CAMBRAY CONSULTING

TRAFFIC ENGINEERING + TRANSPORT PLANNING

Theodore Wind Farm

PRELIMINARY TRAFFIC IMPACT ASSESSMENT REPORT

Prepared for Environmental Resources Management Australia Pty Ltd

9 August 2024

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1.0 Introduction

Theodore Energy Development Pty Ltd (**TED**) (the **Proponent**) is developing the Theodore Wind Farm (the **Project**), located approximately 22 km east of Theodore and 50 km south of Biloela in the Banana Shire Council Local Government Area, Queensland. The closest major town is Gladstone, 150 km northeast of the proposed Project, with Queensland's capital Brisbane located 380 km southeast of the Project.

The Project consists of up to 170 wind turbines and ancillary infrastructure including, but not limited to, access tracks, collector stations, overhead and underground electrical cabling, hardstands, and an operations and maintenance compound.

Environmental Resources Management Australia Pty Ltd (**ERM**) has been engaged by TED to prepare the Planning Development Application, in accordance with QLD State Development Assessment Provisions (SDAP) and the State Code 23 planning guidelines for wind farm Project. ERM has engaged Cambray Consulting Pty Ltd to prepare a Transport Route and Site Access Assessment for the Project to support the proposed Development Application for consideration by the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) for approval, along with the following advice agencies:

- The Department of Transport and Main Roads (DTMR); and
- Rockhampton Regional Council.

1.2 Scope of Works

As part of preparing this report, we undertook the following scope of works:

- Completion of a site inspection to review the operation and configuration of the existing transport network, including potential construction traffic access locations;
- An assessment of the Defence Road and Leichhardt Highway intersection taking into consideration:
    - Expected operational and construction traffic generation;
    - The types of vehicles expected to access the site, particularly during construction;
    - The potential need for road upgrade works; and
- A high-level review of the proposed Project Area access alternatives from a traffic perspective, taking into consideration the existing local government road form in the vicinity of each access location.

The results of the above activities and our findings and recommendations are discussed in the following sections.

1.3 Limits of Report

This report takes into account the particular instructions and requirements of the Proponent. Cambray Consulting has taken care in the preparation of this report, however it neither accepts liability nor responsibility whatsoever in respect of:

- Any use of this report by any third party;
- Any third party whose interests may be affected by any decision made regarding the contents of this report; and/or
- Any conclusion drawn resulting from omission or lack of full disclosure by the Proponent, or the Proponents' consultants.

1.4 Safety in Design

Within our scope, we have identified safety in design issues and potential hazards, whenever reasonably practicable within our field of expertise. It is not considered reasonably practicable to identify all potential hazards which may occur throughout the life of the Project, including during detailed design and construction activities. It is strongly recommended that safety in design issues be reviewed during all detailed design and pre-construction stages of the Project.

1.5 Qualifications

This report was prepared by:

- Andrew Douglas, Director – BE Civil (Hons), MSc Env Man, FIEAust, CPEng, **RPEQ 6691**;
- John Dollisson, Senior Transport Engineer – BE Civil; and
- Reece Ralston, Transport Engineer – BE Civil.

1.6 Application Process

As part of the Project Application process, this TIA report has been prepared to consider the proposed vehicle access locations and potential traffic generation during the construction and operational phases to determine if upgrades are triggered. This assessment includes the following tasks:

- Overview of the Route Assessment report and findings;
- Location and form of intersections between the State Controlled Road Network and the Local Road Network expected to be used by construction and operational traffic;
- Review of the proposed accesses to wind farm site from the Local Road Network;
- Summary of existing road features (turn treatments and road corridors);
- Overview of background traffic;
- Anticipated traffic generation for the construction and operational phases; and
- A turn warrant assessment from State Controlled Road Network into Local Road Network and summary.

The Project has been assessed in accordance with State Code 23 V3.0 and has taken into consideration of the future draft State Code 23 V3.1 requirement for this Planning Development Application.

The sections within this report where the Performance Outcomes are addressed are summarised in **Table 1.1.**

Table 1.1 State Code 23 V3.0 (Current)

Performance Outcome	Acceptable Outcome	Section within report
Vehicular access and movement		
PO6 Development provides suitable vehicular access, manoeuvring areas and parking for the ongoing operation and maintenance activities associated with the wind farm.	No acceptable outcome is prescribed.	Discussions regarding suitable vehicular access is discussed in **Section 5.0** of this report. The manoeuvring area, parking, etc. will be further detailed design phase due to the preliminary nature of this application.
Construction management		
PO13 Construction activities associated with the development do not adversely impact **transport networks** and road infrastructure.	No acceptable outcome is prescribed.	Discussions regarding Construction activities associated with the development are further discussed in **Section 3.0** and **Section 6.0** of this report.

Following Development Application approval, a more detailed assessment, and the setting of conditions for the transport of all components and materials will be required once construction and delivery contracts are entered into for the supply and transport of the wind farm components, which will include:

- A Final Traffic Impact Assessment;
- A Pavement Impact Assessment;
- A Road Use Management Plan; and
- A Traffic Management Plan.

The construction phase of the development process will also include:

- A review of the proposed OSOM Route by a specialist haulage contractor in conjunction with manufacturer of wind turbine components;
- Construction Movement Schedules (i.e., commencement of haulage, expected duration of each haulage, total duration of all construction movement activities) and OSOM applications to seek permits for the movement of all OSOM components;
- Where works are proposed to intersections or accesses on State Controlled roads; and
- A Section 33 application under State Government approvals.

This report addresses the Development Application requirements of a Traffic Impact Assessment Report.

1.7 DTMR Standard Requirements

Table 1.2 provides a summary of items required by the Department of Transport and Main Roads (DTMR) for a Traffic Impact Assessment with reference to the sections where these items are discussed.

Table 1.2 Summary of DTMR items addressed within the report.

DTMR Standard Requirement Items	Section within report
In support of the Development Application the Department of Transport and Main Roads (DTMR) will require: a. A Route Assessment Report demonstrating the feasibility of the proposed route for transport of wind turbine components including the blades, towers, and nacelle (and any other oversize overmass (OSOM) loads from the Port of Gladstone to the subject site. The following must be identified and/or demonstrated via the required Route Assessment Report:	Discussed in the Route Assessment Report
• What the proposed route is.	
• The location of stopping and/or rest areas.	
• The location and extent of any mitigation works on the State-Controlled Road (SCR) network.	
• Any operational impacts on the SCR network resulting from any required mitigation works.	Discussed in **Section 3.0** and **Section 5.0**
• Swept path assessment for all relevant turns along the route.	Provided in the Route Assessment Report

• Timing it takes for vehicles to turn at relevant intersections. It should be noted that closures of this nature under traffic control usually have a maximum limit of 15 minutes.	To be conditioned and reviewed by specialist haulage consultant, following DA approval and once sufficient detail is available.
• Confirmation that the vertical geometry of the route has been considered, given the length of the wind turbine blades.	Discussed in the Route Assessment Report
• The extent of vegetation clearing/earthworks required along the route.	
• Information regarding the timing of OSOM movements, including expected travel time from Port to Site. Part 3 and Part 5 of DTMR's Traffic and Road Use Manual are particularly relevant. If movements are to be staged, proposed vehicle storage arrangements need to be identified.	To be conditioned and resolved as part of the construction management planning.
• That the road use management strategy can ensure that emergency vehicles will be able to pass at all times.	
• Consideration of impacts on school bus routes. Movements should be routed and/or scheduled to avoid any conflict with school bus services.	
• Contingency planning in the event of highway closure due to traffic incident while en route. An OSOM vehicle stopped on the roadway would pose an obstacle due to widths. If the roadway is reduced to single lane due to an accident or roadworks the wider loads would not be able to pass through and possibly block oncoming traffic. This can be alleviated with the inclusion of regular pull over areas.	
• A Road Access Location Report demonstrating that the proposed vehicular access point/s to SCR does not worsen the safety and efficiency of the road network. For accesses to a SCR, the Road Access Location Report must be prepared in accordance with section 10.3.1 of the Guide to Traffic Impact Assessment (GTIA), Department of Transport and Main Roads 2018.	**Discussed in Section 3.0 and Section 5.0**

2.0 Project Description

2.1 Project Area and Location

The proposed Project involves the development, construction and operation of a large-scale wind farm approximately 22 km east of Theodore and 50 km south of Biloela in the Banana Shire Council Local Government Area, Queensland. The closest major town is Gladstone, 150 km northeast of the proposed Project, with Queensland's capital Brisbane located 380 km southeast of the Project.

The Project Area lies adjacent to and within the locality (10km) of several state forests including Belmont State Forest to the east, Montour State Forest to the north and Trevethan State Forest to the south. The Project Area is located within the Rural Zone of the Banana Shire Council, with the predominant land use being cattle grazing (and associated homesteads).

The Project Area is the land/properties containing the proposed Project. It is approximately 46,830 hectares (ha) in size. The Project Area consists of nine lots on three properties. The total Project footprint has a maximum area of 1,932.2 ha, which accounts for approximately 4.1% of the Project Area.

The Project Area is comprised of the following lots and is summarized in **Table 2.1**.

Table 2.1 Project Area Property List and Size

Property	Lot on Plan	Tenure	Size (ha)
Landowner 1	Lot 4 on SP131475	Freehold	1,392
	Lot 2 on RP617749	Freehold	1,311
	Lot 1 on RP617748	Freehold	1,072
	Lot 8 on DW2	Lands Lease (currently being converted to freehold)	4,553
Landowner 2	Lot 17 on DW49	Freehold	3,092
	Lot 18 on DW550	Freehold	4,617
Landowner 3	Lot 11 on DW446	Freehold	7,985
	Lot 19 on DW551	Freehold	3,099
	Lot 20 on SP100500	Freehold	19,594
Road Reserves	Part of Defence Road	Road Reserve	333
	Part of Crowsdale Camboon Road	Road Reserve	
	Unnamed Road Reserves	Road Reserve	
		Total	**46,830 ha**

2.2 Project Specifications

The Theodore Wind Farm is proposed to be up to 170 wind turbines, consisting of:

- WTG foundations and hardstand areas;
- Temporary infrastructure such as concrete batching plants, laydown areas, temporary construction offices and parking and on-site accommodation;
- Access tracks and electrical reticulation;
- Switching stations and substations;
- Battery Energy Storage Systems (BESS);
- Temporary and Permanent meteorological masts; and
- Permanent operations and maintenance facilities, with a variety of associated site facilities and storage laydowns around the proposed site.

The Project Area and proposed Project layout is illustrated in **Figure 2.1.**

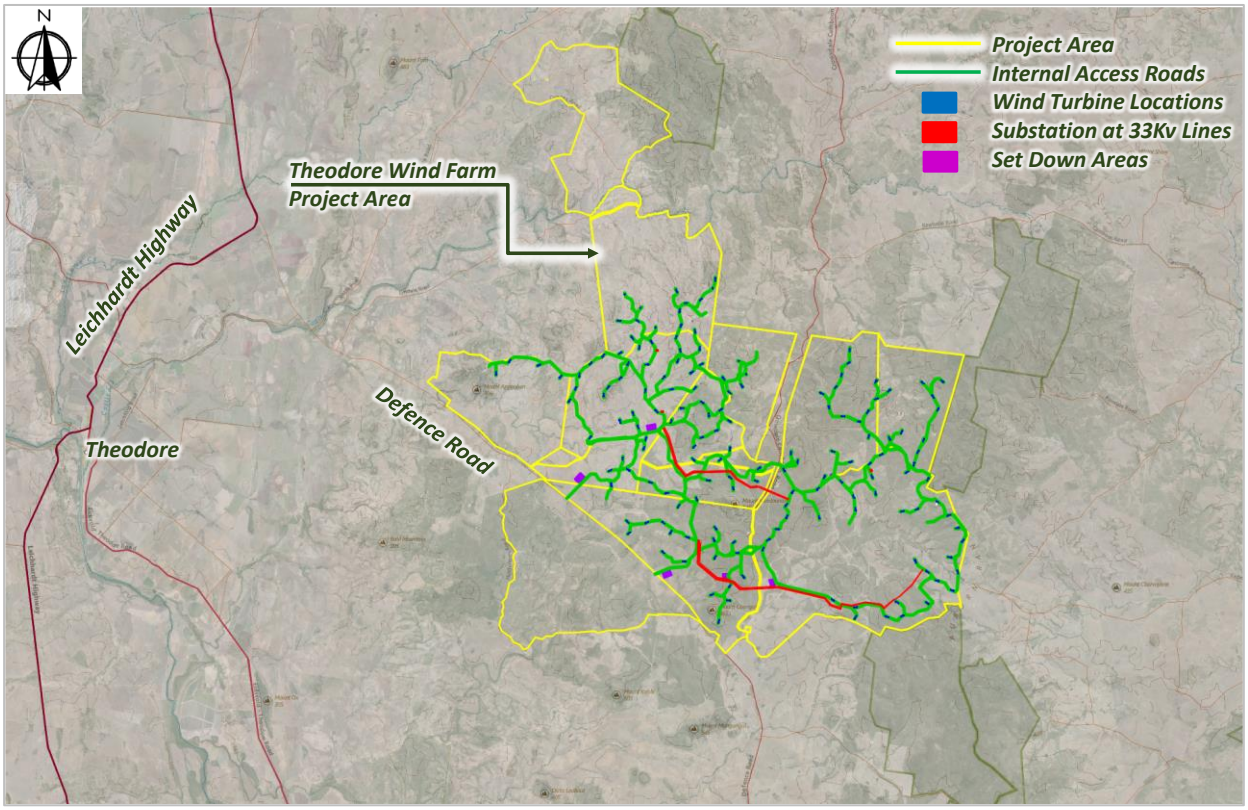

Figure 2.1 Project Area and Proposed Project Layout

2.3 Route Assessment Report

A route assessment was undertaken to determine the most suitable route(s) from the Port of Gladstone to the proposed set-down areas for the proposed wind turbine components. A Route Assessment Report was prepared which:

- Identified intersections and interchanges where vehicle movements are likely to be impeded;
- Suggested solutions or options at intersections and interchanges to assist the passage of over-length and over-height vehicles transporting indivisible wind farm components; and
- Provided commentary on permanent or temporary works and other measures that may be required to facilitate movement of the wind turbine blades through those intersections and interchanges.

The route assessment was broken done into four (4) stages which included:

- Stage 1 – Desktop Review to Identify Route Options;
- Stage 2 – Route Review;
- Stage 3 – Swept Path Assessment; and
- Stage 4 – Route Assessment Report.

The adopted Project Transport Routes (PTRs) and distance were summarized as in **Table 2.2** and is illustrated in **Figure 2.2.**

Table 2.2 Approximate Route Distances

Route	Origin	Via	Distance (Approx.)
PTR1 (Route 1)	Port of Gladstone - Auckland Point	Gladstone, Mount Larcom, Gracemere, Westwood, Dululu, Banana	300km
PTR2 (Route 2)	Port of Gladstone - Auckland Point	Gladstone, Mount Larcom, Calliope, Biloela, Banana	242km
OSOM Route	Port of Gladstone - Auckland Point	Gladstone, Calliope, Biloela, Banana	222km
Alt. Port 1	Port of Gladstone - Fisherman's Landing	-	-
Alt. Port 2	Port Alma	-	-

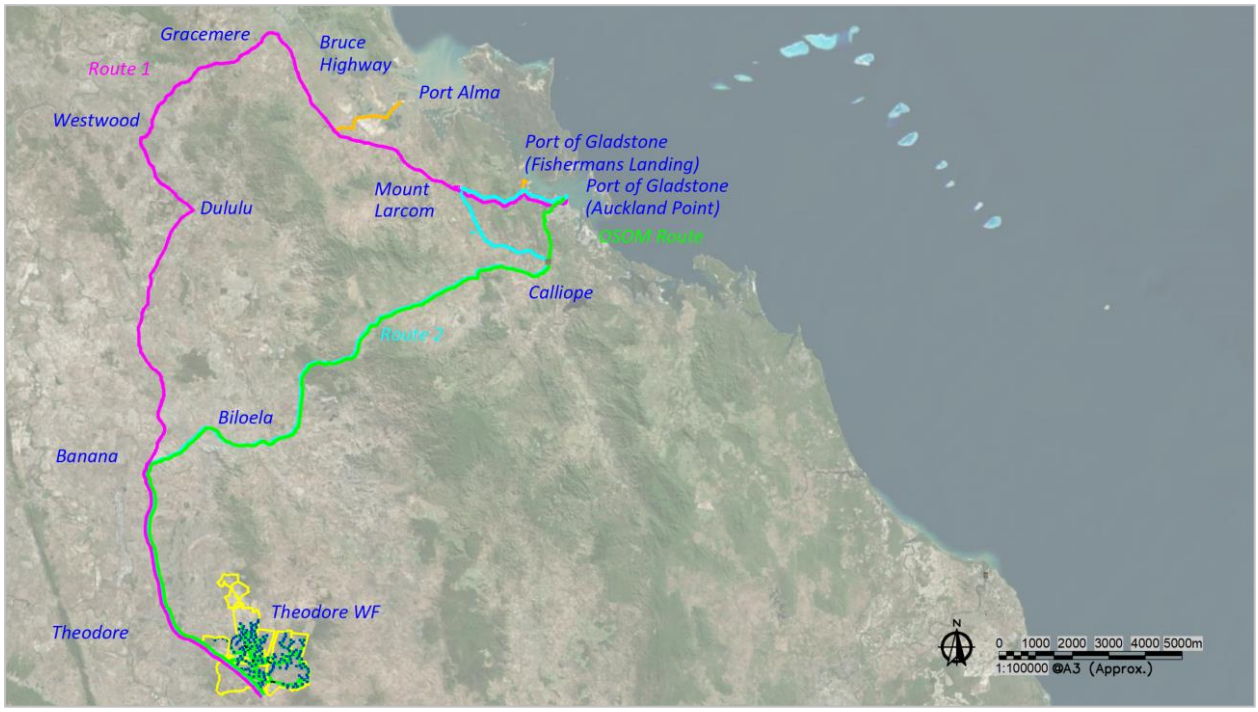

Figure 2.2 Routes and Alternative Ports to Theodore Wind Farm

A number of upgrades have been completed on the road network in proximity to the Port of Gladstone to facilitate movements for the Clark Creek Wind Farm. The road network has been summarised and further discussed in the Route Assessment Report.

2.3.1 Local Road Access

The Project Transport Route 1 and 2 merge in Banana and share a common route to the Project Area Access. Access from the state-controlled Leichardt Highway to the local road network is via the existing intersection with Defence Road. The local road network is further discussed in **Section 4.1** of this report.

2.3.2 Construction Phase Traffic Generation

The Project construction phase is anticipated to be the most significant impact on the State controlled and local controlled road networks due to the limited and intensified traffic moving from:

- Components moving between the Port of Gladstone and the Project Area;
- Materials and equipment moving between local population centres and the Project Area; and
- Workers moving between to and from the Project Area during the construction period.

Construction materials may be to be sourced from local suppliers, which may reduce the burden on the Bruce Highway and the Dawson Highway between the Port of Gladstone and the Project Area.

The Preliminary Route Assessment has considered the component delivery to the Project Area.

2.3.3 Operations Phase Traffic Generation

The proposed Project will operate seven (7) days per week, 365 days per year and require up to 20 light vehicles to access the site each day. We have assumed that each of these vehicles may generate 40 trips per day (20 in and 20 out).

The Project is expected to also require servicing once a week by a refuse collection vehicle and occasional larger maintenance vehicles, when needed. Therefore, we estimate that the Project may generate up to 42 (21 in and 21 out).

2.4 State Controlled Road Network Summary

The Project intends to utilise the Stage Controlled Road (SCR) network in order to access the Project site of which includes the following roads:
Capricorn Highway (16A – Rockhampton - Duaringa);

- Leichhardt Highway (26A – Westwood - Taroom); and
- Dawson Highway (46A – Gladstone - Biloela).

2.4.1 State Controlled Road Network Heavy Vehicle Routes and Restrictions

A review of the SCR network for Heavy Vehicle Routes and Restrictions was undertaken in the vicinity to the Project Area in order to understand the potential limitations of the Project Area access.

Extracts from the SCR Heavy Vehicle Routes and Restrictions mapping are illustrated in **Figure 2.3** to **Figure 2.8** and indicate the extent of routes pre-approved for the following heavy vehicle classes:

- Type 1 Road Train / PBS 3A (RT1) which include;
    - Vehicles configured to be up to 36.5 metres in length and 113 tonnes;
- Higher mass limits (HML) of which;
    - Is a mass exception allowing an increase in mass limit for specific single axles or axle groups of heavy vehicles;
- One Tonne Mass Transfer (1TMT) which;
    - 1TMTA allows increased mass on tri-axle groups so that they may be loaded by up to 1 tonne above the normal tri-axle group 20t General Mass Limit (GML) provided any additional mass loaded onto each tri-axle group is offset onto other non-steer axle or axle groups; and
- Critical Roads Network.

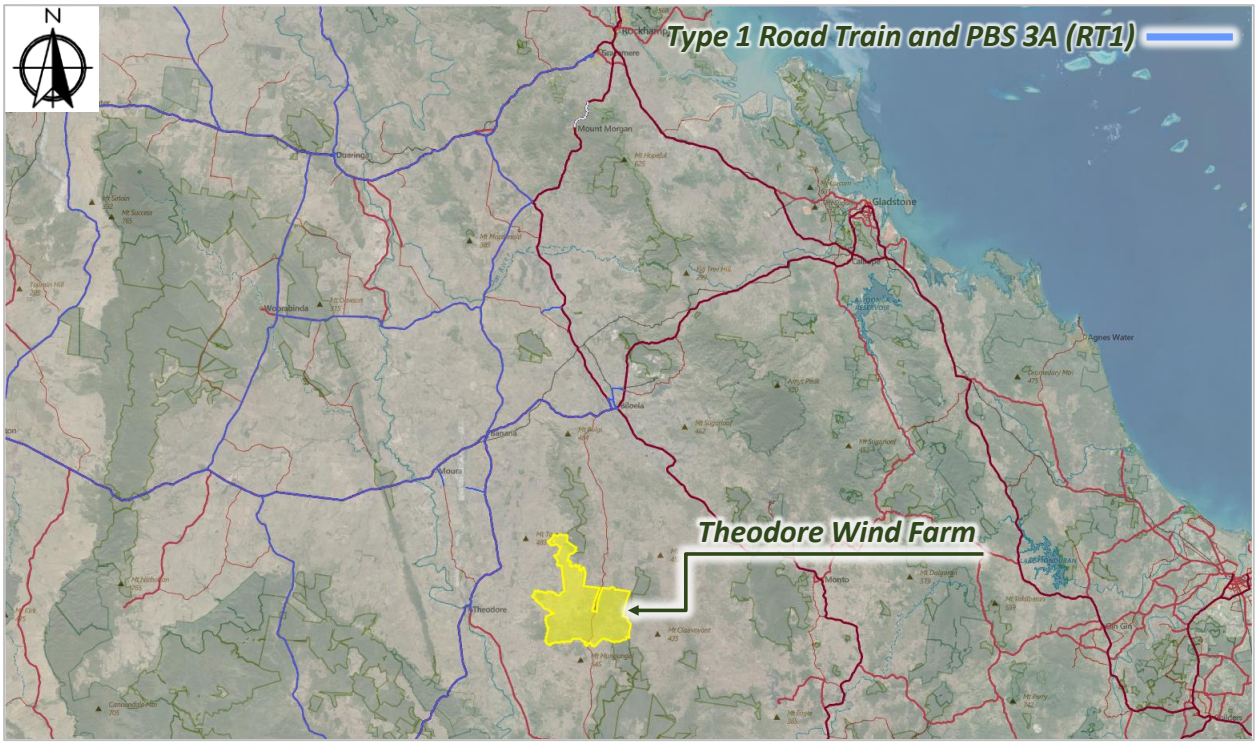

Figure 2.3 Type 1 Road Train and PBS 3A Network

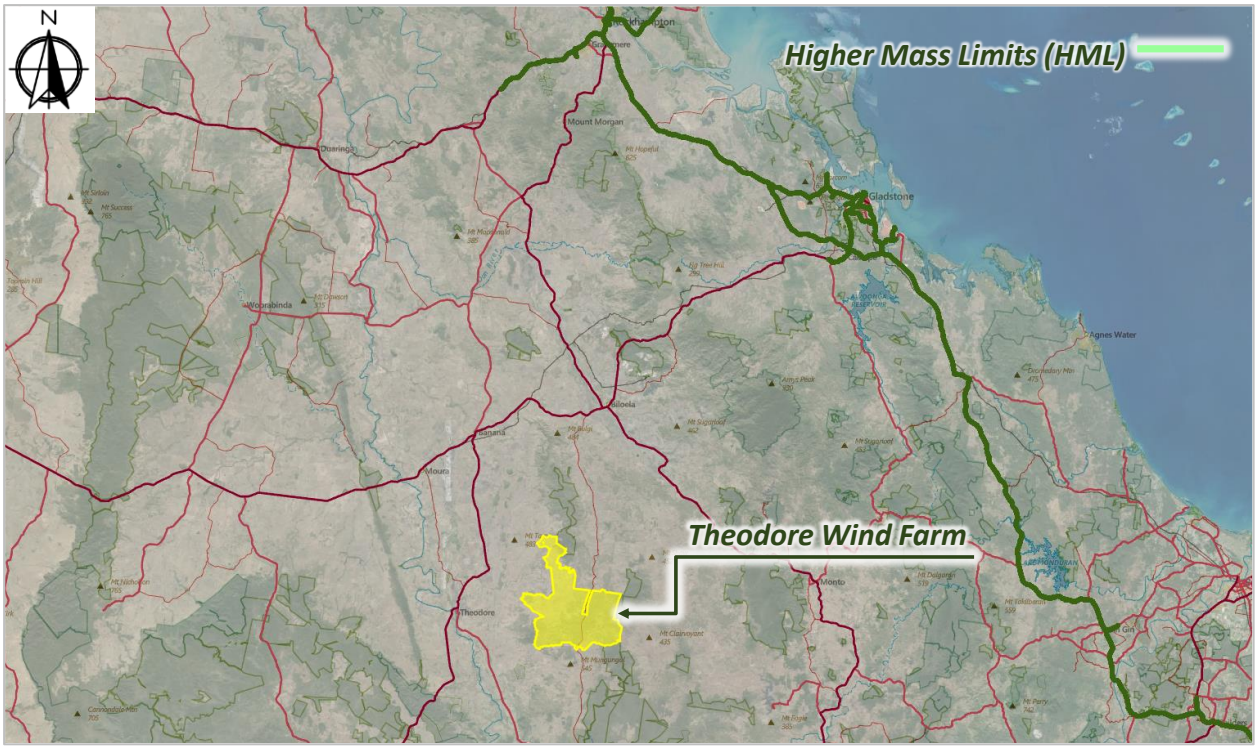

Figure 2.4 Higher Mass Limits Network

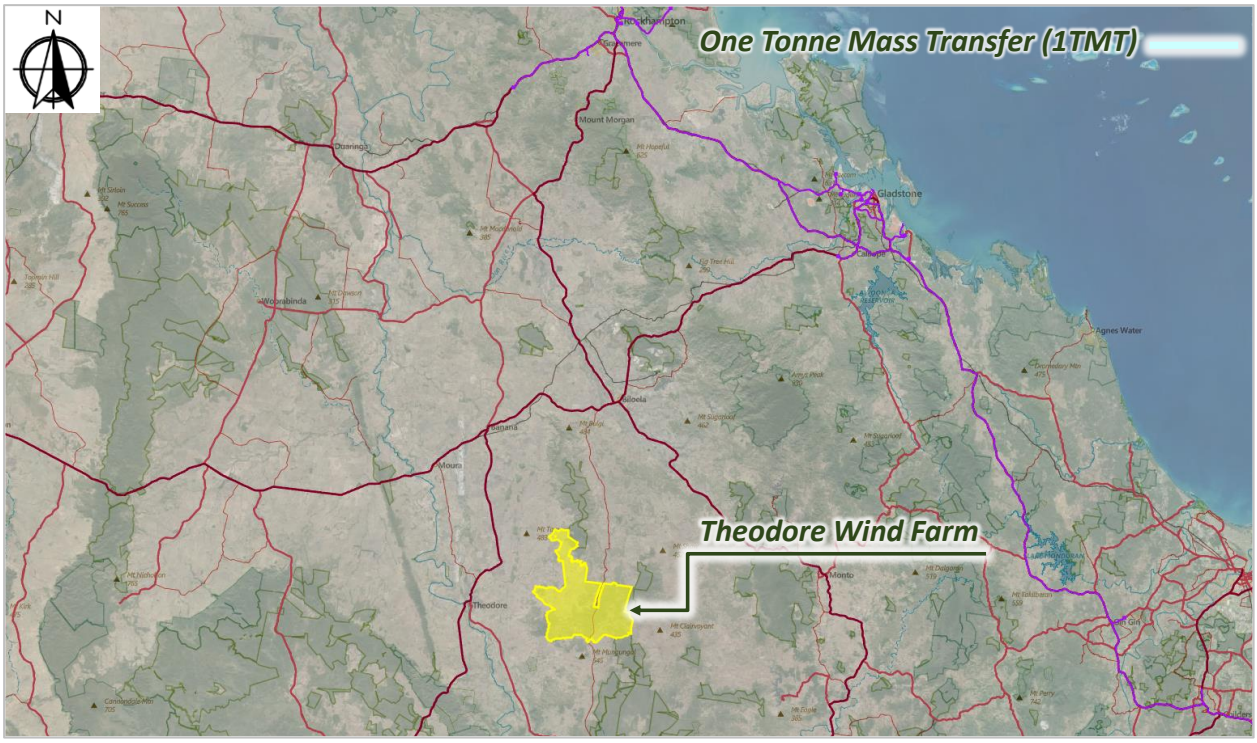

Figure 2.5 One Tonne Mass Transfer Network

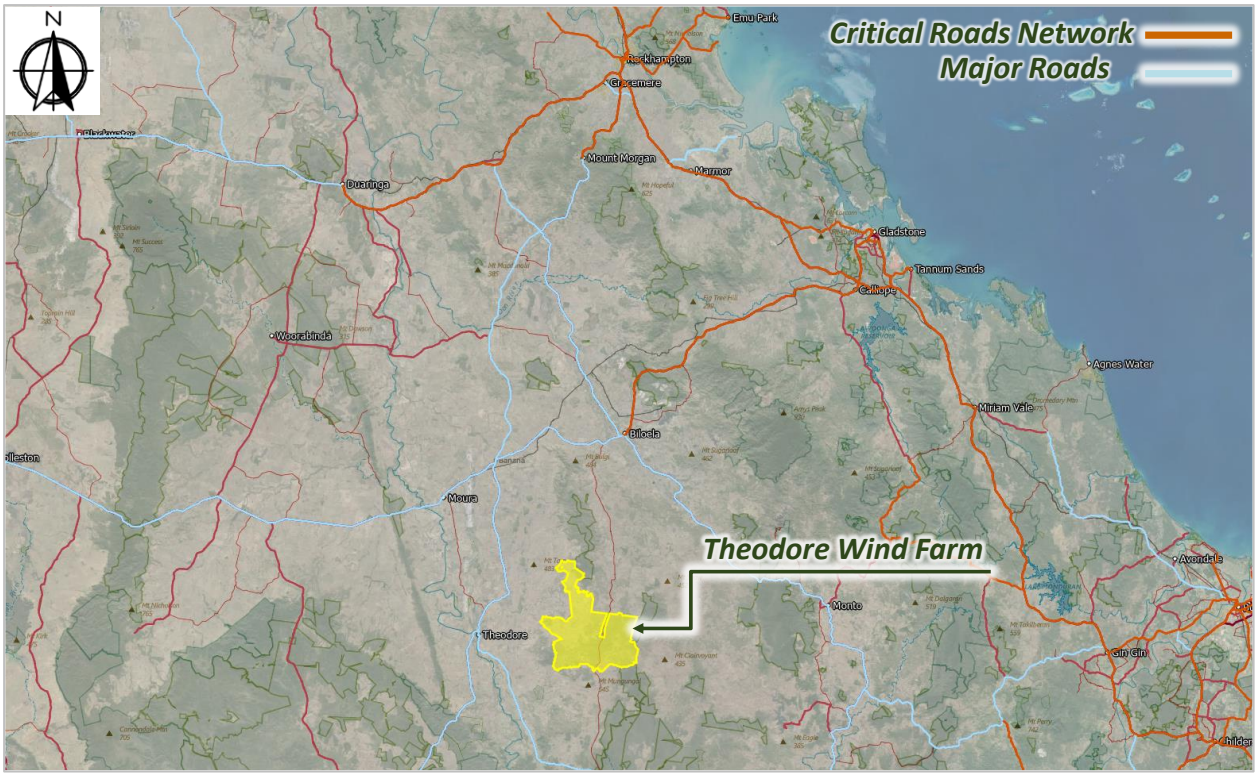

Figure 2.6 Critical Roads Network

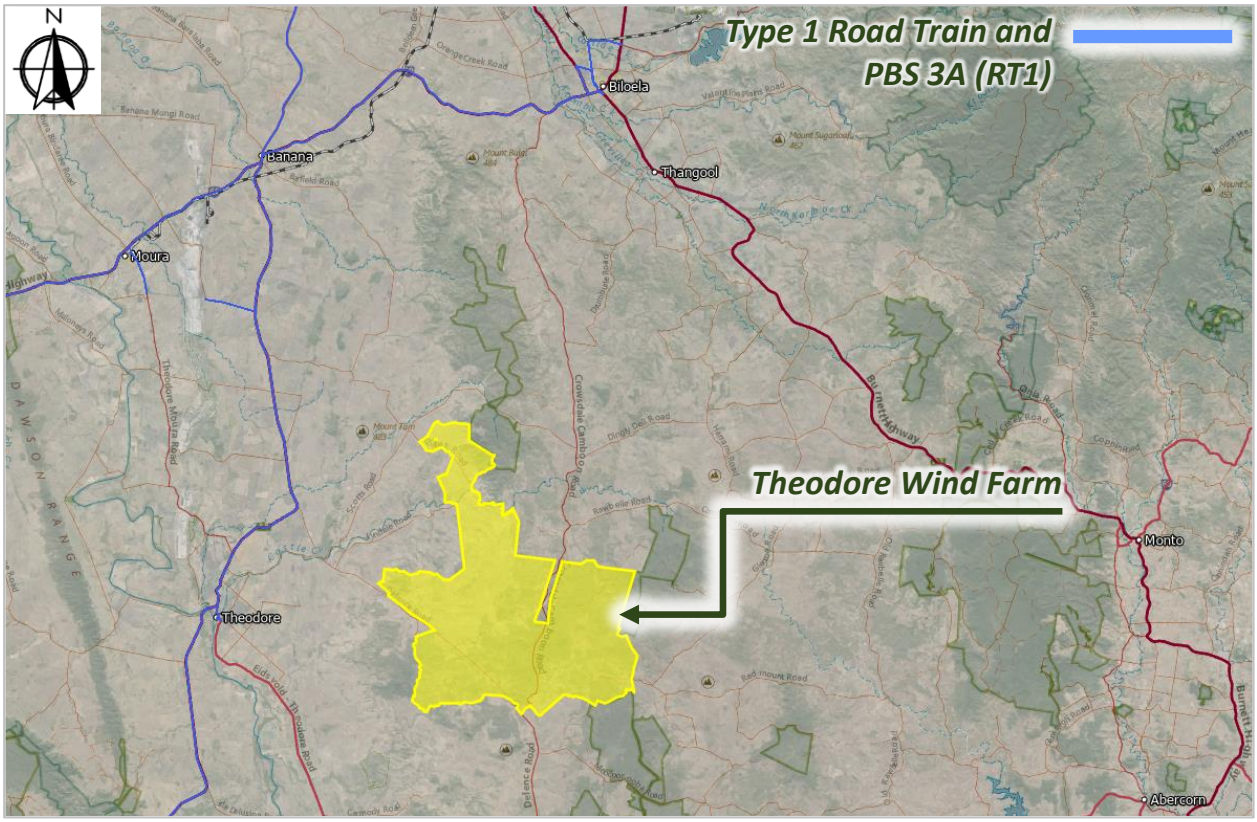

Figure 2.7 Type 1 Road Train and PBS 3A Network in Vicinity to the Project

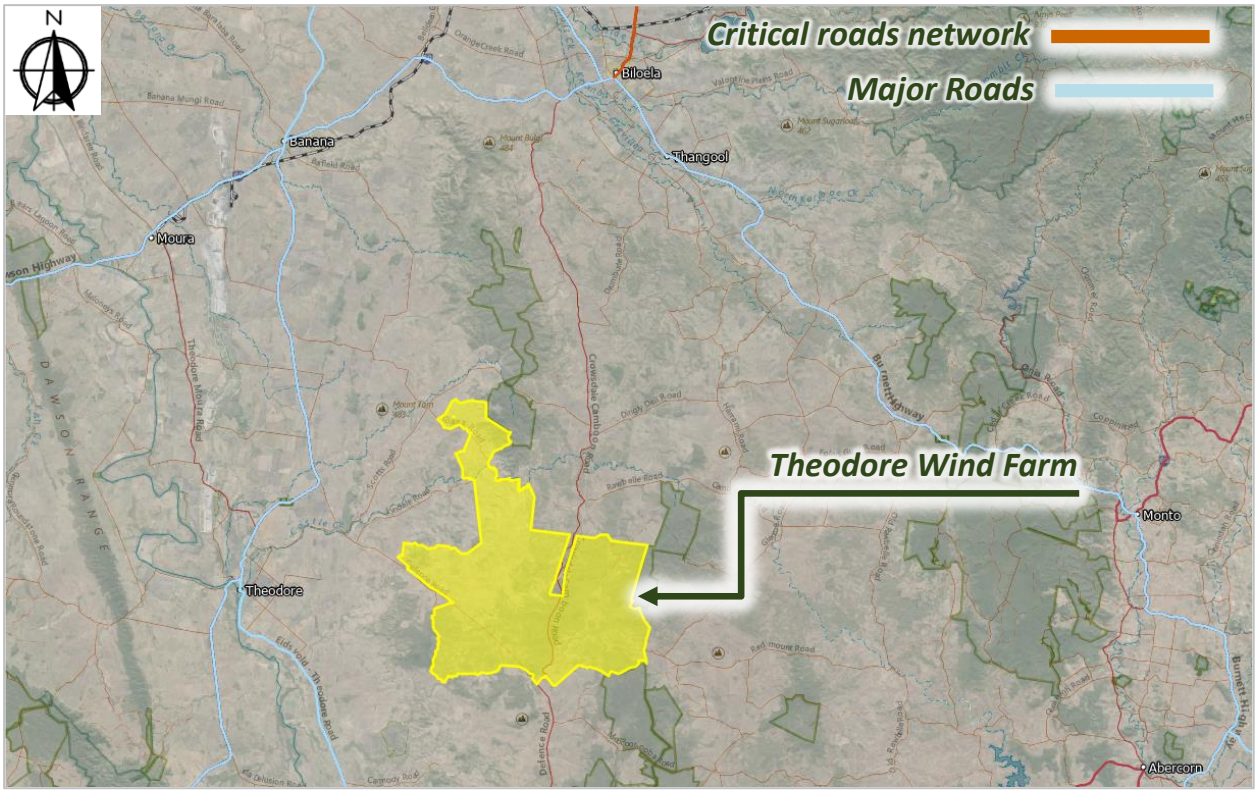

Figure 2.8 Critical Roads Network in Vicinity to the Project

The existing approved capacity of the route between the Port of Gladstone and the Project Area along the SCR network (illustrated in **Figure 2.3** to **Figure 2.8**), are as follows:

- Higher Mass Limits (HML) and One Tonne Mass Transfer (1TMT) vehicle combinations between the Port of Gladstone to Gracemere and is limited to the east coast roads;
- Type 1 Road Train and PBS 3A (RT1) appearing to be approved west of Gracemere to the Project Site; and
- SCR Critical Road Network covers most of the Project Transport Routes except for the Leichardt Highway.

The review indicates that the SCR has the potential to carry longer and heavier loads depending on loading combinations via the proposed Project Transport Route 1. Project Transport Route 1 does not carry the load combinations summarised between Biloela and Banana along the Dawson Highway.

3.0 State Controlled Road Access Assessment

3.1 Leichhardt Highway Summary

The Leichhardt Highway is a State Controlled Road (SCR) which will be utilized for OSOM delivery, equipment and materials delivery and workforce access for access to the local road network. The Leichhardt Highway is typically a two-lane, two-way road cross section and is approved for Type 1 Road train and PBS 3A (RT1) and is noted as a Critical roads network.

Table 3.1 provides a summary of the existing and observed parameters of the Leichhardt Highway in vicinity to the local road network access.

Table 3.1 Leichhardt Highway Design Parameters

Parameter	East Bound	West Bound
Posted speed limit	100km/h	100km/h
Design speed adopted	110km/h (posted + 10km/h)	
Road width	3.5m Approx.	3.5m Approx.
Shoulders	Sealed with clear zones on either side	

3.2 SCR access to Local Road Network

Access to the local road network by OSOM vehicles is proposed to be undertaken from the Leichhardt Highway and Defence Road via the existing intersection. A review of the movement at the local road intersection was undertaken to review the existing arrangements and highlight potential shortfalls in the existing infrastructure.

The movement is identified as ID12 of PTR1 in the which is discussed in the Preliminary Route Assessment Report **(Section 3.2.5)** requires a left turn onto Defence Road from Leichhardt Highway, as illustrated in **Figure 3.1.**

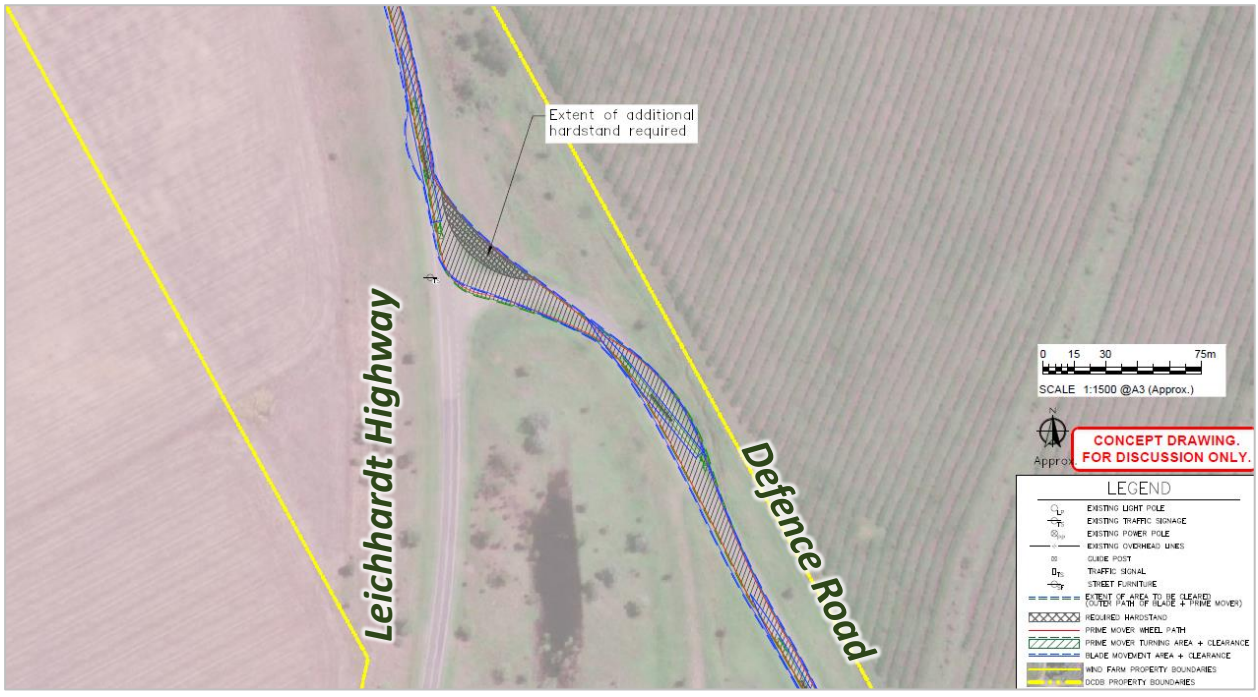

Figure 3.1 PTR Movement ID12 – Overall

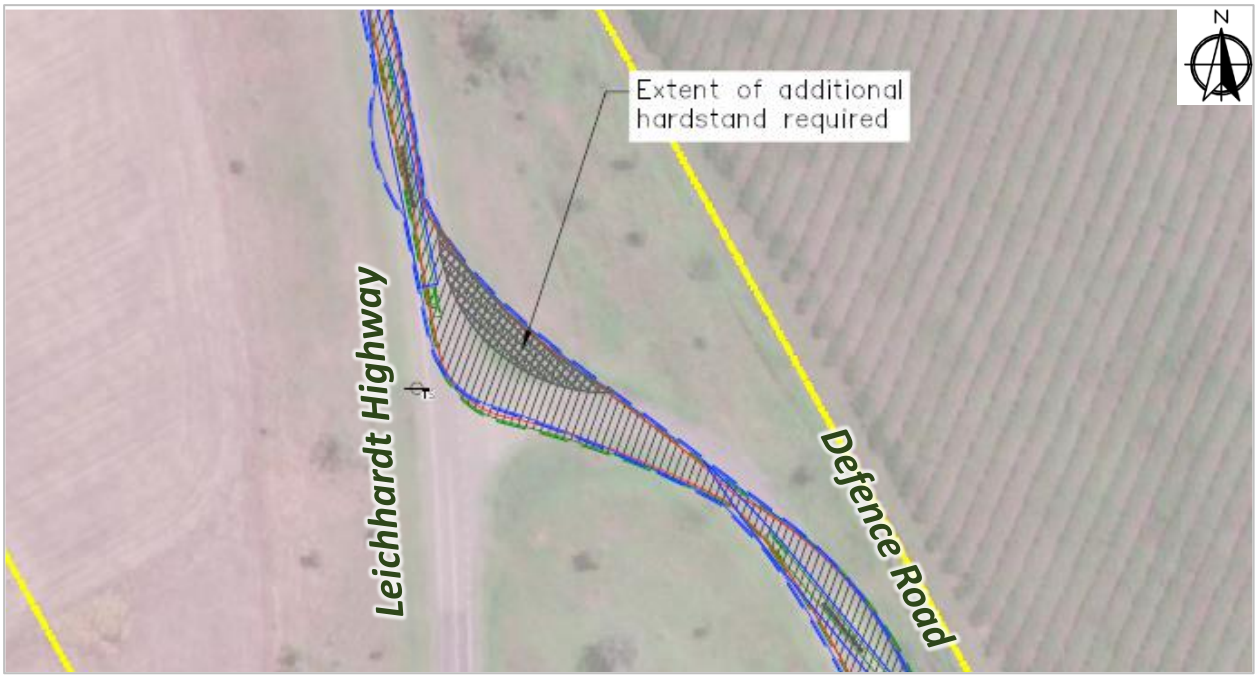

Figure 3.2 PTR Movement ID12 – Key Considerations

Figure 3.3 Street view of Leichhardt Highway and Defence Road intersection facing south

Figure 3.1 shows that additional hardstand is required between the north and eastern approaches in order to facilitate vehicle movements. However, this hardstand is to act as an extension of the intersection, with standard traffic movements to remain consistent.

3.3 SCR Intersection Review

The existing turn treatment arrangement at the intersection of Leichardt Highway and Defence Road is illustrated in **Figure 3.4** and consists of:

- Basic Left (BAL) Turn Treatment; and
- Simple Left (SL) Turn Treatment.

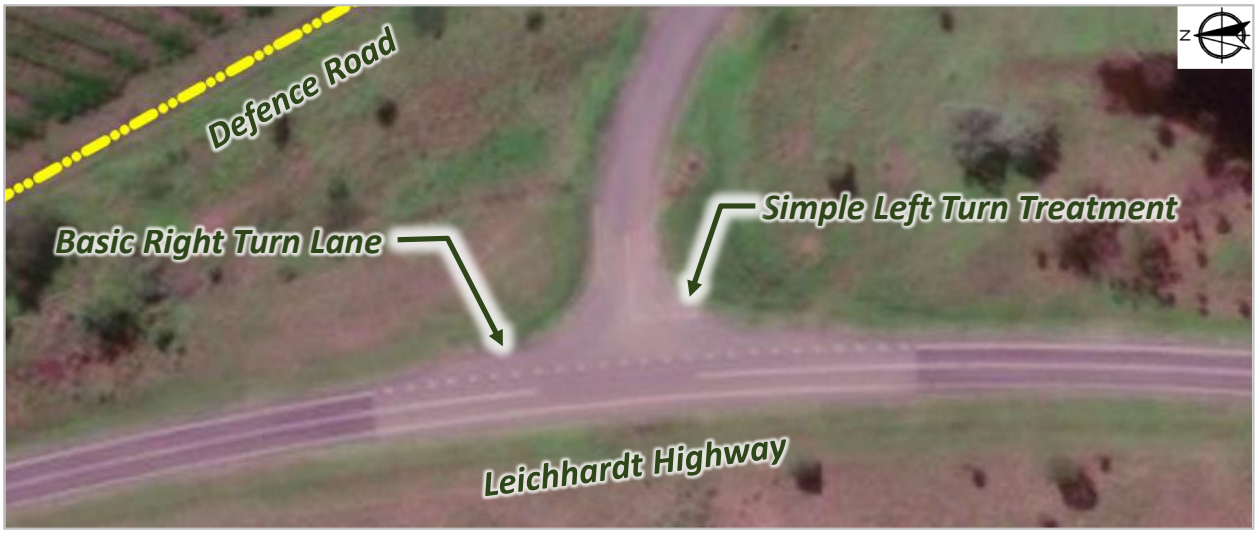

Figure 3.4 Existing Turn Treatment Arrangement

A review of the existing parameters versus the requirements outlined in Austroads Guide to Road Design *Part 4a: Unsignalised and Signalised Intersection* Figure 8.2 for Basic left turn lane configuration has been undertaken. The BAL measures 35m in length which appears appropriate for a design speed of 110km/h in accordance with Table 8.1.

It is noted that the current arrangement may be sufficient for the likely low turn volumes currently generated by Defence Road.

3.3.1 Sight Distance Requirements

Sight distances were assessed at the intersection of Leichhardt Highway and Defence Road against the Department of Transport and Main Roads *Road Planning and Design Manual (RPDM) Edition 2: Volume 4a* in accordance with Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD4a).

Table 3.2 provides a summary of the recommended Safe Intersection Sight Distance (SISD) to/from the Leichhardt Highway / Defence Road intersection.

Table 3.2 Sight Distance Review

Parameter	East bound	West bound
Road Grade	Generally flat	
SISD AGRD4a	285m	285m
Reaction Time	2.0s	
Available Sight Distance		
To/From Defence Road	> 285m	> 285m

The available sight distances are illustrated in **Figure 3.5** to/from the Leichhardt Highway / Defence Road intersection.

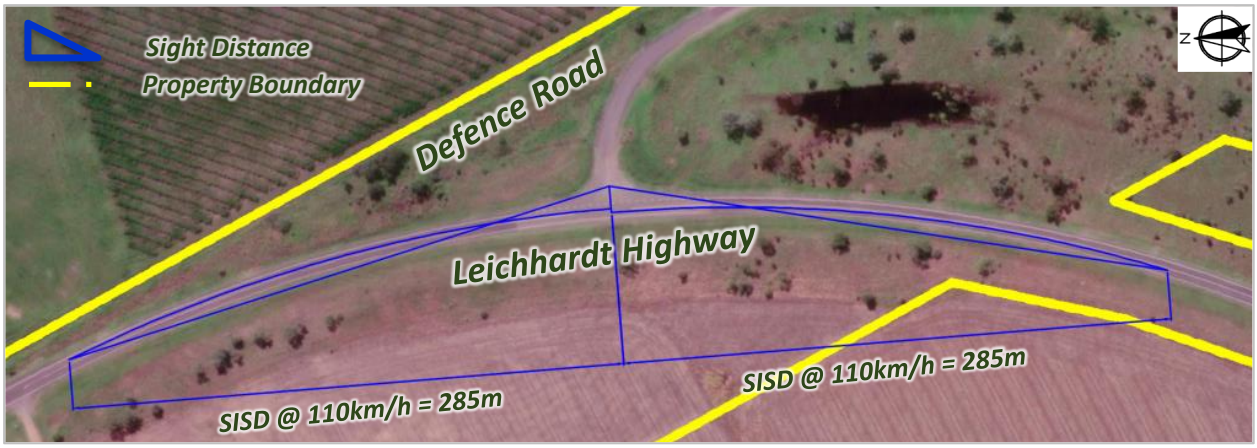

Figure 3.5 Safe Intersection Sight Distance – Leichhardt Highway / Defence Road intersection

Sight distances to/from Defence Road were observed on site and are shown in **Figure 3.6** and **Figure 3.7.**

Figure 3.6 Leichhardt Highway / Defence Road intersection facing north from Leichhardt Highway

Figure 3.7 Leichhardt Highway / Defence Road intersection facing south from Leichhardt Highway

Based on the design speed of 110km/h and the available sight distances at the Leichhardt Highway / Defence Road intersection exceed AGRD4a SISD requirements.

3.4 Road Crash History Review

A review of the road crash history on both Leichhardt Highway and Defence Road 1500m from the intersection, was undertaken using the road crash data available from the Queensland Globe database (2001-2023).

A total of two (2) road crashes were observed over the time period with the latest occurring in 2018 in the vicinity of the intersection of Leichhardt Highway and Defence Road as illustrated in **Figure 3.8.**

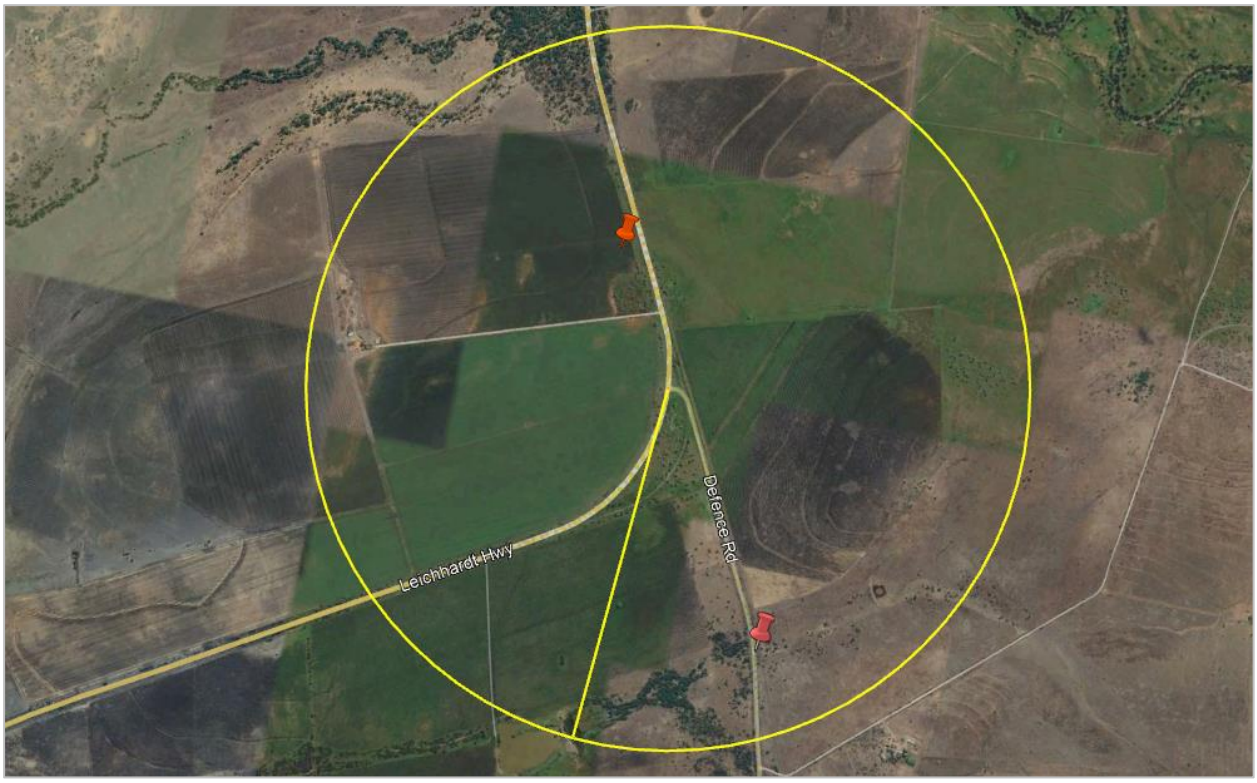

Figure 3.8 Recoded Road Crashes within 500m of intersection

A summary of the of the Road Crash History between 2001 – 2022 is provided in **Table 3.3.**

Table 3.3 Summary of Road Crash History (2001 – 2022)

Crash ID	Year	Crash Severity	Crash Type	DCA	Description
Intersection of Leichhardt Highway and Defence Road (Approx. 150.168188°, -24.830715°)					
Nil					
Leichhardt Highway within 500m of Defence Road					
247651	2005	Medical Treatment	Single Vehicle	704	Off Path-Straight: Right Off Causeway Hit Object
247805	2018	Hospitalisation	Single Vehicle	801	Off Path-Curve: Off Causeway Right Bend

Key items to consider based on the publicly available data as summarised in **Table 7.4**, are as follows:

- There has not been a crash since 2018;
- All crashes have been single vehicle and off path in nature suggesting other factors are at play; and
- None of the crashes are located in proximity to the intersection of the Leichhardt Highway and Defence Road.

Based on the limited number of crashes recorded in the last 10 years, the current traffic volumes, and the lack of crash clusters, it can be concluded that there is no specific road feature or design deficiency at this location which may be directly contributing to the recorded vehicle crashes.

4.0 Local Road Network Summary

A review of the local road network has been undertaken against the following:

- Banana Shire Planning Scheme Policy 2021 (Council PSP);
- Capricorn Municipal Development Guidelines *Geometric Road Design D1* (Issue 10 Dec 2022);
- Australian Standards AS2890.1 to 6 *Parking Facilities*; and
- Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD4a).

A review of the Banana Shire Planning Scheme *Schedule 8.4.3 Transport Network desired standards of service* refers to the *Capricorn Municipal Design Guidelines* for further information regarding geometric road design and classification.

4.1 Road Network Summary

Banana Shire Council does not have a clearly defined road hierarchy map, so details were inferred from a road's inclusion in the 'Local Road of Regional Significance Network.'

Details regarding the design criteria of each class of road can be found from *Annexure D01A Revision 1 September 2022* within the *Capricorn Municipal Development Guidelines Geometric Road Design D1 (Issue 10 Dec 2022)*.

A summary of the key characteristics is contained in **Table 4.1** and illustrated in **Figure 4.1.**

Table 4.1 Banana Shire Council Local Road Network

Road	Surface	Classification	Traffic Gen. (AADT)*
Defence Road	Sealed from Leichardt Highway to Crowsdale Camboon Road, unsealed past this point	Rural Major Collector[&]	>250
Crowsdale Camboon Road	Unsealed	Rural Major Collector[&]	>250
Hamiltons Road	Unsealed	Rural Major Access[&]	40-99

**AADT defined by Capricorn Municipal Development Guidelines Geometric Road Design D01A*
[&]Classification inferred from 'Local Roads of Regional Significance Network'

The road characteristics have been reviewed in accordance with *Capricorn Municipal Development Guidelines Geometric Road Design D1G* which note a desirable speed of 100km/h with a formation width of 8m for all three (3) roads.

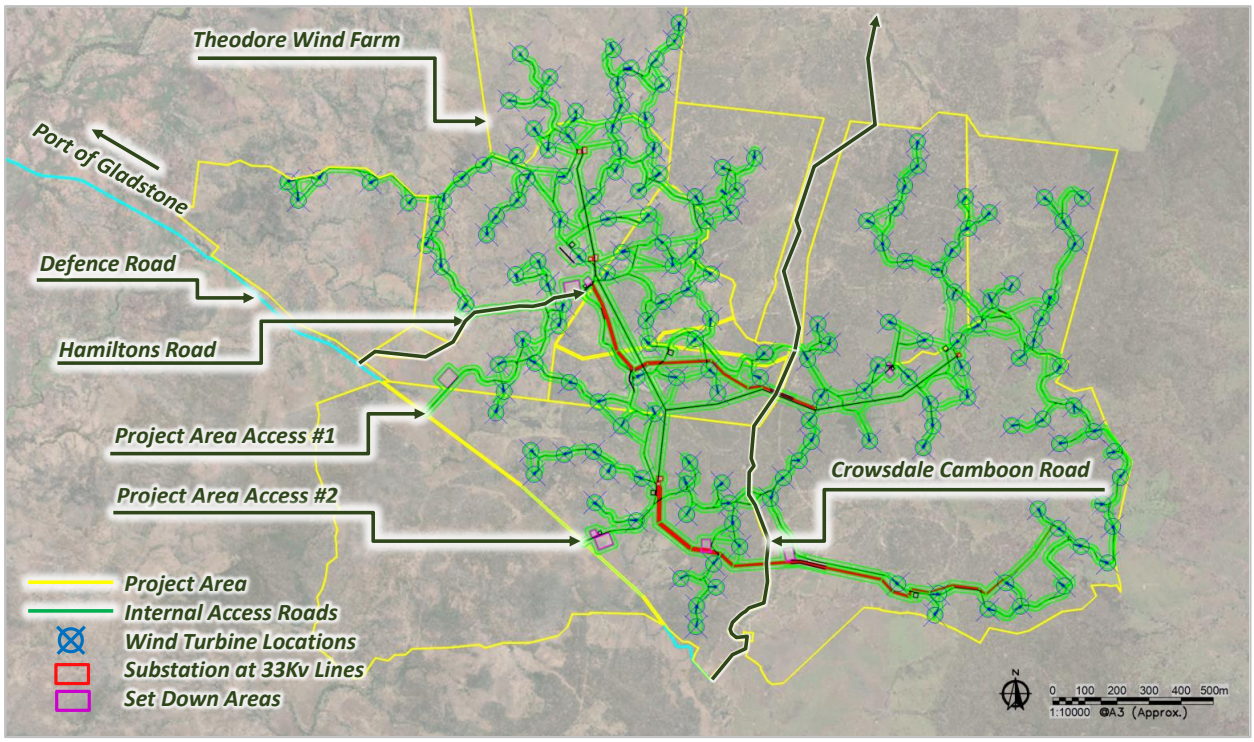

Figure 4.1 Local Road Network

4.1.1 Floodway and Cattle Grid Structures

Data was sourced from a site visit along Defence Road. A summary of the location (latitudes and longitudes of the existing floodway structures was listed in **Table 4.3**. The floodway structures are located between crests, sags and on back-to-back curves and therefore require further consideration from a geometric perspective.

The location of these floodways is shown in **Figure 4.2**, and a summary of the floodway structures is provided in **Table 4.3** along Defence Road fronting the two (2) proposed Project Area Access locations.

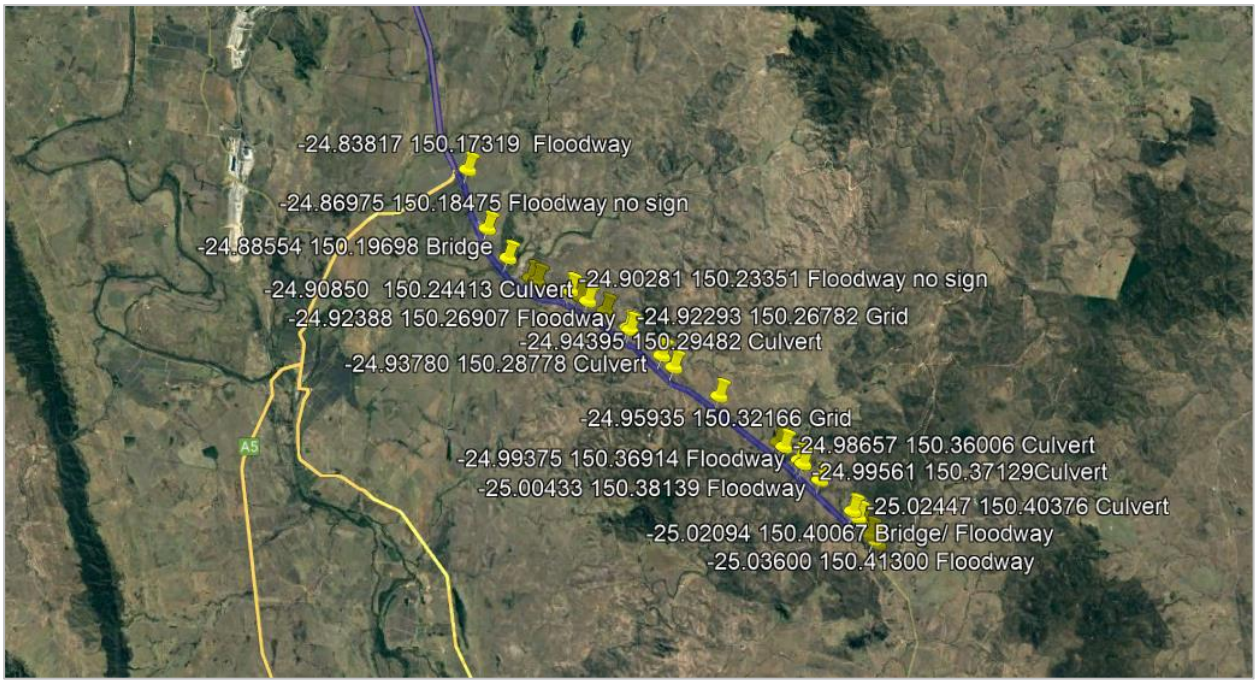

Figure 4.2 Existing Floodway Structures along Defence Road

The floodway structures, in some instances, restrict two-way traffic movements from occurring simultaneously. Limited advanced warning signage is provided to identifying the narrow structures to motorists, with limited control measures (i.e., Give Way signage) to manage the vehicle crossing movements in a two-way, one-lane configuration.

The latitude and longitude of the floodways are summarised in **Table 4.3**.

Table 4.3 Existing Floodway Summary on Defence Road

Structure	Lat.	Long.
Floodway	-24.83840°	150.17319°
Floodway	-24.86975°	150.18475°
Bridge	-24.88554°	150.19698°
Grid	-24.89621°	150.21049°
Culvert	-24.89795°	150.21405°
Culvert	-24.90850°	150.24413°
Grid	-24.91393°	150.25433°
Grid	-24.92293°	150.26782°
Floodway	-24.92388°	150.26907°
Culvert	-24.93780°	150.28778°
Culvert	-24.94395°	150.29482°
Floodway	-24.97643°	150.32118°
Grid	-24.95935°	150.32166°
Grid	-24.98414°	150.35666°
Culvert	-24.98657°	150.36006°
Floodway	-24.99375°	150.37129°
Culvert	-24.99561°	150.37129°
Floodway	-25.00433°	150.38139°
Bridge/Floodway	-25.02094°	150.40067°
Culvert	-25.02447°	150.40376°
Floodway	-25.02675°	150.40549°
Grid	-25.03333°	150.41068°
Floodway	-25.03600°	150.41300°
Floodway	-25.03850°	150.41559°

A number of the floodways may require widening for two (2) key reasons, as follows:

- The operation of the floodways operates as a two-way, one lane arrangement; and
- Depending on the existing configuration of the structure to carry the low loader configuration selected to transport the wind turbine components.

Where insufficient sight distance is achieved, signage should be installed to improve advance warning of two-way, one lane arrangement during increased period of traffic along Defence Road. the typical arrangement is illustrated in **Figure 4.3.**

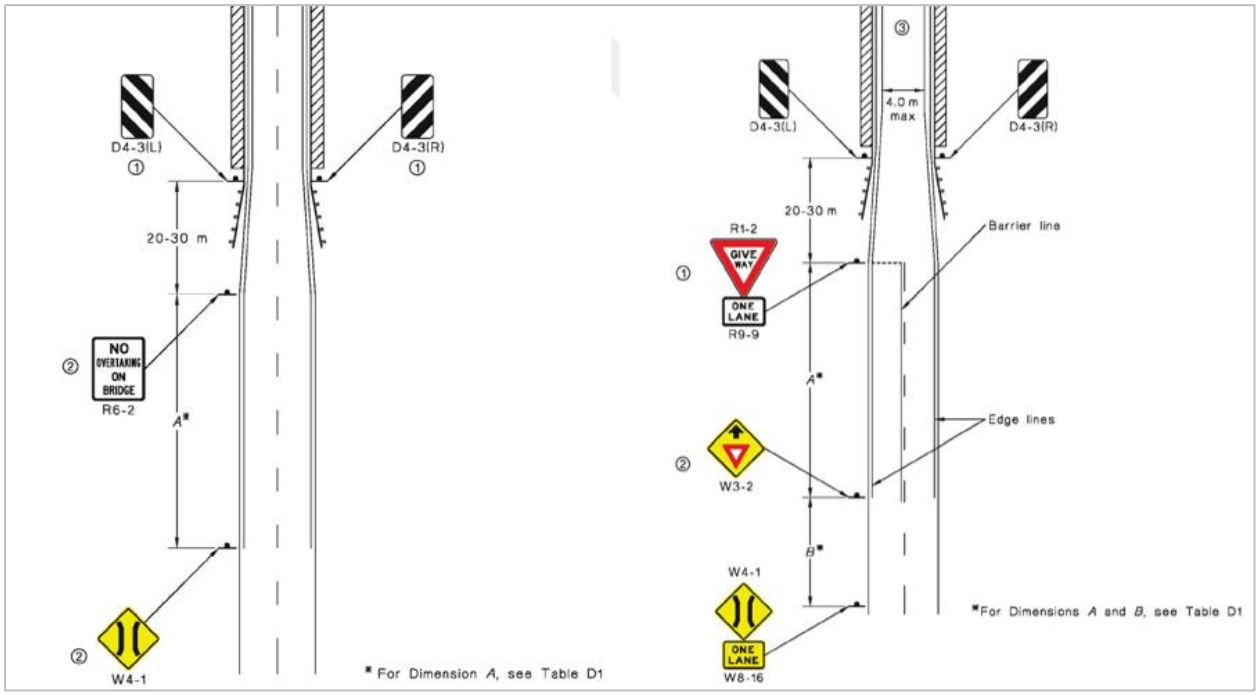

Figure 4.3 AS1742.2 Narrow Bridge and One-way with Giveway Treatments

5.0 Project Area Access Arrangements

A review of the local road network and proposed accesses has been undertaken against the following:

- Banana Shire Planning Scheme Policy 2021 (Council PSP);
- Capricorn Municipal Development Guidelines *Geometric Road Design D1* (Issue 10 Dec 2022);
- Australian Standards AS2890.1 to 6 *Parking Facilities*; and
- Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD4a).

5.1 Project Area Access Review

The Theodore Wind Farm will be accessed from two (2) locations along Defence Road (as illustrated in **Figure 5.1**). A site visit was undertaken on the 6th of February 2023 to review the proposed Project Area Access Locations to confirm if the identified locations are workable from a traffic engineering perspective.

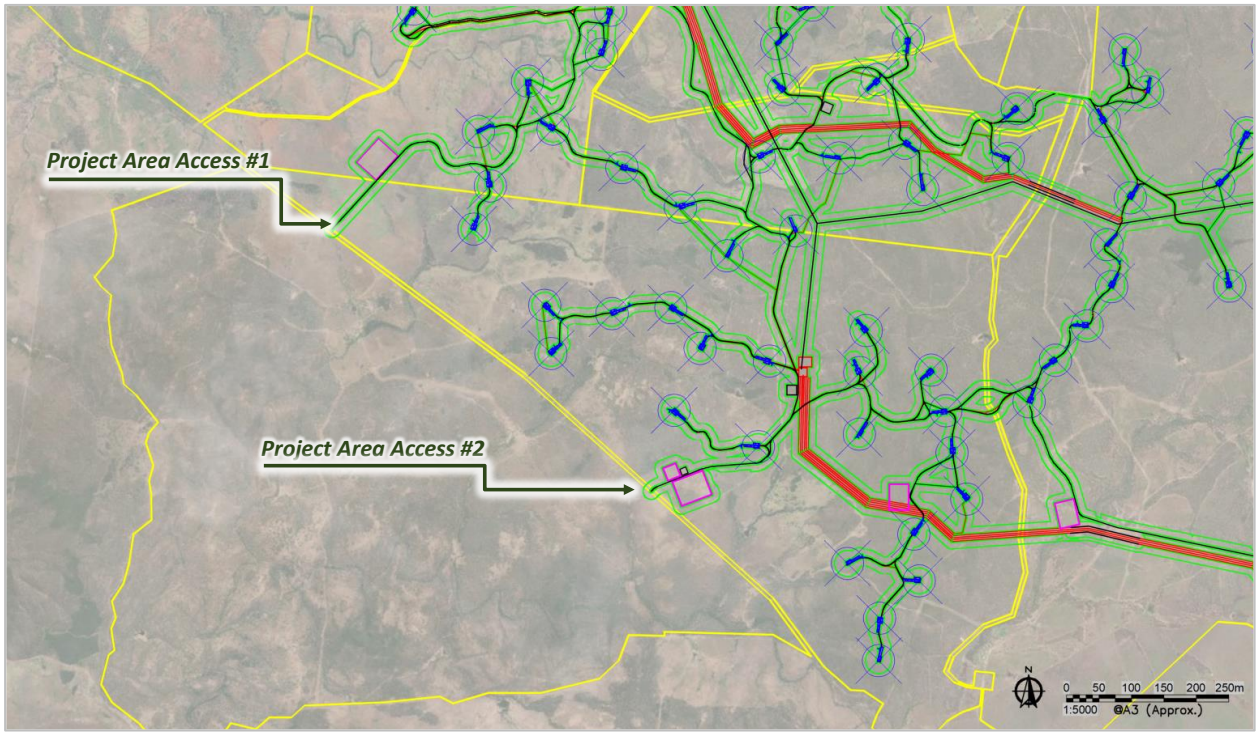

Figure 5.1 Local Access to the Theodore Wind Farm

A summary of design parameters for review of each access location on Defence Road can be found in **Table 5.1.**

Table 5.1 Defence Road Existing Parameters

Parameter	Existing Conditions
Posted Speed Limit	100km/h
Formation Width	8m approx.
Road Width	6.5m approx. sealed
Shoulders	Unsealed and Grassed with Table Drains

The locations of these Project Area Accesses are listed in **Table 5.2**.

Table 5.2 Defence Road Project Area access Locations

Access Point	Lat.	Long.	Access Type
Project Area Access #1	-24.968°	150.335°	To be newly constructed
Project Area Access #2	-25.006°	150.383°	

The following section discusses the two (2) Project Area Access locations in further detail.

5.1.1 Project Area Access Sight Distance Requirements

Project Area Access #1 and Project Area Access #2 will be constructed as new accesses to the Project Area and have been assessed against in accordance with Australian Standards *Parking facilities Part 1: Off-street car parking* (AS2890.1) and *Part 2: Off-Street Commercial Vehicle Facilities* (AS2890.2).

The sight distance requirements are summarised in **Table 5.3.**

Table 5.3 AS2890 Project Area Access Sight Distance Review

Parameter	North bound	South bound
Desirable 5s Gap (100km/h)	139m	139m
Available Sight Distance		
To/From Project Area access	> 139m	> 139m
Sufficient Sight Distance	✓	✓

A Construction Traffic Management Plan (CMTP) should be implemented, and it is expected a reduced speed limit will be posted along Defence Road for the duration of the Project construction. Therefore, the sight distance requirements are summarised in **Table 5.4** for a 60km/h posted speed limit in accordance with AS2890.1 and AS2890.2.

Table 5.4 AS2890 Project Area Access Sight Distance Review

Parameter	North bound	South bound
Desirable 5s Gap (100km/h)	83m	83m
Available Sight Distance		
To/From Project Area access	> 83m	> 83m
Sufficient Sight Distance	✓	✓

As summarised in **Table 5.3** and **Table 5.4**, the sight distance requirements to and from the proposed Project Area accesses appear to have sufficient sight distances based on the observed operational speed limit of 100km/h and would be further improved by reducing the speed limit to 60km/h during the construction period.

5.1.2 Project Area Access #1

Location: The North-Eastern side of Defence Road at approx. -24.968°, 150.335°.
Site Summary: Project Area Access #1 appears workable from a traffic perspective, noting:

- There appears to be minimal vegetation which may impede the rear swept path of the WTB swinging into the site as Illustrated in **Figure 5.2**;
- The topography of the land appears suitable to move longer loads from Defence Road onto the Project Area as Illustrated in **Figure 5.3**; and
- The proposed Project Area access provided adequate sightlines to the north and south as shown in **Figure 5.4** to **Figure 5.7**.

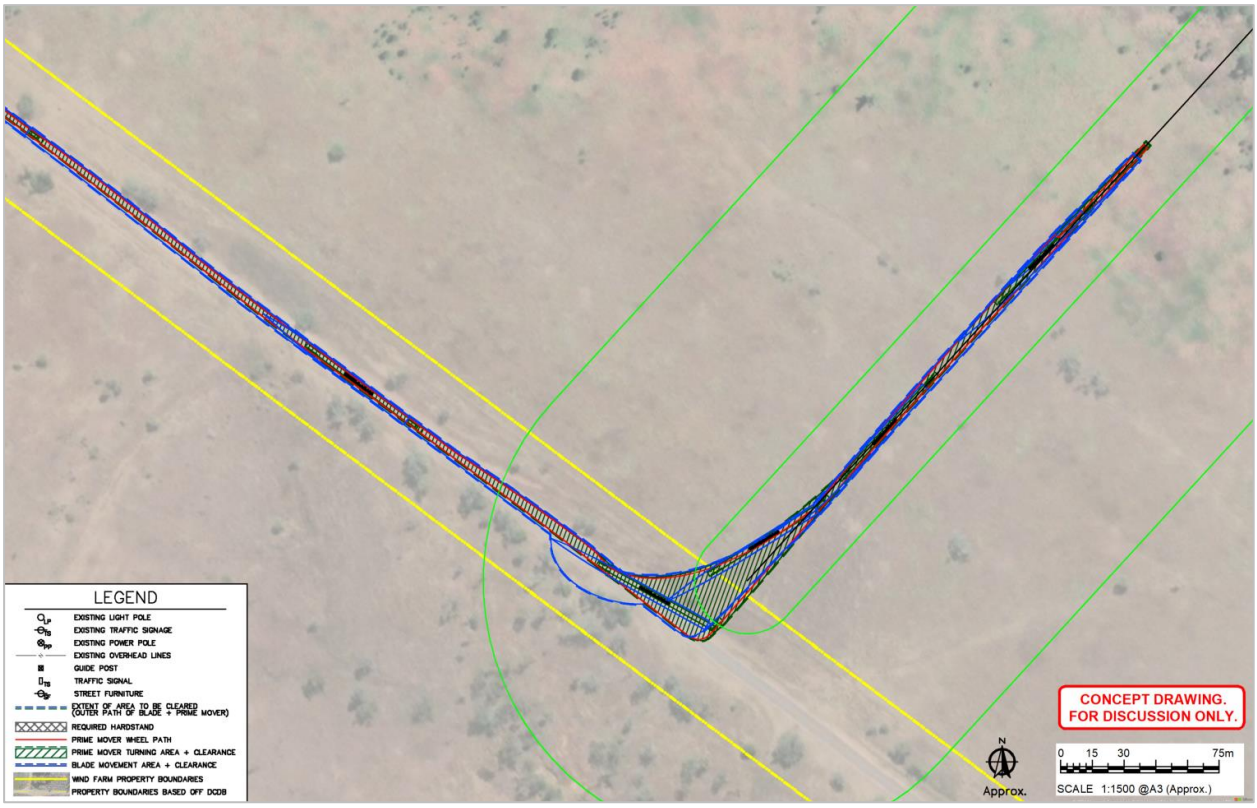

Figure 5.2 Project Area Access #1 Swept Path of Wind Turbine Blade Transport Accessing Project Site

Figure 5.3 Street View of Project Area Access #1

Figure 5.4 Street View facing North from Access #1 along Defence Road

Figure 5.5 Street View facing South from Project Area Access #1 along Defence Road

Figure 5.6 Street View facing South to Project Area Access #1 along Defence Road

Figure 5.7 Street View facing North from Project Area Access #1 along Defence Road

5.1.3 Project Area Access #2

Location: The North-Eastern side of Defence Road at approx. -25.006°, 150.383°.
Site Summary: Project Area Access #1 appears workable from a traffic perspective, noting:

- The topography of the land appears suitable to move longer loads from Defence Road onto the Project Area;
- There appears to be minimal vegetation which may impede the rear swept path of the WTB swinging into the site as Illustrated in **Figure 5.8**; and
- The proposed Project Area access provided adequate sightlines to the north and south as shown in **Figure 5.9** to **Figure 5.12**.

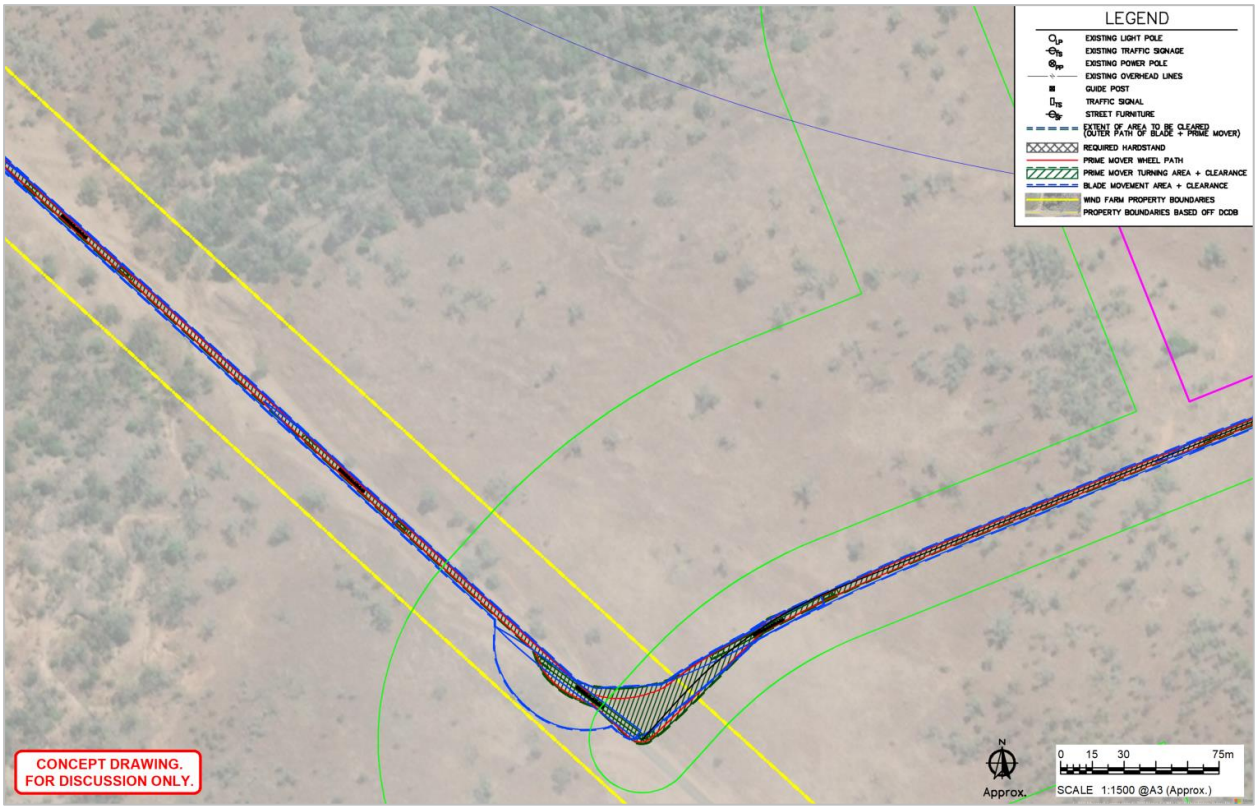

Figure 5.8 Project Area Access #2 Swept Path of Wind Turbine Blade Transport Accessing Project Site

Figure 5.9 Street View facing South from Project Area Access #2 along Defence Road

Figure 5.10 Street View facing South to Project Area Access #2 along Defence Road

Figure 5.11 Street View facing North from Project Area Access #2 along Defence Road

Figure 5.12 Street View facing North to Project Area access #2 along Defence Road

5.1.4 Project Area Access Summary

Project Area Accesses appear to have sufficient sight distances to/and from and are positioned clear of dense vegetation and topographical constraints. The Project Area Accesses appear reasonable from a traffic engineering perspective.

6.0 Traffic Generation and Distribution

6.1 Overview

Section 6.0 provides a preliminary assessment of the potential traffic generated by the Project and subsequent impacts on the existing transport network surrounding the Project site. The inputs which form the basis of our review are based on a "first principles" approach and provide approximate volumes generated based on previously completed assessments. The preliminary assessment is outlined in the following sections.

6.2 Background Traffic Volumes

The 2022 Annual Average Daily Traffic (AADT) for the most relevant State Controlled Road traffic census data location has been sourced from DTMR and summarised in **Table 6.1.** The Table also includes the proportion of heavy vehicles which use the road segment and the growth over a 10-year period.

Existing traffic volumes for Leichhardt Highway have been sourced from the TMR Traffic Census at location 21km north of Defence Road.

Table 6.1 2022 DTMR Census data for Leichhardt Highway

Traffic Count Site	AADT	% of HV	Road Section	ID	10-year Growth	In relation to Defence Road
60050	830	51.03%	Leichhardt Highway (Westwood - Taroom)	26A	-0.34%	21km North

The growth rate over the last 10 years is -0.34%, therefore, a 0% background growth rate has been applied to the traffic volumes for the purposes of this assessment.

6.3 Project Traffic Volumes

Information provided by the proponent has been used to estimate traffic volumes for the construction phase of the Project. The proposes a construction timeframe of circa 48 months over four (4) stages of development due to the number of wind turbine installations, and four (4) sub-stations to be constructed.

Each phase of the Project is planned to continue into the next Project stage. I.e., construction of internal tracks, site establishment, etc. once completed will move onto the next stage. E.g. civil works on later stages will likely coincide with turbine erection on the first stages.

A number of key points from the *Assessment of Traffic Loadings During Construction – Rev 1.0*, are as follows:

- All movements from Leichhardt Highway on the northern end of Defence Road due to the condition of approaching the Project from the south;
- Site vehicles are expected to circulate on internal tracks/roads within the Project site rather than utilising Defence Road due to minimise Biosecurity risk and improve safety;
- The site vehicles are proposed to access the main site entrance off Defence Road;
- The Project area accesses will be maintained for the duration of the project;
- The use of the Project area access will be used primarily to reduce construction traffic along Camboon Road.

The estimated traffic generated by the proposed Project is set out in **Appendix B**.

6.3.1 Light Vehicle Traffic Generation

Light vehicle traffic generation has been outlined in the *Assessment of Traffic Loadings During Construction* (**Appendix B**), which includes:

- Works camp locations is to be determined;
- Work camps may be located Theodore, Banana or Biloela;
- Busses are likely to be provided with the use of private light vehicles discouraged;
- Travel to the Project Area over a 7-day work week is anticipated to be between 06:00 - 07:00 AM and 16:00 - 19:00 PM;
- A conservative adoption of 80% light vehicles accessing the Project area during peak periods.

For the purposes of this assessment, the full passenger vehicle movements have been adopted for a highly conservative assessment and have been provided for typical and peak light vehicle movement periods, which is summarised in **Tables 6.2.**

Table 6.2 Anticipated Light Vehicle Movements

Movements	Typical	Peak
Daily Average Two-Way Movements	50-80 vpd	100-110 vpd
Daily Average One-Way Movements	25-40 vpd	50-55 vpd
Peak Hour Movements	80%	
Peak Movements Volume	20-32 vph	40-44 vph

As summarised in **Tables 6.2**, the Project anticipates during the peak hour the following one-way movement volumes of light vehicles:

- Typical - 20-32 vph; and
- Peak - 40-44 vph.

6.3.2 Heavy Vehicle Traffic Generation

Heavy vehicle traffic generation has been outlined in the *Assessment of Traffic Loadings During Construction* (**Appendix B**), which includes:

- Heavy vehicle traffic is predominantly associated deliveries of construction materials, plant and equipment.
- Heavy vehicle traffic would be day traffic from the nearest major centres of Gladstone and Biloela;
- Heavy vehicles could be expected to the Project Area over a 7-day work week between 7:00 AM to 17:00PM resulting in arrivals on site late morning/early afternoon resulting in arrivals on site between 11:00 and 15:00PM.

A 20% of the typical and peak heavy vehicle movements have been adopted for a highly conservative assessment, given that heavy vehicle movements may be more likely between 11:00 and 15:00PM. The daily average typical and peak volumes for the first six (6) months and plus six (6) months are summarised in **Tables 6.3.**

Table 6.3 Anticipated Heavy Vehicle Movements

Movements	Typical	Peak
Daily Average (Months 1-6) Two-Way Movements	50-75 vpd	100 vpd
Daily Average (Months 1-6) One-Way Movements	25-38 vpd	50 vpd
Peak Hour Movements	20%	
Peak Movements Volume	5-8 vph	10 vph
Daily Average (Months 6+) Two-Way Movements	60-80 vpd	100 vpd
Daily Average (Months 6+) One-Way Movements	30-40 vpd	50 vpd
Peak Hour Movements	20%	
Peak Movements Volume	6-8 vph	10 vph

As summarised in **Tables 6.3**, the Project anticipates during the peak hour the following one-way movement volumes of heavy vehicles:

- Months 1-6 - Typical - 5-8 vph
- Months 1-6 - Peak - 10 vph;
- Months 6+ - Typical - 6-8 vph; and
- Months 6+ - Peak - 10 vph.

The number of heavy vehicle trips per week may change dependent on the component shipment time frames and overlapping construction phases. Whilst the construction period will involve larger vehicles transporting OSOM loads, these will be carefully controlled to avoid peak periods, and will be limited in frequency by specialist haulage vehicle availability, pilots, and escorts. We have therefore adopted the more intensive early civil works phase as a sensitivity test to assess the potential peak week and peak hourly traffic volumes.

6.3.3 Typical Daily / Peak Hour

Table 6.4 summarises the estimated average day/peak hour potential vehicle trips expected to access the site during the approximate construction phase (48 Month period). This is based on a seven (7) day work week, a uniform number of component deliveries and no substantial delays due to weather or other causes.

Table 6.4 Construction phase traffic: Typical Daily / Peak Hour

Scheduled Period	Period	HV	LV	Total Vehicles
Months 1-6	Daily	38	40	78
	Peak	8	32	40
Months 6+	Daily	40	40	80
	Peak	8	32	40

Table 6.4 indicates the approximate number of vehicle trips expected to access the site during the peak demand, is in the order of 40-80 one-way vehicle trips in the AM and PM peak periods.

6.3.4 Peak Daily / Peak Hour

Table 6.5 summarises the estimated peak day/peak hour potential vehicle trips expected to access the site during the approximate construction phase (48 Month period). This is based on a seven (7) day work week, a uniform number of component deliveries and no substantial delays due to weather or other causes.

Table 6.5 Construction phase traffic: Peak Daily / Peak Hour

Scheduled Period	Period	HV	LV	Total Vehicles
Months 1-6	Daily	50	55	105
	Peak	10	44	54
Months 6+	Daily	50	55	105
	Peak	10	44	54

Table 6.5 indicates the approximate number of vehicle trips expected to access the site during the peak demand, is in the order of 54-105 one-way vehicle trips in the AM and PM peak periods.

6.3.5 Operational Phase Traffic Estimate

The proposed Project will operate seven (7) days per week, 365 days per year and require up to 20 light vehicles to access the site each day. We have assumed that each of these vehicles may generate 40 trips per day (20 in and 20 out).

The Project is expected to also require servicing once a week by a refuse collection vehicle and occasional larger maintenance vehicles, when needed. Therefore, we estimate that the Project may generate up to 42 (21 in and 21 out).

7.0 Traffic Impact Assessment

A turn warrant assessment was undertaken at the Leichhardt Highway and Defence Road intersection in accordance with Austroads *Guide to Road Design Part 4A* and the Department of Transport and Main Roads' (DTMR) *Road Planning and Design Manual.* The turn warrants assessment identified the turn-lane treatment/s that may be required to support turning volumes during Project construction and operation.

A growth rate of 0% has been applied to the Defence Road background traffic volumes based on the negative five-year growth rate listed in the AADT Segment data by DTMR Census data (refer **Table 6.1**).

The construction phase commencement is anticipated to be November 2025 and be in the order of 48-months duration. We have adopted the early works period as outlined in **Section 6.3** as a highly conservative approach and have incorporated the following:

- 15% of the 2022 AADT segment volume for the count site of 60050 for the peak hour, applied as 50%/50% north/south split on the Leichhardt Highway in summarised in **Table 6.1**; and
- 100% of the traffic volumes have been applied to approach/egress Defence Road from the Leichhardt Highway from the North.

The assessment does not take into consideration the existing traffic volumes at the Leichhardt Highway and Defence Road intersection.

The background traffic volumes and peak hour traffic generation is illustrated in **Figure 7.1.**

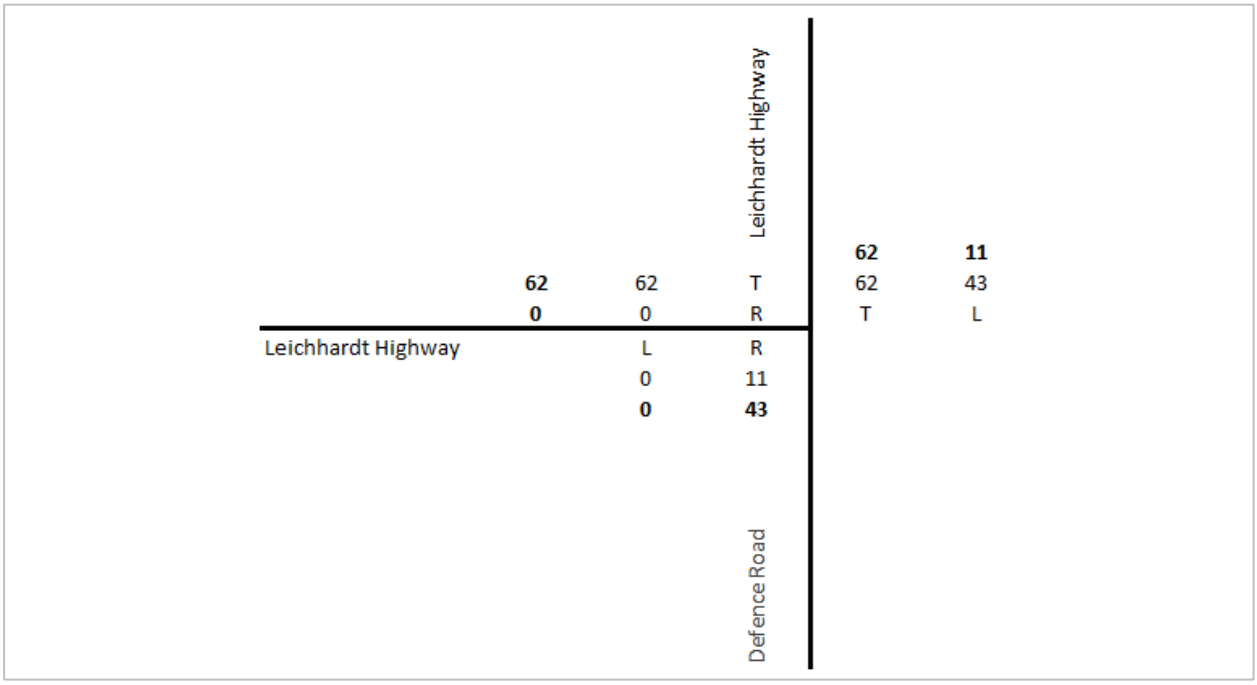

Figure 7.1 Background traffic and peak construction traffic generation

A turn warrant assessment based on the 100km/h posted speed limit was undertaken for the background traffic and peak hour traffic generation and is provided in **Figure 7.2.**

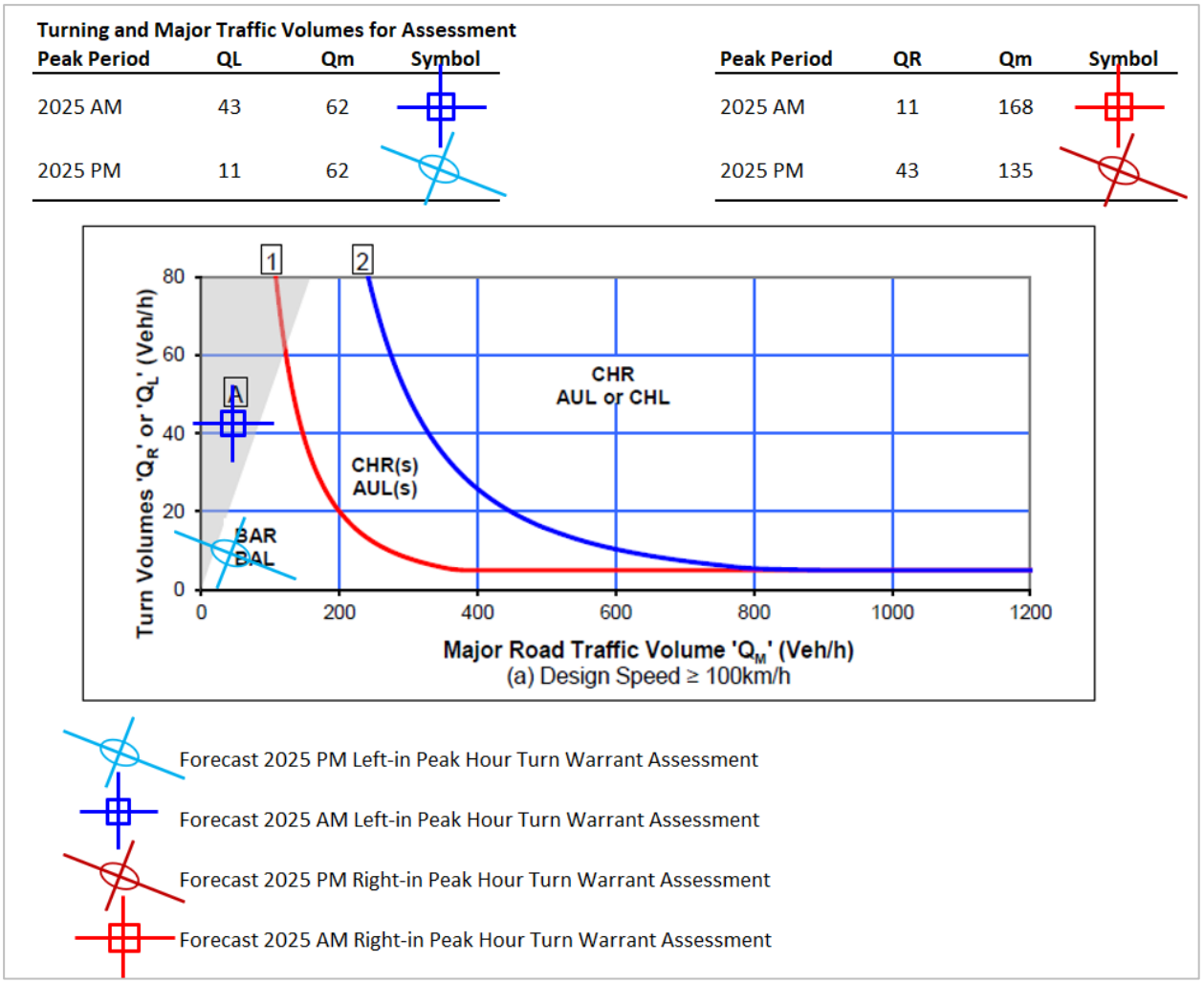

Figure 7.2 Turn Warrant Assessment results for Background Traffic and Peak Construction Traffic Generation (Leichhardt Highway / Defence Road Intersection)

Table 7.1 summarises the turn warrant treatments identified in **Figure 7.2.**

Table 7.1 Turn Warrant Findings Summary (Defence Road / Leichhardt Highway intersection)

Traffic Scenario	Left-Turn		Right-Turn	
	AM	PM	AM	PM
Peak Hour Construction Traffic Scenario	BAL	BAL	No right Turns into Project proposed as part of this application	

The turn warrants analysis indicated that only a BAL turn treatment arrangement is required for the left turn movements into Defence Road from the Leichhardt Highway based on the existing volumes and peak construction traffic during the assessed periods.

As summarised in **Section 3.3**, the existing arrangements provide a BAL treatment. Therefore, no upgrade to the existing intersection arrangements is required based on the traffic information provided.

8.0 Summary and Recommendations.

8.1 Summary

Theodore Energy Development Pty Ltd (TED) (the Proponent) is developing the Theodore Wind Farm (the Project), located approximately 22 km east of Theodore and 50 km south of Biloela in the Banana Shire Council Local Government Area, Queensland. The closest major town is Gladstone, 150 km northeast of the proposed Project, with Queensland's capital Brisbane located 380 km southeast of the Project.

The Project consists of up to 170 Wind turbines and ancillary infrastructure including, but not limited to, access tracks, collector stations, overhead and underground electrical cabling, hardstands, and an operations and maintenance compound.

Key findings are summarised, as follows:

- The Project is proposed to be accessed from the state-controlled road network via the Leichhardt Highway and Defence Road intersection;
- The existing Leichhardt Highway / Defence Road intersection configuration appear adequate based on the traffic generation information provided for the peak hourly construction traffic;
- Adequate sight distances to/from the intersection in accordance with Austroads *Guide to Road Design Part 4a*;
- Internal access tracks are intended to be utilised for the Project and improvements to the existing flat site may be undertaken for set down and car parking arrangements.

In light of the above, we recommend that the proposed Theodore Wind Farm Project be approved with reasonable and relevant conditions as set out above.

Please do not hesitate to contact John Dollisson or the undersigned on 07 3221 3503 if you have any queries regarding the above.

Yours faithfully,

Andrew Douglas
Director | Cambray Consulting Pty Ltd
BECivil (Hons) |MSc Env Man
FIEAust | CPEng | RPEQ 6691

APPENDIX A

Project Area access Swept Path Assessment

LEGEND

- EXISTING LIGHT POLE
- EXISTING TRAFFIC SIGNAGE
- EXISTING POWER POLE
- EXISTING OVERHEAD LINES
- GUIDE POST
- TRAFFIC SIGNAL
- STREET FURNITURE
- EXTENT OF AREA TO BE CLEARED (OUTER PATH OF BLADE + PRIME MOVER)
- REQUIRED HARDSTAND
- PRIME MOVER WHEEL PATH
- PRIME MOVER TURNING AREA + CLEARANCE
- BLADE MOVEMENT AREA + CLEARANCE
- WIND FARM PROPERTY BOUNDARIES
- PROPERTY BOUNDARIES BASED OFF DCDB

CONCEPT DRAWING.
FOR DISCUSSION ONLY.

N

Approx.

0 15 30 75m

SCALE 1:1500 @A3 (Approx.)

CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Site Access Assessment
Port of Gladstone To TWF
84.3m V172 Blade (R59) on 63m Trailer
Project Area Access #1

LOCATION
Theodore Wind Farm
West of Theodore, Queensland

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	05.07.24	Route Analysis - Preliminary	J.D.	A.D.

PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
ERM0123-02 // SK01

DATE
05.07.24

SCALE (A3)
As Shown

PREPARED FOR
Discussion Only

LEGEND

- EXISTING LIGHT POLE
- EXISTING TRAFFIC SIGNAGE
- EXISTING POWER POLE
- EXISTING OVERHEAD LINES
- GUIDE POST
- TRAFFIC SIGNAL
- STREET FURNITURE
- EXTENT OF AREA TO BE CLEARED (OUTER PATH OF BLADE + PRIME MOVER)
- REQUIRED HARDSTAND
- PRIME MOVER WHEEL PATH
- PRIME MOVER TURNING AREA + CLEARANCE
- BLADE MOVEMENT AREA + CLEARANCE
- WIND FARM PROPERTY BOUNDARIES
- PROPERTY BOUNDARIES BASED OFF DCDB

CONCEPT DRAWING.
FOR DISCUSSION ONLY.

N

Approx.

0 15 30 75m

SCALE 1:1500 @A3 (Approx.)

CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Site Access Assessment
Port of Gladstone To TWF
84.3m V172 Blade (R59) on 63m Trailer
Project Area Access #2

LOCATION
Theodore Wind Farm
West of Theodore, Queensland

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	05.07.24	Route Analysis - Preliminary	J.D.	A.D.

PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
ERM0123-02 // SK02

DATE
05.07.24

SCALE (A3)
As Shown

PREPARED FOR
Discussion Only

APPENDIX B

Potential traffic volumes for Project

Thedodore Wind Farm

Assessment of Traffic Loadings During Construction – Rev 1.0

Dated 2 October 2023

General

Theodore Wind Farm is being developed as a 160WTG wind farm in Western Central Queensland.

Construction is indicatively scheduled between November 2025 and December 2029.

The site will be developed as four stages, each connecting into a separate substation. For the purpose of this indicative assessment a rolling program of construction is assumed such that construction activities moves from one stage to the next progressively rather than completing each stage before moving to the next. As a result activities across the site will cover all aspects of wind farm construction simultaneously (eg civil works on later stages will likely coincide with turbine erection on the first stages) and the workforce and traffic loads will be larger than for a project completed in separate stages.

For the purpose of the assessment all traffic is considered to enter site along Defence Road from the north. Access along Defence Road from the south is not considered for this assessment due to the existing road condition. During construction access from the south will be discouraged although not prohibited.

This assessment does not include traffic associated with the grid construction (by Others) but assumes substation construction by RWE.

All traffic volumes are expressed as two-way journeys.

The estimated traffic volumes are based upon an initial assessment of construction duration and sequence and project design. Factors such as the impact of wet/dry season on construction activities have not been considered to date. Uncertainty in figures, particularly in regard to the peak traffic volumes could be +/- 20% .

Workforce

It is anticipated that the majority of the workforce for the site will be accommodated in dedicated off-site accommodation camp/s (location to be confirmed but likely to be within town boundaries Theodore/ Banana/ Biloela).

Busses would be provided to transport the workforce to and from site and use of private passenger vehicles discouraged.

Nevertheless, allowance for passenger vehicle traffic to site has been made.

It is likely that the level of small passenger and light trade vehicles traffic to and from site will increase as work moves from large scale earthworks and cabling to more trade-based activities.

Passenger traffic is likely to be heavily focused on workforce arrival and exit from the site (06-07:00 AM and 16-19:00 PM) with light traffic at other times.

Heavy vehicles

Construction will create heavy vehicle traffic throughout the construction works.

Heavy vehicle traffic is associated with movement of plant, equipment and consumables onto and way from site and include:

- Mobilisation of plant and equipment (and demobilisation)
- Mobilisation of site facilities (site offices,tanks, generators, storage etc)
- Importation of roadmaking materials (ahead of borrow pit establishment)
- Materials for on-site concrete production (cement, aggregate, sand, water)
- Material deliveries (reinforcement, cabling, electrical equipment, fencing, bedding sand etc)
- Consumables and services (fuel, sewage and waste disposal, water, etc)
- Transportation of workforce to and from site and to and from Rockhampton/Gladstone when off-roster.

Oversized Vehicles.

Access for a range of oversized vehicles will be required during construction including:

- WTG component deliveries
- Transformer deliveries
- Prefabricated switchroom deliveries
- Large earthmoving equipment (eg 80T excavator, AWD dump trucks)
- Cranes

These vehicles movements will be licenced and require varying levels of police and private escort. Some assumptions have been made regarding these deliveries but they will be highly dependant on movement licence conditions.

Light Vehicles

Light vehicle traffic , particularly passenger and light trade vehicles, are estimated as below:

Table 1 - Light Vehicle Traffic - Accessing Site off Defence Rd

	Typical - Range	Peak	
Average Daily Traffic Volume	50-80	100-110	
Comment	Mostly workforce (80% arriving/departing between peak hours)	Workforce plus trade vehicles etc.	
Peak times	06:00-07:00 PM 16:00 – 19:00PM	06:00-07:00 PM 16:00 – 19:00PM	

The above figures are thought to be conservative assuming effective bussing of the workforce is maintained. Peak light vehicle traffic is most likely associated with end of roster periods (where workforce seek to travel directly from the site).

Based upon 80% of the light vehicle traffic being workforce and accessing site in peak periods this could lead to a peak traffic load of around 80 vehicles per hour during the morning peak. This peak does not coincide with other site traffic or with other critical traffic such as school bus runs etc. It is however likely to coincide with other early morning traffic (particularly along the Leichardt Highway) such as for mining workers

In order to minimise biosecurity risks the use of site vehicles on the public roads will be tightly controlled and personal vehicles will not be permitted to travel on the site (even on made roads). These measures will limit the movement of site vehicles on the public roads.

Heavy Vehicles

Heavy vehicle traffic is estimated as:

Table 2- Heavy Vehicle Traffic Accessing Site off Defence Rd

	Typical	Peak	
ADTF (Months 1-6)	50-75 vpd	100 vpd	Imported aggregates in early phase of construction leads to increased heavy vehicle movements.
ADTF (>Month 6) *	60-80 vpd	100 vpd	
Additional Concrete Delivery Traffic	N/A	80-100 vpd**	

*Excluding concrete deliveries

** Peak concrete deliveries for construction east of Camboon Rd only. Max 2 days per week over Months 20-32 (est)

Heavy vehicle traffic is predominantly associated deliveries of construction materials, plant and equipment.

Heavy vehicles could be expected to access site from 7:00 AM to 17:00PM (Mon- Fri) spending a relatively short duration on site before undertaking their return journey. It is reasonable to assume that a significant portion of the heavy vehicle traffic would be day traffic from the nearest major centres of Gladstone and Rockhampton. Setting off from these locations in early morning would result in arrival on site in late morning/early afternoon resulting in a focus of arrivals on site between 11:00 and 15:00PM.

Early construction activities are expected to require imported aggregate ahead of opening borrow pits, processing material and establishing suitable haul routes leading to peak heavy vehicle movements. Sources for such aggregates are local and vehicles could be expected to make multiple journeys to site per day. As such, while the heavy vehicle traffic volume is high during the earlier construction months the actual number of vehicles involved in deliveries is low.

Concrete Deliveries

On site concrete batching will be undertaken for the duration of the project.
Traffic volumes have been assessed on the basis of all concrete components (cement, aggregate,

sand, water) being imported and requiring traffic movements on the public road network. These deliveries would be scheduled on a regular basis and stockpiled on site to avoid peaking of traffic volumes.

Concrete deliveries, specifically for the main foundation pours which requires 600-700 cubic metres in a continuous pour over 10-12 hours, lead to peak heavy vehicle traffic. For the western stages of construction all concrete delivery traffic is maintained within the site and has no impact on the public road network.
Once construction progresses to the east of Camboon Road there are two option for concrete batching as outlined below with different impacts in regard to concrete delivery traffic:

1) A single batching plant location established to serve the entire project in the proximity of the main site entrance (off Defence Road). Concrete for construction of the Eastern stages of the project would be required to travel on Camboon Rd. Concrete component deliveries would be restricted to Defence Road.
   Traffic on the affected section of Camboon Road would be increased by 8-10 concrete vehicles per hour (each way) for each main foundation pour. It is anticipated such additional traffic would occur for 2 days per week over a period of approximately 40 weeks.

2) Relocating the concrete batching facilities to a site within the eastern stages of construction midway through construction to avoid peak concrete deliveries on the public road network. Concrete component deliveries would need to access along Camboon Rd in order to deliver to the relocated batching plant.

Significant reduction in delivery traffic could be achieved if:

- A suitable on site water supply is established (likely);
- Aggregate of a suitable quality for concrete production is available from the site (less likely)

Camboon Road Traffic.

It is anticipated that work on the eastern side of the site would commence from approximately Month 20 with the formation of construction compounds, borrow pits and commencement of tracks.

Traffic movements along or across Camboon Road would increase from that point.

It is anticipated that the majority of vehicles would access the site through the main access off Defence Road and travel through the western area of the wind farm site to access Camboon Road (rather than accessing Camboon Road off Defence Road directly).

The precise access points onto and off Camboon Road are likely to be influenced by the location of suitable crossing points for the LNG pipeline, terrain and vegetation impacts. A direct crossing of Camboon Road is preferred but a short distance of travel along Camboon Road may be necessary.

Light Vehicle Traffic – Camboon Road

It is envisaged that the main site entrance off Defence Road will be maintained for the duration of the project and that staff will predominantly be bussed to the eastern area through the western zone of the Theodore Wind Farm rather than along Defence Road and Camboon Road. This approach

minimises construction traffic along Camboon Road. This will result in a reduced morning peak on Camboon Road when compared with Defence Road.

There will however be an increase in light vehicles moving between the east and west areas of the wind farm for supervisory roles during the working day.

The overall light vehicle traffic is likely to be marginally lower than stated in the Table 1 above.

Heavy Vehicle Traffic – Camboon Road

Heavy vehicle traffic on Camboon Road is expected to increase from Month 20 as work moves across to the eastern areas of the wind farm. While there will be a ramping up of traffic utilising Camboon Road it will be less pronounced than for the commencement of the western area of the Theodore Wind Farm.

Heavy vehicle traffic on Camboon Road are generally expected to be more evenly spread over the working day than for traffic on Defence Road and to be approximately 60% of the traffic flows along Defence Road.

The exception to this is in the event of concrete deliveries from a single batching plant at the Defence Rd entrance. Under the single batching plant option concrete deliveries will utilise Cambon Road to access the Eastern Zone. Concrete deliveries will result in a peak traffic of approx. 80-100 vehicles on days when the main foundation pours are being progressed. This is expected to be on 2 days per week between Months 24-40.

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