although turn movements at the intersection of D'Aguilar Highway / Tarong Power Station Road increase by more than 5%, the impacts to intersection performance are negligible
  - No dedicated active or public transport infrastructure is located in vicinity of The Project site and increases to traffic volumes are not expected to impact active or public transport networks in the regional centres along the D'Aguilar Highway.
- Increased safety risks are associated with construction or operation of The Project. To mitigate the identified increased road safety risk from increases in traffic associated with The Project, the following mitigation is recommended:
  - Temporary warning signs are recommended be introduced on the D'Aguilar Highway in the vicinity of the intersection with Tarong Power Station Road to provide road users advanced warning of additional turning vehicles during the construction stages
  - Due to the low generated traffic volumes associated with The Project operational activities (an average of 3 vehicle trips per year), no mitigation measures are required.

# 6 Limitations

## 6.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

## 6.2 Qualifications and assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information)*, those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

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This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

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## 6.4 Disclaimer

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# Attachment A

Certification of Traffic Impact Assessment Report

## Appendix B: Traffic impact assessment certification

**Certification of Traffic Impact Assessment Report**

**Registered Professional Engineer Queensland**

for

| | |
|---|---|
| Project title: | Meandu Mine Transmission Line Relocation Project |

As a professional engineer registered by the Board of Professional Engineers of Queensland pursuant to the *Professional Engineers Act 2002* as competent in my areas of nominated expertise, I understand and recognise:

- the significant role of engineering as a profession, and that
- the community has a legitimate expectation that my certification affixed to this engineering work can be trusted, and that
- I am responsible for ensuring its preparation has satisfied all necessary standards, conduct and contemporary practice.

As the responsible RPEQ, I certify:

(i) I am satisfied that all submitted components comprising this traffic impact assessment, listed in the following table, have been completed in accordance with the *Guide to Traffic Impact Assessment* published by the Queensland Department of Transport and Main Roads and using sound engineering principles, and

(ii) where specialised areas of work have not been under my direct supervision, I have reviewed the outcomes of the work and consider the work and its outcomes as suitable for the purposes of this traffic impact assessment, and that

(iii) the outcomes of this traffic impact assessment are a true reflection of results of assessment, and that

(iv) I believe the strategies recommended for mitigating impacts by this traffic impact assessment, embrace contemporary practice initiatives and will deliver the desired outcomes.

| | | | |
|---|---|---|---|
| Name: | Rachael Christie | RPEQ No: | 27497 |
| RPEQ competencies: | Civil Engineering | | |
| Signature: | R.Chr | Date: | 28/11/2022 |
| Postal address: | Level 2, 2 Emporio Place, Maroochydore, 4558 | | |
| Email: | rachael.christie@wsp.com | | |

| Traffic impact assessment components to which this certification applies | ✓ |
|---|---|
| *1. Introduction* | |
| Background | ✓ |
| Scope and study area | ✓ |
| Pre-lodgement meeting notes | |
| *2. Existing Conditions* | |
| Land use and zoning | |
| Adjacent land uses / approvals | |
| Surrounding road network details | ✓ |
| Traffic volumes | ✓ |
| Intersection and network performance | ✓ |
| Crash History | ✓ |
| Site access | |
| Public transport (if applicable) | ✓ |
| Active transport (if applicable) | ✓ |
| Parking (if applicable) | |
| Pavement (if applicable) | |
| Transport infrastructure (if applicable) | |
| *3. Proposed Development Details* | |
| Development site plan | |
| Operational details (including year of opening of each stage and any relevant catchment / market analysis) | ✓ |
| Proposed access and parking | |
| *4. Development Traffic* | |
| Traffic generation (by development stage if relevant and considering light and heavy vehicle trips) | ✓ |
| Trip distribution | ✓ |
| Development traffic volumes on the network | ✓ |
| *5. Impact Assessment and Mitigation* | |
| With and without development traffic volumes | ✓ |
| Construction traffic impact assessment and mitigation (if applicable) | ✓ |
| Road safety impact assessment and mitigation | ✓ |
| Access and frontage impact assessment and mitigation | |
| Intersection delay impact assessment and mitigation | ✓ |
| Road link capacity assessment and mitigation | ✓ |
| Pavement impact assessment and mitigation | ✓ |
| Transport infrastructure impact assessment and mitigation | |
| Other impacts assessment relevant to the specific development type / location (if applicable) | |

| Traffic impact assessment components to which this certification applies | ✓ |
|---|---|
| *6. Conclusions and Recommendations* | |
| Summary of impacts and mitigation measures proposed | ✓ |
| Certification statement and authorisation | |
| *[change above and / or insert other component as needed]* | |

# Attachment B

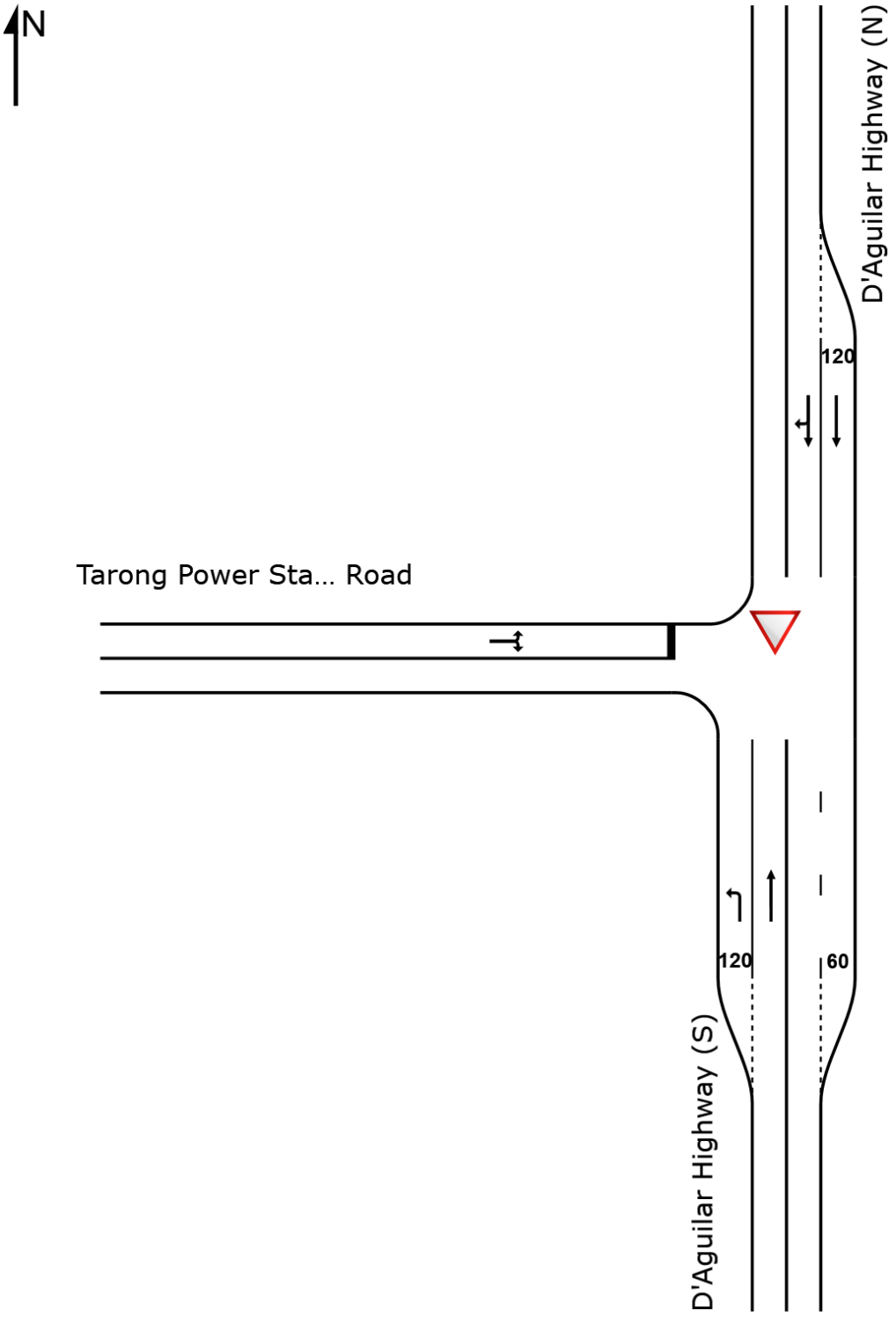
SIDRA Results

# SITE LAYOUT

## Site: [AM peak - 2023 No Project (Site Folder: D'Aguilar Highway / Tarong Power Station Road)]

Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# MOVEMENT SUMMARY

## Site: [AM peak - 2023 No Project (Site Folder: D'Aguilar Highway / Tarong Power Station Road)]

Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | | | | | | | | | | | | | | |
| 1 | L2 | 2 | 1 | 2 | 50.0 | 0.002 | 6.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 0.00 | 51.6 |
| 2 | T1 | 101 | 19 | 106 | 18.8 | 0.061 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 103 | 20 | 108 | 19.4 | 0.061 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 0.00 | 59.8 |
| North: D'Aguilar Highway (N) | | | | | | | | | | | | | | |
| 8 | T1 | 102 | 19 | 107 | 18.6 | 0.048 | 0.1 | LOS A | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.9 |
| 9 | R2 | 2 | 1 | 2 | 50.0 | 0.048 | 6.8 | LOS A | 0.0 | 0.2 | 0.02 | 0.02 | 0.02 | 55.0 |
| Approach | | 104 | 20 | 109 | 19.2 | 0.048 | 0.2 | NA | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.8 |
| West: Tarong Power Station Road | | | | | | | | | | | | | | |
| 10 | L2 | 2 | 1 | 2 | 50.0 | 0.006 | 10.9 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 49.1 |
| 12 | R2 | 2 | 1 | 2 | 50.0 | 0.006 | 12.7 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 48.8 |
| Approach | | 4 | 2 | 4 | 50.0 | 0.006 | 11.8 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 49.0 |
| All Vehicles | | 211 | 42 | 222 | 19.9 | 0.061 | 0.4 | NA | 0.0 | 0.2 | 0.01 | 0.03 | 0.01 | 59.5 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: [AM peak - 2023 Construction (Site Folder: D'Aguilar Highway / Tarong Power Station Road)]

Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | | | | | | | | | | | | | | |
| 1 | L2 | 26 | 7 | 27 | 26.9 | 0.018 | 5.9 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 0.00 | 52.5 |
| 2 | T1 | 101 | 19 | 106 | 18.8 | 0.061 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 127 | 26 | 134 | 20.5 | 0.061 | 1.2 | NA | 0.0 | 0.0 | 0.00 | 0.12 | 0.00 | 58.3 |
| North: D'Aguilar Highway (N) | | | | | | | | | | | | | | |
| 8 | T1 | 99 | 18 | 104 | 18.2 | 0.057 | 0.2 | LOS A | 0.1 | 1.1 | 0.08 | 0.09 | 0.08 | 58.8 |
| 9 | R2 | 19 | 1 | 20 | 5.3 | 0.057 | 6.1 | LOS A | 0.1 | 1.1 | 0.12 | 0.13 | 0.12 | 55.8 |
| Approach | | 118 | 19 | 124 | 16.1 | 0.057 | 1.1 | NA | 0.1 | 1.1 | 0.09 | 0.10 | 0.09 | 58.3 |
| West: Tarong Power Station Road | | | | | | | | | | | | | | |
| 10 | L2 | 2 | 1 | 2 | 50.0 | 0.007 | 10.9 | LOS A | 0.0 | 0.2 | 0.32 | 0.90 | 0.32 | 49.0 |
| 12 | R2 | 2 | 1 | 2 | 50.0 | 0.007 | 13.1 | LOS A | 0.0 | 0.2 | 0.32 | 0.90 | 0.32 | 48.7 |
| Approach | | 4 | 2 | 4 | 50.0 | 0.007 | 12.0 | LOS A | 0.0 | 0.2 | 0.32 | 0.90 | 0.32 | 48.8 |
| All Vehicles | | 249 | 47 | 262 | 18.9 | 0.061 | 1.3 | NA | 0.1 | 1.1 | 0.05 | 0.12 | 0.05 | 58.1 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: [PM peak - 2023 No Project (Site Folder: D'Aguilar Highway / Tarong Power Station Road)]

Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | | | | | | | | | | | | | | |
| 1 | L2 | 2 | 1 | 2 | 50.0 | 0.002 | 6.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 0.00 | 51.6 |
| 2 | T1 | 101 | 19 | 106 | 18.8 | 0.061 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 103 | 20 | 108 | 19.4 | 0.061 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 0.00 | 59.8 |
| North: D'Aguilar Highway (N) | | | | | | | | | | | | | | |
| 8 | T1 | 102 | 19 | 107 | 18.6 | 0.048 | 0.1 | LOS A | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.9 |
| 9 | R2 | 2 | 1 | 2 | 50.0 | 0.048 | 6.8 | LOS A | 0.0 | 0.2 | 0.02 | 0.02 | 0.02 | 55.0 |
| Approach | | 104 | 20 | 109 | 19.2 | 0.048 | 0.2 | NA | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.8 |
| West: Tarong Power Station Road | | | | | | | | | | | | | | |
| 10 | L2 | 2 | 1 | 2 | 50.0 | 0.006 | 10.9 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 49.1 |
| 12 | R2 | 2 | 1 | 2 | 50.0 | 0.006 | 12.7 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 48.8 |
| Approach | | 4 | 2 | 4 | 50.0 | 0.006 | 11.8 | LOS A | 0.0 | 0.2 | 0.31 | 0.90 | 0.31 | 49.0 |
| All Vehicles | | 211 | 42 | 222 | 19.9 | 0.061 | 0.4 | NA | 0.0 | 0.2 | 0.01 | 0.03 | 0.01 | 59.5 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: [PM peak - 2023 Construction (Site Folder: D'Aguilar Highway / Tarong Power Station Road)]

Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: D'Aguilar Highway (S) | | | | | | | | | | | | | | |
| 1 | L2 | 2 | 1 | 2 | 50.0 | 0.002 | 6.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 0.00 | 51.6 |
| 2 | T1 | 101 | 19 | 106 | 18.8 | 0.061 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 103 | 20 | 108 | 19.4 | 0.061 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 0.00 | 59.8 |
| North: D'Aguilar Highway (N) | | | | | | | | | | | | | | |
| 8 | T1 | 102 | 19 | 107 | 18.6 | 0.048 | 0.1 | LOS A | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.9 |
| 9 | R2 | 2 | 1 | 2 | 50.0 | 0.048 | 6.8 | LOS A | 0.0 | 0.2 | 0.02 | 0.02 | 0.02 | 55.0 |
| Approach | | 104 | 20 | 109 | 19.2 | 0.048 | 0.2 | NA | 0.0 | 0.2 | 0.01 | 0.01 | 0.01 | 59.8 |
| West: Tarong Power Station Road | | | | | | | | | | | | | | |
| 10 | L2 | 18 | 1 | 19 | 5.6 | 0.059 | 8.8 | LOS A | 0.2 | 1.8 | 0.31 | 0.90 | 0.31 | 50.9 |
| 12 | R2 | 24 | 6 | 25 | 25.0 | 0.059 | 11.3 | LOS A | 0.2 | 1.8 | 0.31 | 0.90 | 0.31 | 49.9 |
| Approach | | 42 | 7 | 44 | 16.7 | 0.059 | 10.2 | LOS A | 0.2 | 1.8 | 0.31 | 0.90 | 0.31 | 50.3 |
| All Vehicles | | 249 | 47 | 262 | 18.9 | 0.061 | 1.9 | NA | 0.2 | 1.8 | 0.06 | 0.16 | 0.06 | 57.9 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.