Darlington Wind Farm

Traffic and Transport Assessment

Global Power Generation Australia Pty Ltd

15 September 2022

→ **The Power of Commitment**

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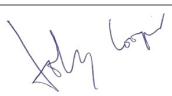
S4	2	M Fletcher-Kennedy	M Petrusma		T Cooper		15/09/2022

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1. Introduction

1.1 Purpose of this report

Global Power Generation Australia Pty Ltd (GPG) has engaged GHD to prepare a preliminary Traffic and Transport Assessment to inform the EES Referral for the proposed Darlington Wind Farm Project (the Project). This report documents key traffic and transport related impacts and proposed mitigation measures to ensure the construction and operation of the wind farm does not cause significant adverse impacts to either the condition or operation of the road network.

1.2 Scope and limitations

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1.3 Assumptions

This report was prepared based on the following assumptions, as well as other assumptions documented within this report:

- Oversized and overmass (OSOM) equipment and components will be shipped to either the Port of Geelong or the Port of Portland and then transported to the site by road.
- Peak hour traffic volumes are typically around 10% of Annual Average Daily Traffic volumes.
- The towers will be comprised of multiple sections.

1.4 References

The following documents and materials were referred to during the preparation of this report:

- Traffic volumes, Department of Transport Open Data Hub
- Five-year crash history, Department of Transport Open Data Hub
- Austroads *Guide to Road Design Part 4a: Unsignalised and Signalised Intersections*
- Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*

2. Project information

2.1 Site location

The Darlington Wind Farm Project would be located in the Shire of Moyne in southwest Victoria. The proposed Project site is located between the townships of Darlington and Mortlake approximately 200 km west of Melbourne. There is approximately 4.6 km from the edge of the Darlington township to the nearest turbine and approximately 6.4 km from the edge of the Mortlake township to the nearest turbine. The Hamilton Highway bisects the site, with several lower order local roads travelling through and around the site.

The site boundaries are presented below in Figure 1.

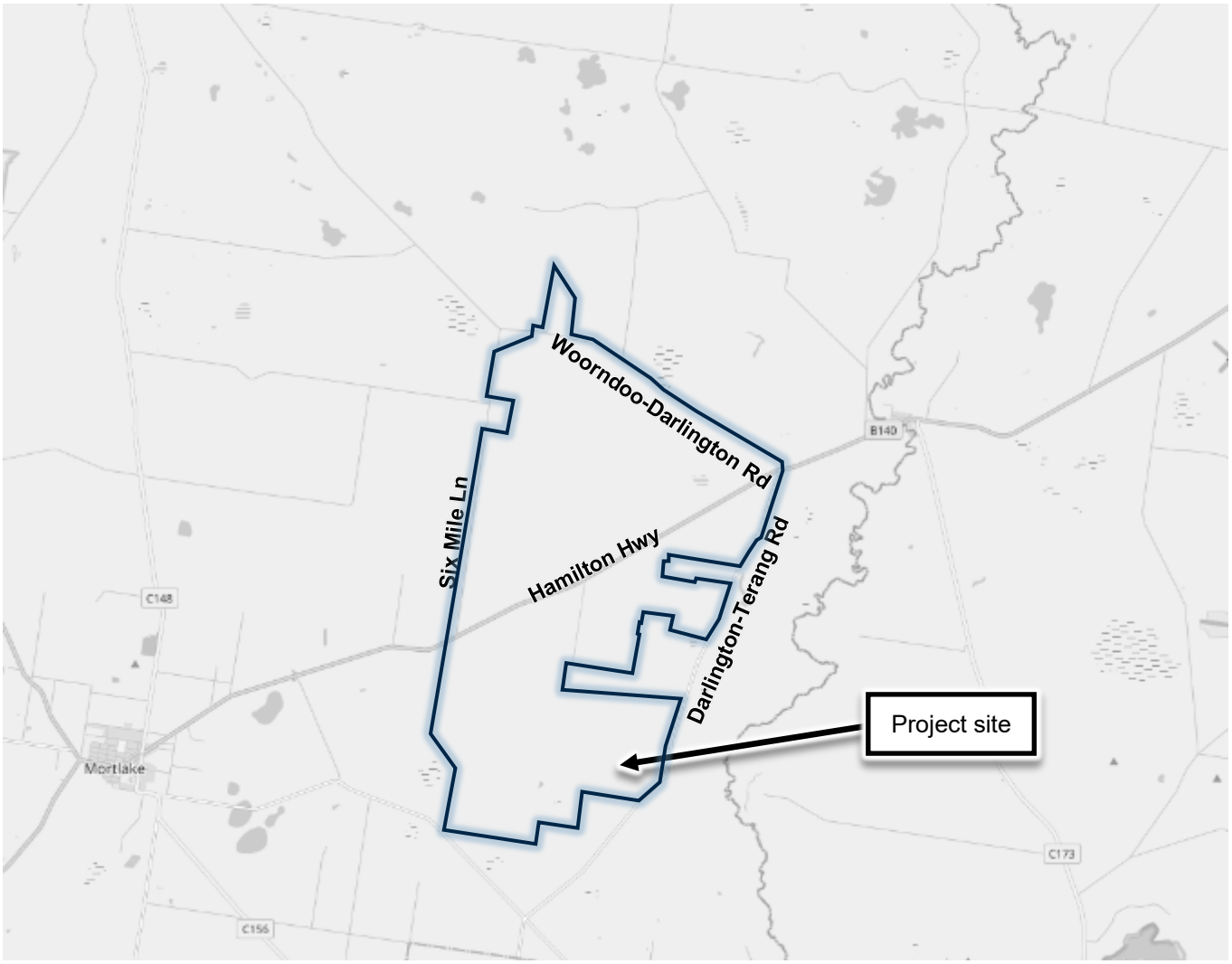

Figure 1 Project site location

Image source: OpenStreetMap, extracted April 2022

Land use in the area is predominantly comprised of rural agricultural lots. The site itself is comprised of several private land parcels (all of which are currently used as farms) and GPG has license agreements, or option to lease agreements, with each of the landowners to operate its infrastructure on their land. The topography of the area is relatively flat.

2.2 Site layout and access

The site layout is included in Appendix A, as well as presented below in Figure 2. The development would consist of up to 61 wind turbines arranged across the site, plus a substation and operations building. During the construction period, a temporary construction compound and concrete batching plant would also be provided by GPG on the site. All of these temporary facilities are to be provided adjacent to the substation and operations building, all of which are located to the immediate east of the termination of Prices Lane.

Access to and from the site would be via two major access points at Six Mile Lane (for areas north of Hamilton Highway) and Darlington-Terang Road (for areas south of Hamilton Highway) as shown below in Figure 2. An additional minor access point from Woorndoo-Darlington Road is also proposed and is intended to assist with logistics for some oversized vehicles transporting turbine components. It is noted that the minor access point would not be used by large volumes of heavy vehicles transporting construction materials to the site.

Note that the turbine to the north of Woorndoo-Darlington Road will be accessed by crossing Woorndoo-Darlington Road from the Six Mile Lane access to limit haulage along Woorndoo-Darlington Road. The location of the Woorndoo-Darlington Road crossing is also shown in Figure 2 below and would involve a right turn from the site onto Woorndoo-Darlington Road, travel for approximately 300 metres along the public road and a left turn into the site opposite.

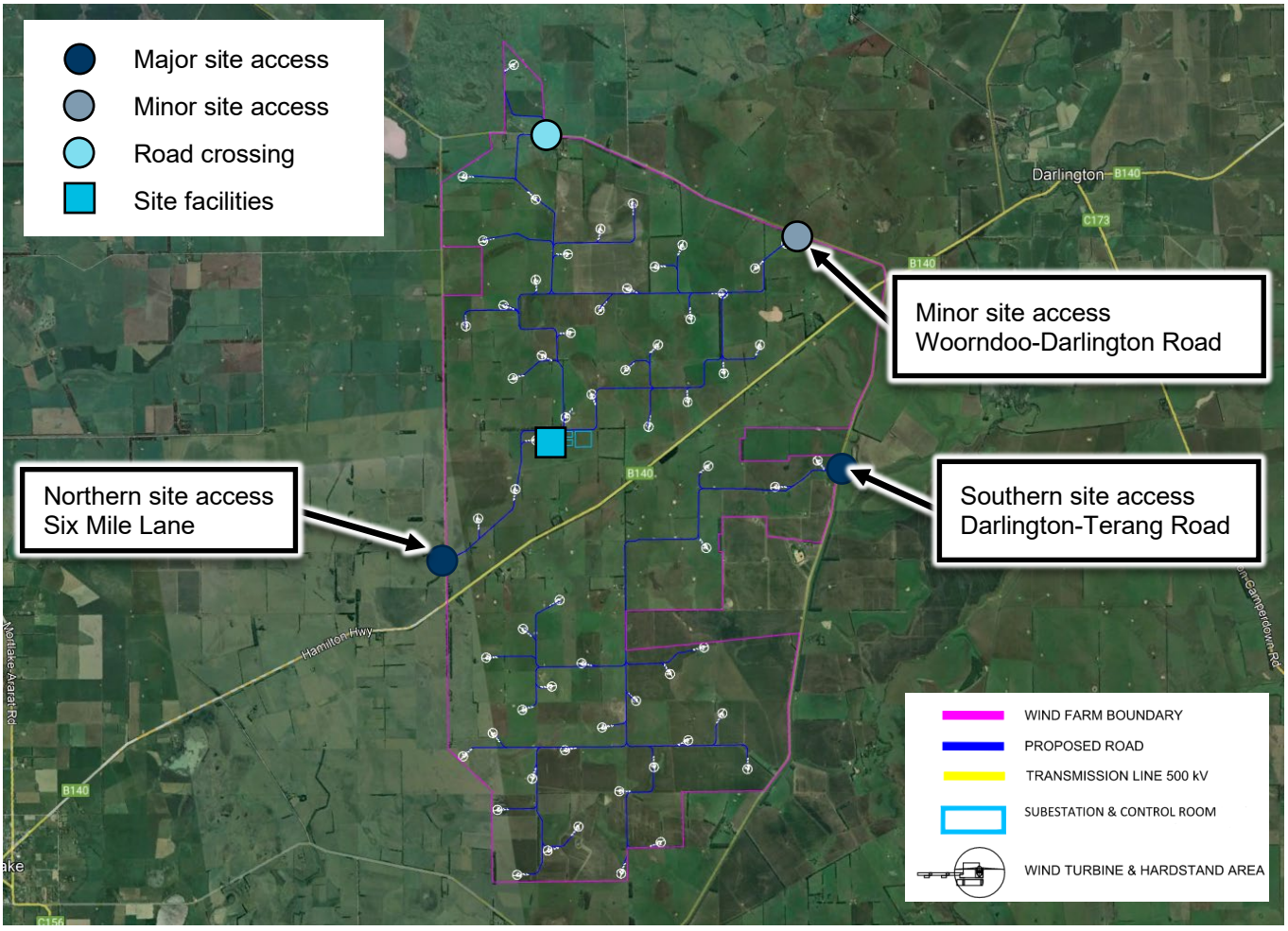

Figure 2 Project site layout

Base Imagery source: Google Earth Pro, extracted June 2022

3. Existing conditions

3.1 Transport network

3.1.1 Department of Transport Roads

The key roads that could be used during the construction of the Darlington Wind Farm project are summarised in Table 1. It is noted that all of the roads listed below have previously been used as part of the haulage routes to other wind farm projects in the region. Key roads in the vicinity of the Project site are described in the following subsections.

Table 1 Transport Network Summary

Road Name	Location Used	Class	Surface Condition
Abery Road	Sea Breeze Parade - Corio Quay Road	Arterial Road	Sealed
Corio Quay Road	Abery Road - Princes Highway	Arterial Road	Sealed
Princes Highway (A10)	Corio Quay Road - Geelong Ring Road	Arterial Highway	Sealed
Geelong Ring Road / Princes Freeway (M1)	Princes Highway - Hamilton Highway	Arterial Freeway	Sealed
Hamilton Highway (B140)	Geelong Ring Road / Princes Freeway - Six Mile Lane / Site access	Arterial Highway	Sealed
Henty Highway (A200)	Port of Portland – Princes Highway	Arterial Highway	Sealed
Princes Highway (A1)	Henty Highway – Hopkins Highway	Arterial Highway	Sealed
Hopkins Highway (B120)	Princes Highway – Hamilton Highway	Arterial Highway	Sealed
Hamilton Highway (B140)	Hopkins Highway – Six Mile Lane / Site access	Arterial Highway	Sealed

3.1.1.1 Hamilton Highway

Hamilton Highway is a DoT controlled arterial highway connecting Geelong and Hamilton via Mortlake. Hamilton Highway is aligned generally east-west and has a typical speed limit of 100 km/h, with reduced speed limits of 50-60 km/h or 80 km/h through towns.

Hamilton Highway is typically two-lane, two-way with gravel shoulders as well as centre and edge line marking. Hamilton Highway is an approved B-double and Oversize & Overmass (OSOM) transport route.

A basic left turn treatment is provided on Hamilton Highway at the intersection with Six Mile Lane. No specific right-turn treatment is provided. A view of Hamilton Highway looking west past the intersection with Six Mile Lane is provided in Figure 3.

At the intersection with Woorndoo-Darlington Road and Darlington-Terang Road, new works have been undertaken to provide a staggered T configuration. Due to the recent works, the road has been resealed and is currently not marked. A splitter island is provided at the intersection with the island at Woorndoo-Darlington Road designed to be partially flush with the road pavement to allow for truck turning movements, as shown in Figure 4. Clear sight lines were observed to both the east and west.

Figure 3 Hamilton Highway looking west past the intersection with Six Mile Lane

Figure 4 Hamilton Highway looking west from the intersection with Woorndoo-Darlington Road

3.1.2 Moyne Shire Council Roads

In addition to each of the arterial roads which will be used to transport materials to the site, a number of roads which are owned and controlled by Moyne Shire Council will be used to access the site. Each of the Council roads that would be used are described in detail in the following sections.

3.1.2.1 Woorndoo-Darlington Road

Woorndoo-Darlington Road connects Hamilton Highway, west of Darlington, and Woorndoo-Dundonnell Road east of Woorndoo. Woorndoo-Darlington Road travels in a southeast-northwest direction on a relatively straight alignment through level terrain. It is noted that there is a tight, narrow bend located at the southeast end of the road, approximately 250 metres northwest of the intersection with Hamilton Highway. This bend may need to be upgraded if the southern portion of the road is to be used as a haulage route for the Project.

The Project site includes areas on either side of Woorndoo-Darlington Road given that that the road travels through the extents of the site.

Woorndoo-Darlington Road is a rural road with a sealed width of approximately 4 metres and gravel shoulders either side which provide a total pavement cross-section of approximately 6-6.2 metres. The default rural speed limit of 100 km/h applies.

Woorndoo-Darlington Road is give-way controlled at the intersection with Woorndoo-Dundonnell Road in the north. At the intersection, clear sight lines are provided for all approaching vehicles to the east and west. Woorndoo-Darlington Road has a wider seal of approximately 6.6 metres width (plus flaring) for the 80 metres up to the intersection junction, after which point the seal narrows to 4 metres. The transition in pavement width is shown in Figure 5 below.

At the intersection with Hamilton Highway in the south, new works have been undertaken to provide a staggered T-intersection, with minor shoulder widening for a total pavement width of approximately 6 metres. A splitter island is provided at the intersection. However, it has been designed to be partially flush with the road pavement to allow for truck turning movements. Clear sight lines were observed to both the east and west.

Figure 5 Woorndoo-Darlington Road looking south, to the south of Woorndoo-Dundonnell Road

3.1.2.2 Six Mile Lane

Six Mile Lane has a straight north-south alignment and connects Woorndoo-Darlington Road in the north to Hamilton Highway in the south. Six Mile Lane runs along the western boundary of the Project site. It is noted Prices Lane runs east from Six Mile Lane for approximately 2.2 km into the Project site, around 3 km north of Hamilton Highway.

Six Mile Lane has a sealed width of approximately 6.1 metres at the northern end, which narrows to a sealed width of 5.1 metres for the middle section, plus gravel shoulders which provide a total cross-section of 6.1 metres width. During on-site investigations undertaken for this preliminary traffic and transport assessment, sheep were observed being moved along Six Mile Lane. The default rural speed limit of 100 km/h applies.

The intersection with Woorndoo-Darlington Road at the north is give-way controlled. A gravel bypass area is provided at the intersection, facilitating southbound trucks turning right into Six Mile Lane or northbound trucks turning left out of Six Mile Lane.

At the south, the intersection with Hamilton Highway is also give-way controlled with barrier board provided at the intersection. Six Mile Lane flares to 29 metres width at Hamilton Highway. As discussed in Section 3.1.1.1, a basic left turn treatment is provided on Hamilton Highway however no right-turn treatment is provided. Sight distance to the west is unobstructed while sight distance to the east is slightly impacted by a crest in the road. Based on site observations however, the crest in the road is not large enough to fully obscure vehicles and sufficient sight distance is available for the prevailing vehicle speeds.

A view of Six Mile Lane is provided in Figure 6 and Figure 7.

Figure 6 Six Mile Lane looking south from the intersection with Woorndoo-Darlington Road

Figure 7 Six Mile Lane looking south during movement of sheep

3.1.2.3 Darlington-Terang Road

Darlington-Terang Road connects Hamilton Highway, west of Darlington, and Terang-Mortlake Road north of Noorat (and Terang). Darlington-Terang Road travels in a southwest-northeast direction and has a relatively straight alignment. Turbines are proposed to be constructed on the west side of the road.

Darlington-Terang Road is a sealed road with a pavement width of approximately 6.6 metres, narrowing to a 4-metre-wide seal and 6-6.2 metre total cross-section over 6 km south of Hamilton Highway. A view of the cross-sections of Darlington-Terang Road is provided in Figure 8 and Figure 9. The default rural speed limit of 100 km/h applies.

As discussed in Section 3.1.1.1, at the intersection with Hamilton Highway to the north, Darlington-Terang Road has recently been upgraded to provide a staggered T-intersection configuration with Woorndoo-Darlington Road.

Figure 8 Darlington-Terang Road looking south, approximately 140 metres south of Hamilton Highway

Figure 9 Darlington-Terang Road looking south, approximately 6.9 km south of Hamilton Highway

3.2 Traffic volumes

Traffic data obtained from the Department of Transport (DoT) Open Data Hub is summarised in Table 2. Note that Heavy Vehicles (HVs) are typically defined as Austroads Class 3 trucks and above.

Table 2 Summary of two-way traffic volume data on key arterial roads

Location	Average daily traffic (vpd)	% Heavy vehicles
Abery Road	4,600	20%
Corio Quay Road	8,000	12%
Princes Highway (A10)	66,000	9%
Geelong Ring Road / Princes Freeway (M1)	46,000	7%
Hamilton Highway (B140)	1,800-6,400	13%
Henty Highway (A200)	1,200-4,000	18-26%
Caramut Road	6600	13%
Bridge Road	2500	14%
Hopkins Highway	2800	17%

Source: VicRoads Traffic Profile Viewer, accessed April 2022

Traffic volumes for Darlington-Terang Road, Woorndoo-Darlington Road and Six Mile Lane were not available however, based on road network context and casual site observations, it is estimated that each of these roads would currently carry less than 200 vehicles per day. It is understood that traffic volumes are higher during the harvest period, from November to April and with increased use by agriculture vehicles. It is recommended that traffic surveys be undertaken for key roads as part of any detailed traffic and transport assessments required as the Project progresses through the next stage of development.

3.3 Crash history

Road crash history for the five-year period between April 2016 and March 2021 was obtained from the DoT Open Data Hub. Within this analysis period, there were a total of 10 recorded crashes. A summary of the extracted crash data is provided in Table 3 and Figure 10.

All crashes recorded in the last five years occurred at midblock locations, with no intersection crashes. Furthermore, no crashes were recorded along Woorndoo-Darlington Road, Six Mile Lane or Woorndoo-Dundonnell Road, all to the north of the site. Struck animals were the most common crash type.

One fatal crash occurred on Mortlake-Ararat Road, just south of the intersection with Woorndoo-Dundonnell Road whereby the vehicle ran off the road and overturned during the night.

Table 3 Summary of five-year crash data by severity and crash type

Location	Number of crashes				Dominant crash type(s)
	Fatal	Serious	Other	Total	
Midblock					
Hamilton Highway	0	2	4	6	Struck animal (2), left off carriageway (1), right off carriageway (1), fall from moving vehicle (1), rear end (1)
Darlington-Terang Road	0	3	0	3	Collision with a fixed object (1), struck animal (1), unknown manoeuvre (1)
Mortlake-Ararat Road	1	0	0	1	Vehicle overturned (1)
Total	***1***	***5***	***4***	***10***	

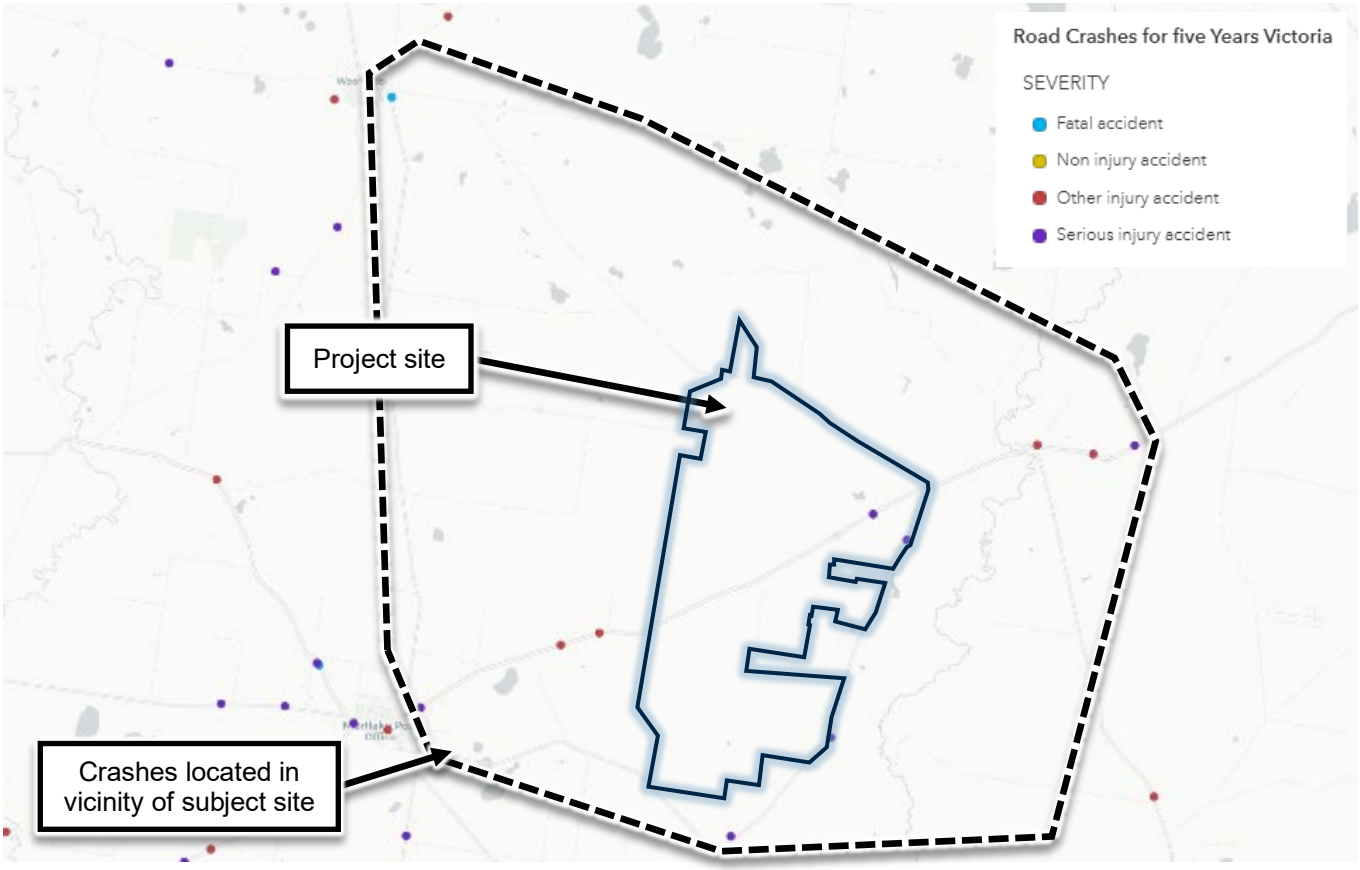

Figure 10 Crash history along proposed transport routes

Data and image source: Department of Transport Open Data Hub, accessed April 2022

4. Access routes

4.1 Over-dimensioned vehicles

4.1.1 Turbine blades and tower sections

The project is proposed to comprise of up to 61 wind turbines with a maximum tip height of 240 metres and a maximum blade length of 85 metres. Each wind turbine is assumed to be made up of multiple tower sections, a nacelle, turbine hub and three turbine blades. The blades and tower sections will be transported to the site by prime mover and extensible trailer. Assuming each tower is made up of four sections, this will result in up to 549-over-dimension trips for blades and towers (i.e. nine trips per turbine).

For the 85 metre rotor blades, the longest single component to be transported to the site, the prime mover and extensible trailer combination would have a total length of up to 93 metres. An indicative transport combination is shown in Figure 11 noting that the combination shown is slightly shorter than the actual load would be. The extensible trailer would be retracted for the return journey, and therefore the over-dimensioned vehicle trip is considered to be one-way only (i.e. towards the site).

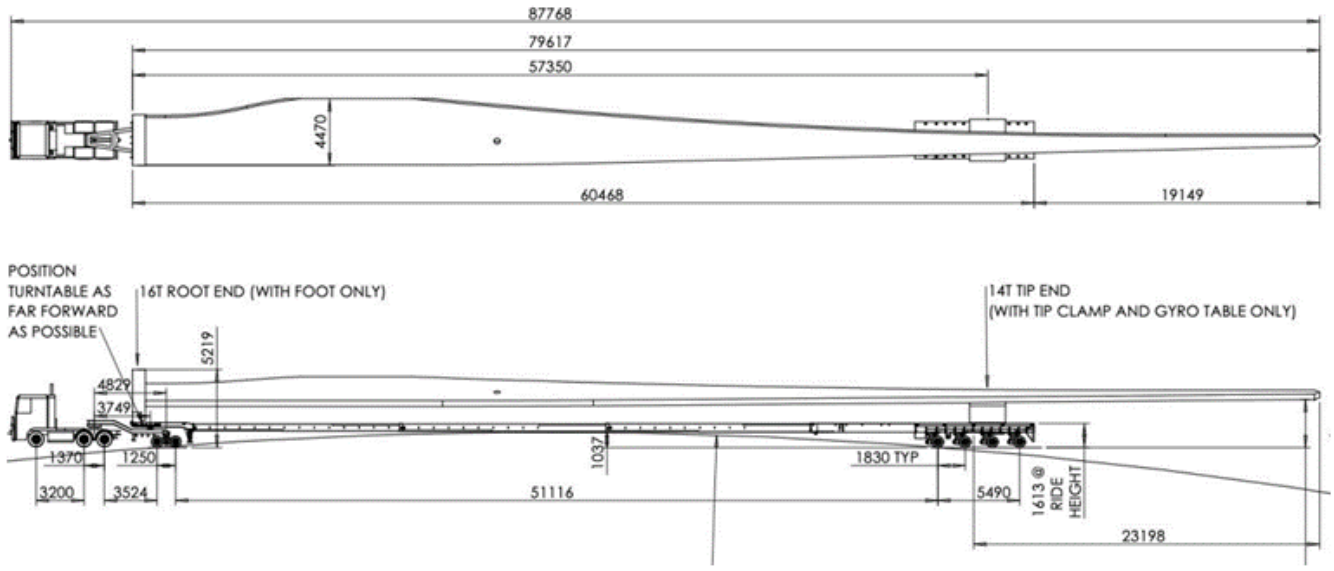

Figure 11 Wind Turbine Transport Combination

The proposed combination will exceed the maximum length requirements to comply with the permit exemptions for VicRoads' approved Class 1 Oversize and Overmass (OSOM) Network and therefore separate permits and approvals will be required to operate along these routes.

4.1.2 Nacelles

Nacelles and drivetrains would be transported to the site using 6x8 platform trailers. Drivetrains may be transported separately, however for the purposes of this report it is assumed that nacelles and drivetrains will be transported together. Each turbine will require one nacelle, resulting in a total of 61 laden trips to the site, and 61 unladen return trips.

These loads would have a mass of approximately 125 to 135 tonnes and therefore would exceed the maximum load limit to comply with the permit exemptions for VicRoads' approved Class 1 OSOM Network. Separate permits and approvals would be required for transport of nacelles and drivetrains.

4.1.3 Hubs

Hubs will be transported using low loader trailers with a total of 61 laden trips to the site (one trip per turbine) and 61 unladen return trips. Hubs will typically have a width exceeding 5 metres and therefore will exceed the maximum dimensions to comply with the permit exemptions for VicRoads' approved Class 1 OSOM Network and would therefore require separate permits and approvals.

4.1.4 Transformers

The on-site substation will include a number of transformers. Three medium sized transformers, 140 MVA each (22/132kV at 140MVA indicative capacity) will be procured either locally or from overseas and one larger transformer (132/500kV at 420 MVA) will be imported via either the port of Geelong or port of Portland. At this stage it will be assumed that all transformers would be delivered to the site using multi-axle, low loader trailers.

4.1.5 Permits and approvals

Each of the components outlined above (turbine blades and tower sections, nacelles, hubs and transformers) have either a mass, dimensions or both which exceed the maximums which would comply with the permit exemptions for VicRoads' approved Class 1 OSOM Network. As such, the haulage contractor will be responsible for obtaining and complying with permits issued by Department of Transport to carry oversize and/or over mass loads to the site.

The final mass and dimensions of each load will determine the specific permit conditions, which may include the following:

– Pre-transport route assessment
– Warning signs and devices
– Pilot vehicles and escort vehicles
– Mass and dimension limits, including rear overhang
– Times of operation

In addition to Department of Transport requirements, the use of oversize vehicles will require a permit from the National Heavy Vehicle Regulator (NHVR).

Further to the above, permits will need to be obtained from Moyne Shire Council for the use of Six Mile Lane and Darlington-Terang Road as required.

4.1.6 Over-dimension vehicle transport route

At the stage of preparing this preliminary traffic and transport assessment report, the preferred route for over-dimensioned vehicles is from Geelong via the Hamilton Highway approaching the Project site from the east. Alternatively, materials may be shipped to the Port of Portland, from which point the over-dimensioned vehicles will travel to the site via the Princes Highway, approaching the site from the southwest.

The following sections outline the over-dimension route options to the site from each the Port of Geelong and the Port of Portland. Each of these routes is based on previously approved routes for wind farms in the areas surrounding Darlington. In this regard, it is the final local access roads from Hamilton Highway east (when approaching from Geelong) and Hamilton Highway west (when approaching from Portland) which must be most thoroughly assessed for the purposes of transporting oversized and over mass vehicles.

4.1.6.1 Geelong route

The proposed haulage route from the Port of Geelong to Darlington is shown in Figure 12 and described as follows:

– South down The Esplanade
– Right-turn into Sea Breeze Parade
– Slight left onto Abery Road
– Straight through to Corio Quay Road
– Straight onto Princes Highway (A10)
– Right-turn into the Geelong Ring Road / Princes Freeway (M1)
– Left-turn onto the Hamilton Highway (B140)
– Use either Six Mile Lane, Darlington-Terang Road or Woorndoo-Darlington Road to access the Project site.

Figure 12 Haulage Route – Port of Geelong to Darlington

Image source: OpenStreetMap, extracted April 2022

4.1.6.2 Portland route

The alternative route from the Port of Portland to Darlington is shown in Figure 13 and described as follows:

– Follow the Henty Highway (A200) to the north from Portland
– Right-turn onto Princes Highway (A1)
– Left-turn onto Caramut Road (C174)
– Right-turn onto Bridge Road
– Left-turn onto Hopkins Highway (B120)
– Right-turn onto Dunlop Street (B140)
– Left-turn onto Hamilton Highway (B140)
– Use either Six Mile Lane, Darlington-Terang Road or Woorndoo-Darlington Road to access the Project site.

Figure 13 Haulage Route – Port of Portland to Darlington

Image source: OpenStreetMap, extracted April 2022

4.1.6.3 Preliminary route assessment

While detailed assessment of the proposed transport routes from Port to the Project site will be required to be prepared by the haulage contractor as part of any permit application, a preliminary assessment has been carried out below to identify key issues that may require consideration at this early planning phase of the Project.

4.1.6.3.1 Overhead obstructions

Locations with overhead obstructions are listed below. Where loads exceed the maximum clearance height, local detours may be required subject to further, more detailed investigation and planning.

– From Port of Geelong:
  - Margaret Street bridge, North Geelong, maximum height clearance of 5.5 metres
  - Church Street bridge, Geelong West, maximum clearance of 5.5 metres
  - Princes Freeway bridge over Geelong Ring Road, maximum clearance of 5.2 metres
  - Thornhill Road bridge above Geelong Ring Road, maximum clearance of 7.6 metres
  - Barrabool Road bridge above Geelong Ring Road, maximum clearance of 6.5 metres
– From Port of Portland:
  - Wellington Road bridge over Henty Highway, Portland, maximum clearance of 5.3 metres
  - Bentnick Street bridge over Henty Highway, Portland, maximum clearance of 5.5 metes
  - Portland Ring Road Pedestrian Overpass, maximum clearance of 5.9 metres
  - Bridge Water Road overpass, Portland, maximum clearance of 5.2 metres.

4.1.6.3.2 Roadside obstructions

The haulage contractor should identify any roadside vegetation that may cause an obstruction in their pre-transport route assessment. GPG should then arrange for the removal of any problem vegetation.

Swept path assessments should be undertaken at all bends in the delivery route to identify potential obstructions such as signage and street furniture to be removed. Work crews will drive ahead of OD vehicles during delivery, allowing staff to remove any obstructions immediately prior to vehicles passing. Any signage and street furniture would need to be replaced immediately following the passage of the vehicle in compliance with any permit conditions on the transport.

4.1.6.3.3 Damage to infrastructure

The construction of the wind farm will see significant increase in the number and size of heavy vehicles using arterial roads. As such, the additional traffic may cause damage to the roads.

GPG will need to liaise with Council and DoT to ensure any pre-construction works are undertaken to bring the road pavement up to the required standard. This would include pavement upgrades for the sections of Six Mile Lane and Darlington-Terang Road between the intersection with Hamilton Highway and the site access points.

Throughout construction, routine inspections would be conducted to monitor for any required repairs. This would be undertaken by an independent road quality auditor appointed for the purpose of this Project (refer Section 5.3).

Certain intersections may need to be altered to accommodate the swept paths of OD vehicles including pavement widening, hardstand construction and/or removal or modification of existing signage.

Swept paths should therefore be undertaken prior to construction to identify any required intersection upgrade works. As most of the proposed haulage routes have previously been used to transport wind farm infrastructure, additional works may not be required.

In some instances, turning trucks may need to cross the centre line of the road for short periods of time while they negotiate corners. While this is only expected at tight bends, in these instances traffic will need to be held by traffic controllers. It will be the responsibility of the haulage contractor to determine the locations along the route where traffic controllers may be required and arrange appropriate traffic management.

4.1.6.3.4 Speed limit

Noting the speed at which trucks turn as well as the time it takes an OD vehicle to cross a road, turning vehicles will create hazards when they are required to turn. Noting the speed limit of the rural roads is typically 100 km/h, the severity of any accident would be high.

As such, temporary speed limit reductions to 60 km/h should be considered where OD vehicles are required to turn onto local access roads.

4.2 General access vehicles and B-doubles

The majority of parts and materials transported to the site will be via general access vehicles, including rigid trucks, semi-trailers and truck & dog combinations, or B-doubles. The use of B-doubles to transport materials to the project site would be restricted to VicRoads' approved B-double network until the site major access points at either of Six Mile Lane or Darlington-Terang Road. Specific approvals from Moyne Shire Council may be required to operate B-doubles on local roads.

In all cases, transport routes to the site would prioritise the road function (i.e. preferencing higher order arterial roads) rather than travel distance. The order of preference for transport routes is as follows:

1. Hamilton Highway B140
2. Other Class B State Roads (e.g. Hopkins Highway B120)
3. Class C State Roads (e.g. Mortlake-Ararat Road C148, Terang-Mortlake Road C156)
4. Local Roads (e.g. Six Mile Lane, Darlington-Terang Road)

It is noted that the proposed minor access point on Woorndoo-Darlington Road is not intended to be used for bulk transport of construction materials (e.g. crushed rock) with the major site access on Six Mile Lane being preferred.

4.2.1 Quarry haulage routes

A significant proportion of total trips travelling to and from the site will be for the import of raw material for road construction, hardstands and concrete from quarries surrounding the site. The specific quarries which would service the site are yet to be identified and by extension, the specific haulage routes cannot be determined. Nonetheless, it is acknowledged that haulage to and from quarries would be the primary traffic load on the road network. Further detailed traffic and transport assessments should include refinement of trip generation estimates for haulage of quarry materials.

The high truck volumes associated with bulk haulage can impact on the condition of the road pavement, particularly for Class C State Roads and local roads. It will be necessary to ensure that the order of preference for transport (above) is followed and that strategies are in place to mitigate the impacts to traffic operations and road condition as necessary including, but not necessarily limited to, road pavement upgrades for heavily utilised access roads where appropriate.

4.3 Workforce

The workforce required for construction would vary based on the activities being undertaken. Construction is expected to last 18 months, with the peak construction period expected to last 1-2 months. Across this period, it is estimated that there would be:

– An average of 100 staff on-site throughout main construction period
– A maximum of 150 staff on-site during construction peak

The construction workforce would be local, or otherwise housed in temporary accommodation facilities in nearby towns as dictated by availability (including Mortlake, Darlington and Camperdown). It is anticipated that all members of the construction workforce will travel to the site by private car or by shuttle bus. There will be no restrictions placed on the users who will be free to travel via the most convenient route to the site. Parking would be provided on-site to accommodate worker vehicles.

5. Construction impacts

5.1 Trip generation

The construction of the wind farm will generate traffic from a number of sources. Projections of these movements are outlined below, based on discussions with the operator.

Over-dimensioned vehicles

The over-dimensioned vehicle trip generation is generally outlined within Section 4.1. In this regard, each turbine is comprised of multiple major components, including multiple tower sections, three (3) turbine blades, one (1) nacelle and one (1) hub. With a total of up to 61 turbines proposed, the site is expected to generate up to nine (9) inbound over-dimension trips per turbine, equivalent to a total of 549 inbound over-dimension trips. This is based on the assumption that the towers are comprised of four sections. It is understood that based on the use of extensible trailers, the outbound trips would be completed by standard sized trucks which will not require a permit.

Construction workers

The anticipated workforce numbers have been supplied by GPG, as outlined within Section 4.3. Based on the provided projections, up to 100 staff are expected to be on-site through the main construction period, increasing to up to 150 workers during the construction peak.

During the construction peak, to reduce the number of private vehicle trips, shuttle buses will be provided to transport workers from Darlington and Mortlake. It is expected that at least half the workforce will utilise the shuttle bus service, accounting for 75 staff. Utilising 22 seat minibuses, two trips will be generated to/from each Darlington (in the east) and Mortlake (in the west), in both the morning and afternoon peak hours.

Each of the remaining construction workers are expected to generate one inbound and one outbound traffic movement per day, equivalent to 75 inbound movements in the AM peak and 75 outbound movements in the PM peak. All worker movements are expected to be evenly distributed between the east and west.

Based on the foregoing, the construction workers are expected to generate a total of 79 inbound and 4 outbound movements in the morning peak, with 4 inbound and 79 outbound movements in the afternoon peak.

Quarry and building material deliveries

Where possible it is advised that quarrying occur on-site, nevertheless, some quarry materials will need to be obtained externally. To minimise impact to the external road network, quarry trips should be spread evenly across the construction period where possible. Additionally, building materials, plant, machinery and water will need to be trucked into the site.

Based on rates observed at a wind farm development of a similar scale, it is anticipated that across the general construction period 5-15 heavy vehicles will travel to/from the site each day, while during the construction peak this is expected to increase to 30-50 vehicles per day. These movements are expected to include the quarry and general building material deliveries and comprise primarily B-doubles or ‘truck and dog’ combination vehicles.

While heavy vehicles are expected to access the site across the course of the day, it will be conservatively assumed that 10% of trips occur during the peak hours. Based on an upper generation rate of 50 vehicles per day, this equates to 5 trips in the peak hours.

Total traffic generation

Based on these projections, at its peak, the site may generate up to a total of 268 vehicle trips per day (split evenly between inbound and outbound), including one over-dimensioned vehicle delivery per day on average, 150 construction workers travelling to/from the site and 50 heavy vehicles making deliveries to/from the site.

Refinement of traffic generation estimates will be required as the project progresses through the design phases and more detailed information is known about proposed construction operations.

5.2 Traffic

5.2.1 Assessment of Arterial roads

Construction workers and trucks will typically travel to and from the site within a 50km radius of the proposed Darlington wind farm. Some additional materials and machinery are expected to be sourced from more distant locations such as Geelong or Portland (including Ports), in which case trucks will adhere to the prescribed arterial routes.

Each of the arterial roads which comprise the OD routes to the site from Geelong and Portland have been previously approved to transport windfarm components. As such, these arterial roads are generally considered to be suitable for transporting OSOM loads. Notwithstanding, permits for use are expected to include project-specific conditions and restrictions to ensure the roads are only used at appropriate times, OSOM loads are appropriately supervised, and all physical road infrastructure is adequately maintained.

5.2.1.1 Hamilton Highway

5.2.1.1.1 Increase in traffic volumes

The existing and projected traffic volumes along Hamilton Highway during the wind farm construction are detailed below in Table 4. The construction projections are based on the peak traffic volume generation.

Table 4 Hamilton Highway traffic volumes

	Daily two-way traffic volumes (vpd)	% Heavy Vehicles
Existing	2400	4%
During construction peak	2668	7%

5.2.1.1.2 Turn lane warrants

The Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*, provides warrants for the provision of turn lanes at unsignalized intersections.

Based on the volumes published by DoT on their Open Data Hub, 1200 vehicles per day travel in each direction along Hamilton Highway where it bisects the site. Assuming the peak hour volumes are 10% of the daily volumes, 120 vehicles per hour travel in each direction along Hamilton Highway or 240 vehicles per hour in both directions.

Based on the traffic projections in Section 5.1, 84 vehicles are expected to arrive to the site in the morning peak hour, evenly split between the east and west. As such, depending on the location of the works, there may be up to 42 left-in and 42 right-in movements at the intersections of Hamilton Highway/Six Mile Lane and Hamilton Highway/Darlington-Terang Road.

With due consideration of the turn lane warrants, as shown below in Figure 14, both the Six Mile Lane and Darlington-Terang Road intersections will require a short channelised right (CHR(s)) turn treatment and a basic left (BAL) turn treatment. Turn treatments should be designed to accommodate B-Double movements, with additional gravel pavement widening to suit tracking of larger over dimensional vehicles as required.

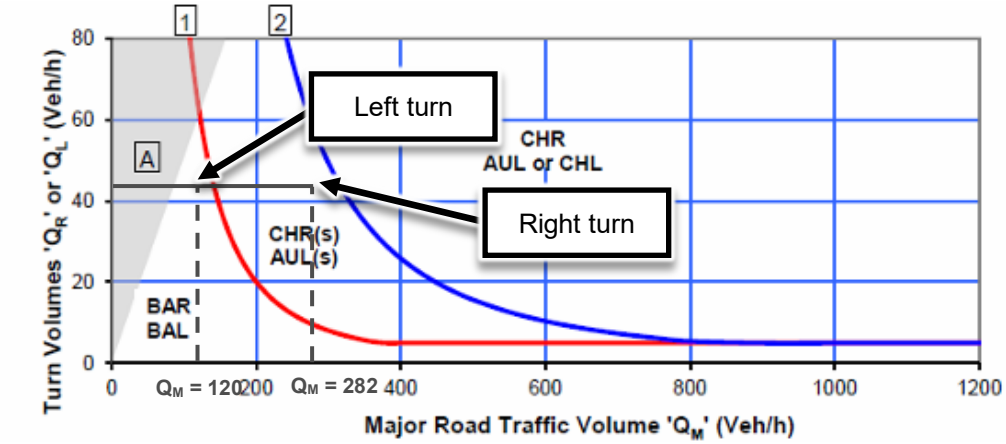

Figure 14 Warrants for Turn Treatments on Major Roads (100 km/h)

Source: Austroads

5.2.2 Assessment of Local Roads

5.2.2.1 Six Mile Lane

5.2.2.1.1 Increase in traffic volumes

The existing and projected traffic volumes along Six Mile Lane during the wind farm construction are detailed below in Table 5. It is noted that these projections are based on the peak traffic volume generation. Furthermore, Six Mile Lane will only be used where turbines are being constructed to the north of Hamilton Highway, for all construction activity to the south, traffic will be directed to/from Darlington-Terang Road.

Table 5 Six Mile Lane traffic volumes

	Daily two-way traffic volumes (vpd)
Existing (estimated)	200
During construction peak	468

5.2.2.1.2 Sight distance assessment

The Austroads *Guide to Road Design Part 4a: Unsignalised and Signalised Intersections*, provides Safe Intersection Sight Distance (SISD) requirements for the major road at any intersection. For a design speed of 100 km/h and a typical driver reaction time of 2.5 seconds, the minimum SISD is 262 metres.

Six Mile Lane has a straight alignment, as shown in Figure 15, and relatively flat road pavement, as shown in Figure 16.

The required 262 metre sight distance is marked up to the north and south. As can be seen in the markup, there are no geometric or roadside obstructions to the north or south of the site, with clear sight lines extending well beyond the required distance.

Figure 15 Sight distance at Six Mile Lane access

Base imagery source: VicPlan

Figure 16 Six Mile Lane view

5.2.2.1.3 Turn lane warrants

The turn lane warrants at the Six Mile Lane access have been assessed using the Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*, as outlined below.

As outlined within Section 3.2 Six Mile Lane is expected to carry up to 200 vehicles per day. As such, it may be expected that the road carries around 20 vehicles per hour in any peak hour.

Based on the assumption that at the construction peak there may be up to 84 vehicles per hour accessing the site, the turn lane warrants at the site access from Six Mile Lane are shown in Figure 17.

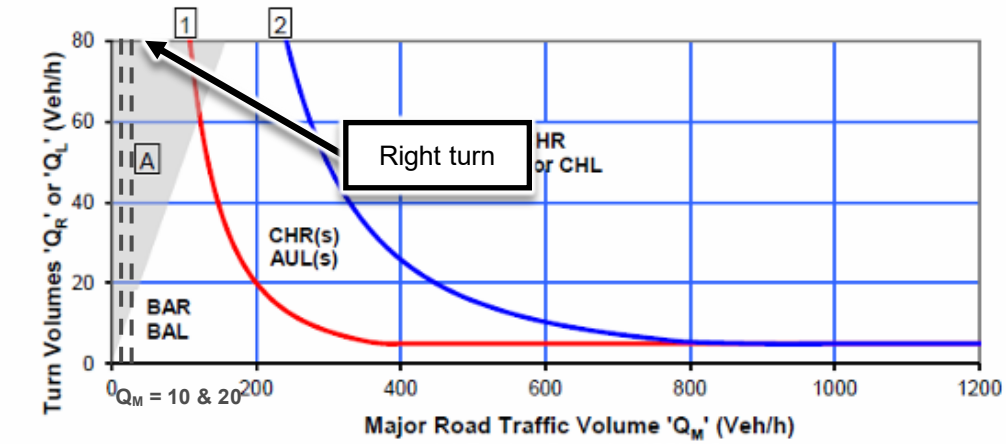

Figure 17 Warrants for Turn Treatments on Major Roads (100 km/h)

Source: Austroads

Based on the traffic volumes, there is no requirement to provide more than a basic left or right turn treatment. In this regard, it is recommended to provide a basic right (BAR) turn treatment as traffic will arrive via the Hamilton Highway at the south, turning right into the site.

Turn treatments should be designed to accommodate B-Double movements, with additional gravel pavement widening to suit tracking of larger over dimensional vehicles as required.

5.2.2.1.4 Livestock transport

As noted in Section 3.1.2.2 sheep were observed occupying the full width of Six Mile Lane during a site visit. The sheep were being moved between paddocks and occupied a minimum length of 20 metres of the road. While the sheep and farmers were able to navigate around an oncoming vehicle, this may prove difficult with over-dimensioned vehicles, such as those proposed to transport components to the site for this Project.

As such, the wind farm operator should liaise with the landholders of the project site and their neighbouring landholders to ensure no transport of over-dimensioned loads occurs on days required for the transfer of livestock. Processes should be in place to ensure the safe movement of trucks and general traffic given the potential presence of livestock, including strict compliance with any livestock related Road Rules.

5.2.2.1.5 Road upgrade

The full length of Six Mile Lane, between Hamilton Highway and the site access point, would require detailed pavement investigations and pavement upgrade prior to wind farm construction works commencing in order to ensure that significant deterioration of the road condition do not occur during construction. A regular program of inspection and maintenance would also be required for the construction period and any pavement condition issues rectified within a reasonable time period.

5.2.2.2 Darlington-Terang Road

5.2.2.2.1 Increase in traffic volumes

The existing and projected traffic volumes along Darlington-Terang Road during the wind farm construction are detailed below in Table 4. It is noted that these projections are based on peak traffic volume generation.

As noted above, traffic will be generated to/from Darlington-Terang Road only when turbines are being constructed to the south of Hamilton Highway.

Table 6 Darlington-Terang Road traffic volumes

	Daily two-way traffic volumes (vpd)
Existing (estimated)	200
During construction peak	468

5.2.2.2.2 Sight distance assessment

While the alignment of Darlington-Terang Road has some bends, the proposed site access is located on the outside of a gentle bend in the road, providing sight distance to the northeast and southwest.

The proposed location of the Darlington-Terang Road site access is shown below in Figure 18 with the required 262 metre sight distance marked up to the northeast and southwest. As shown in the markup, there are no geometric or roadside obstructions in the vicinity of the access point.

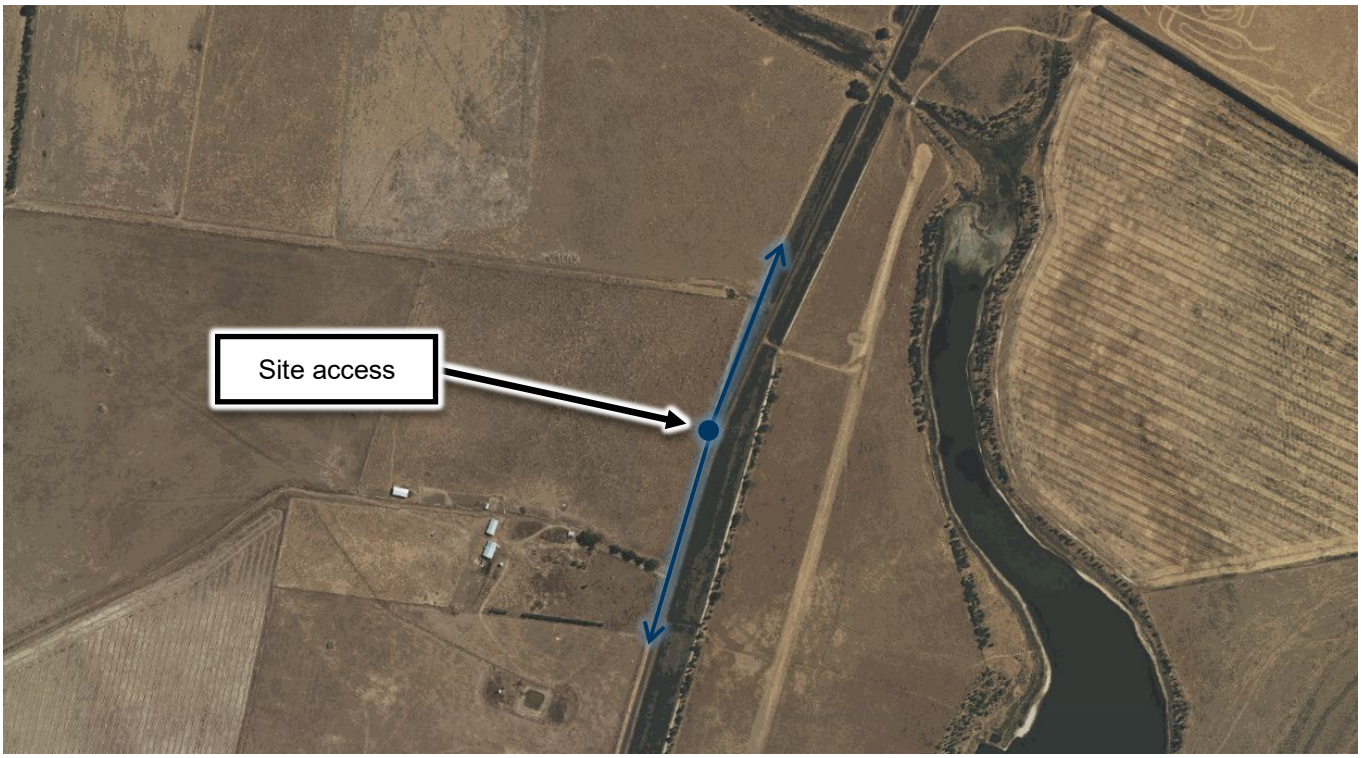

Figure 18 Sight distance at Darlington-Terang Road

Base imagery source: VicPlan

5.2.2.2.3 Turn lane warrants

The turn lane warrants at the Darlington-Terang Road access have been assessed using the Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*, as outlined below.

As outlined within Section 3.2 Darlington-Terang Road is expected to carry up to 200 vehicles per day. As such, it may be expected that the road carries around 20 vehicles per hour in any peak hour.

Based on the assumption that at the construction peak there may be up to 84 vehicles per hour accessing the site, the turn lane warrants at the site access from Darlington-Terang Road are shown in Figure 19.

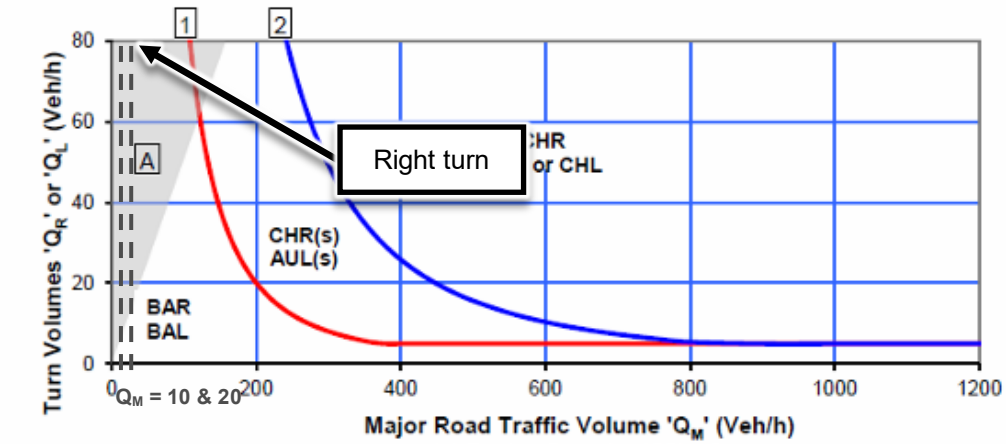

Figure 19 Warrants for Turn Treatments on Major Roads (100 km/h)

Source: Austroads

Based on the traffic volumes, there is no requirement to provide more than a basic left or right turn treatment. In this regard, it is recommended to provide a basic right (BAR) turn treatment as traffic will arrive via the Hamilton Highway, undertaking a right-turn to enter the site.

Turn treatments should be designed to accommodate B-Double movements, with additional gravel pavement widening to suit tracking of larger over dimensional vehicles as required.

5.2.2.2.4 Road upgrade

The full length of Darlington-Terang Road, between Hamilton Highway and the site access point, would require detailed pavement investigations and pavement upgrade prior to wind farm construction works commencing in order to ensure that significant deterioration of the road condition do not occur during construction. A regular program of inspection and maintenance would also be required for the construction period and any pavement condition issues rectified within a reasonable time period.

5.2.2.3 Woorndoo-Darlington Road

5.2.2.3.1 Increase in traffic volumes

In addition to the two primary access points, it is proposed to provide both a minor access point and a public road crossing along Woorndoo-Darlington Road, located approximately 1.8 km and 7.1 km northwest of the intersection with Hamilton Highway, respectively.

Minor Access

The minor access point on Woorndoo-Darlington Road is intended to be utilised by some oversized vehicles travelling to turbine locations in its direct vicinity, where it is much more convenient than accessing the site via Six Mile Lane. The major access point on Six Mile Lane would be used for the majority of trips generated by construction on the north side of the Hamilton Highway in preference to the minor access. On this basis, the minor access point is considered to generate only infrequenty traffic movements (up to one to two movements per day) by oversized trucks.

Public road crossing

The public road crossing on Woorndoo-Darlington Road will provide a direct connection between the site to the south of Woorndoo-Darlington Road to a site on the north side which includes one wind turbine. Accesses will therefore be required at one point, on either side of Woorndoo-Darlington Road to facilitate internal traffic movements through the project site which require crossing of the road. It is noted that only one turbine is proposed on the north side of Woorndoo-Darlington Road, and therefore the volume and duration of the use of this crossing will be limited.

It is acknowledged that it may be difficult to restrict all movements through these accesses to crossings only and therefore, there may be some additional lighter vehicle movements expected between these access points and Woorndoo-Darlington Road. These are likely to be minimal and have not been explicitly assessed in this report.

5.2.2.3.2 Sight distance assessment

Minor Access

While the alignment of Woorndoo-Darlington Road has a significant bend about 250m from the intersection with Hamilton Highway, at the proposed minor site access (located approximately 1.8km from Hamilton Highway) the alignment of the road is very straight providing good sight distance to the northwest and southeast.

The proposed location of the Woorndoo-Darlington Road minor site access is shown below in Figure 18 with the required 262 metre sight distance marked up to the northwest and southeast. As shown in the markup, there are no geometric or roadside obstructions in the vicinity of the access point.

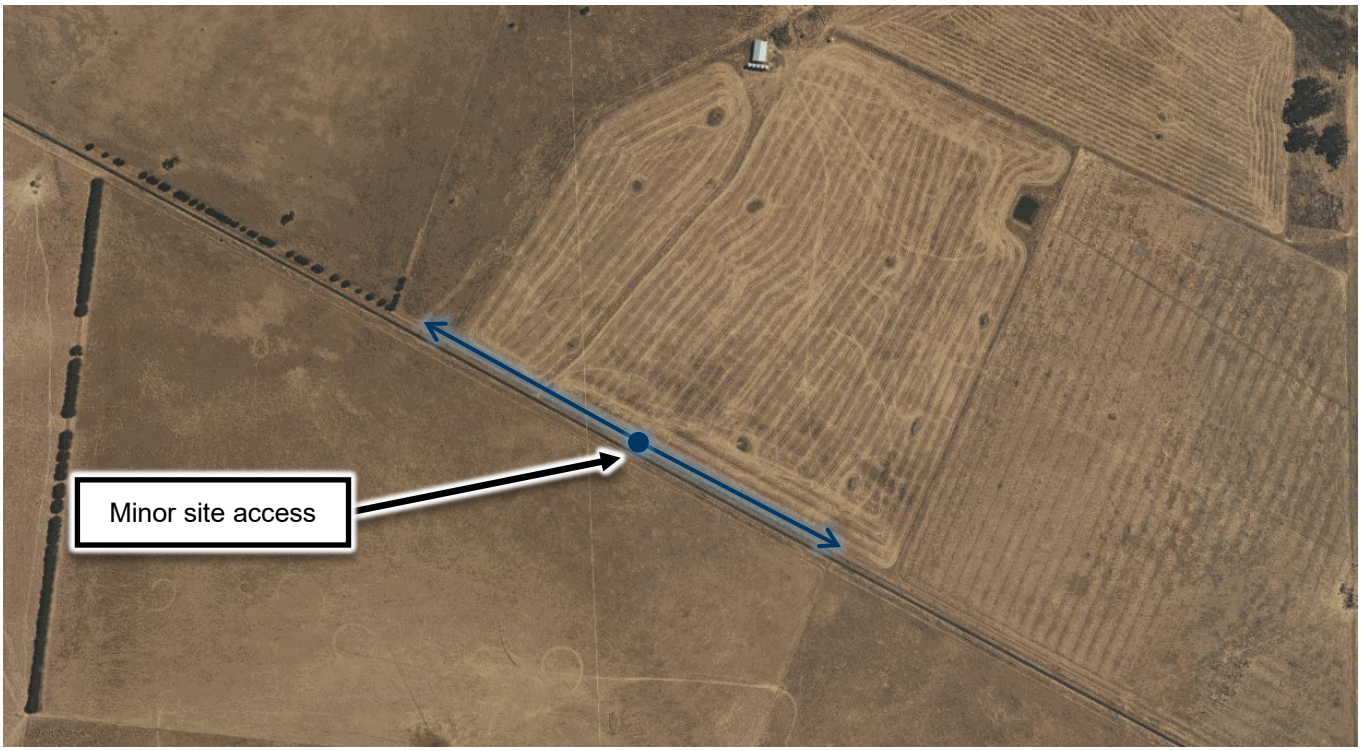

Figure 20 Sight distance at Woorndoo-Darlington Road minor access

Base imagery source: VicPlan

Public road crossing

The proposed location of the Woorndoo-Darlington Road crossing is shown in Figure 21, whereby vehicles will turn right onto Woorndoo-Darlington Road from the south and access the northern site via a left-turn into a second access point to the east. After delivering materials, vehicles will return via the same crossing points albeit in the reverse direction.

The required 262 metre sight distance to the east and west of each of the crossing turn points are shown marked up. With due consideration of the road geometry and the roadside obstructions, the sight lines to both the east and west from either access are considered acceptable.

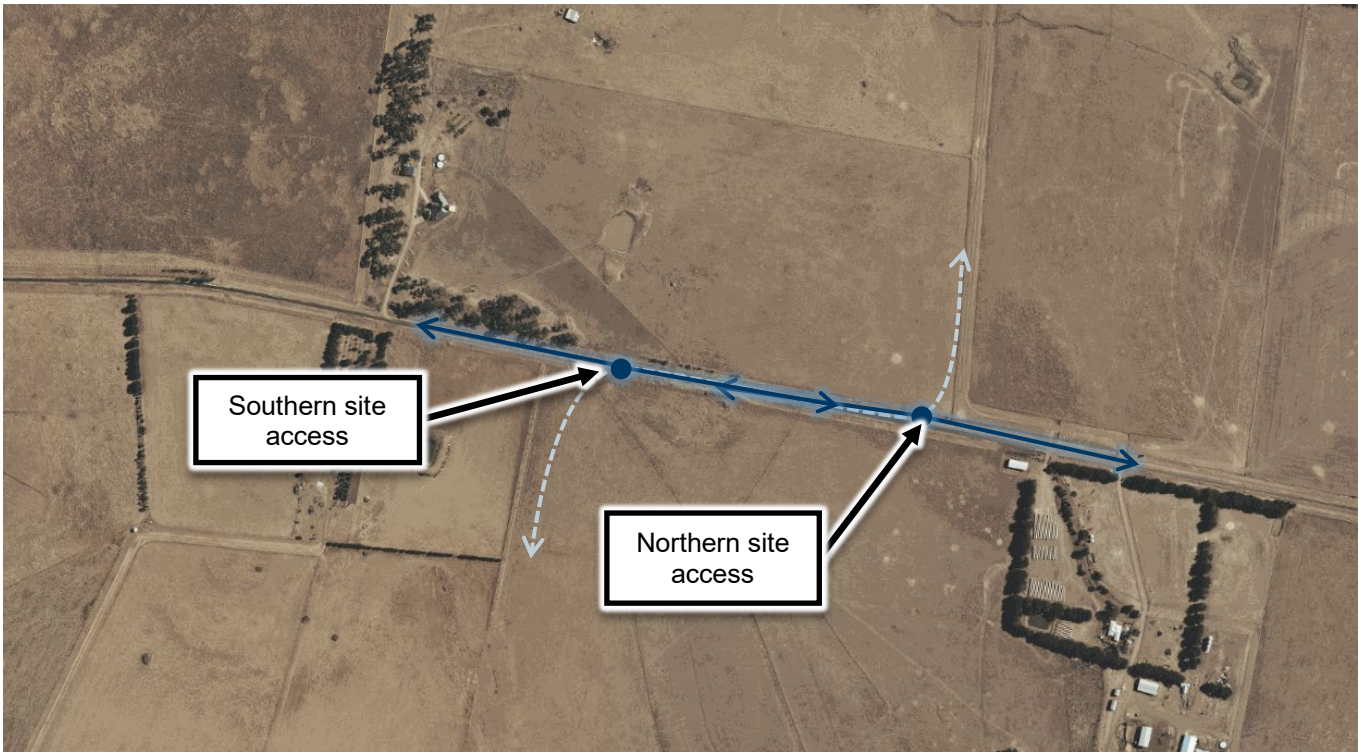

Figure 21 Sight distance at Woorndoo-Darlington Road crossing accesses

Source: VicPlan

5.2.2.3.3 Turn lane warrants

The turn lane warrants at the Woorndoo-Darlington Road minor access have been assessed using the Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*, as outlined below.

As outlined within Section 3.2 Woorndoo-Darlington Road is expected to carry up to 200 vehicles per day. As such, it may be expected that the road carries around 20 vehicles per hour in any peak hour.

Based on the assumption that at the construction peak there may be up to 84 vehicles per hour accessing the site, the turn lane warrants at the site access from Woorndoo-Darlington Road are shown in Figure 19.

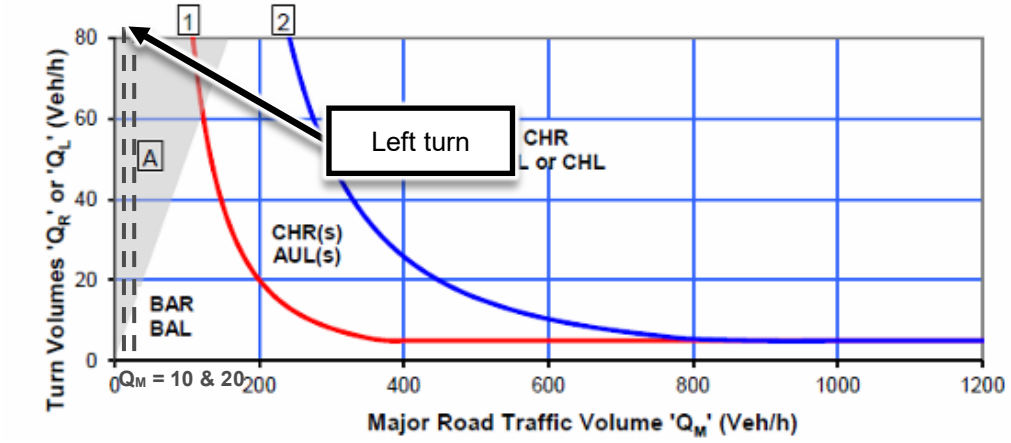

Figure 22 Warrants for Turn Treatments on Major Roads (100 km/h)

Source: Austroads

Based on the traffic volumes, there is no requirement to provide more than a basic left or right turn treatment. In this regard, it is recommended to provide a basic right (BAL) turn treatment if the minor access is to be used as traffic will arrive via the Hamilton Highway, undertaking a left turn to enter the site. It is noted that temporary

pavement widening would be required at the access point in order to accommodate the swept path of oversized vehicles transporting turbine components to the site.

5.2.2.3.4 Road upgrade

Localised pavement upgrades may be required on Woorndoo-Darlington Road to ensure that the passage of heavy vehicles associated with wind turbine construction does not cause significant deterioration of the pavement. To facilitate use of the minor access point, the pavement will need to be upgraded between the intersection with the Hamilton Highway and the minor access (approximately 1.8km of pavement).

There are also a series of tight bends in Woorndoo-Darlington Road located approximately 250 metres from the intersection with Hamilton Highway that would likely require road widening works to accommodate oversized loads.

In addition, the pavement for the length of the proposed road crossing will also need to be upgraded at each of the access point locations as well as approximately 300 metres of public road in between. Truck warning signage should also be provided on either side of the crossing to warn drivers of the presence of heavy trucks crossing Woorndoo-Darlington Road at this location.

5.3 Pavement

Addressing the potentially significant amounts of pavement wear which may be caused by the passage of heavy vehicles is becoming increasingly important when planning wind farms. Excessive wear on sealed roads due to bulk transport of quarried and other materials can cause significant damage.

In order to ensure that damage to pavement is minimised, and issues are rectified as soon as possible, the following mitigation measures would be implemented:

– Trucks to preference using higher order roads over shorter travel distances in accordance with the route hierarchy provided in Section 4.2.
– Trip generation estimates for the Project should be refined as the project develops to ensure that expected truck demands are understood and appropriate mitigation treatments can be in place.
– Local roads should be reconstructed prior to any works commencing, ensuring the new pavement width is of an appropriate standard for the forecast traffic.
– An independent Road Quality Auditor should be engaged by GPG for the duration of the Project construction. The auditor would be a suitably qualified engineer who is approved for the role by Moyne Shire Council and the Department of Transport.

The role of the auditor will be to:

– Undertake a pre-construction pavement condition survey of any roads which are to be used by the wind farm.
– Undertake inspections of each local access road.
– Inspect any road upgrade works to ensure that construction is in accordance with the approved engineering drawings to the appropriate standard.
– Report the results of all condition surveys and inspections to Moyne Shire Council or VicRoads as relevant.

If the Road Quality Auditor identifies that a road has been damaged as a result of construction vehicle activity, corrective action will be undertaken within an agreed upon time period in accordance with the requirements of the relevant road authority.

5.4 Dust & mud

The proposed works are likely to result in the spread of mud and dust via vehicles coming to and from the site.

Vehicle wash down areas should be placed at the construction compound to prevent mud being tracked onto sealed road surfaces and to allow for the removal of excess mud at the site.

All vehicles and equipment should be inspected for soil and weed material before entering and leaving the site, until such time as all internal access tracks are constructed. After this time, only vehicles and equipment that will be leaving formal tracks would require inspection. Any vehicles found to be carrying soil and/or weed material will be washed down before entering or leaving the site.

Various techniques will be used to mitigate the production of dust, including the spraying of water (potentially with wetting or binding agents added) onto road surfaces, including internal access tracks. This is likely to be especially important during summer.

GPG should monitor Six Mile Lane, Darlington-Terang Road and Woorndoo-Darlington Road for the presence of mud or debris generated from the construction of the wind farm. If it is determined that mud is impacting on the operation or safety of the road, GPG should arrange for the road to be washed.

5.5 Parking

All car parking will occur within the site, with all personnel to be instructed not to park on the roadside of any of the external access roads. Hardstand areas should be provided at the substation and operations building, as well as at the base of each turbine to facilitate vehicle parking.

It is noted that at all stages of construction, including prior to the construction of the hardstand areas, car parking for workers should be provided in a dedicated area on-site, to ensure right of way and pedestrian/vehicle priority is clear within the site boundaries.

5.6 School bus routes

It is understood that a number of schools operate school buses in the general vicinity of the site, including (but not limited to):

– Lake Bolac College
– Mortlake College
– Derrinallum College
– St Colemans
– Hamilton and Alexandra College
– Monivae College

To ensure that OD vehicles avoid any interaction with school buses and children heading to and from school, GPG would engage with Moyne Shire Council and school bus operators during the Project development to determine any routes which interface the OD vehicle routes and the times at which these roads should not be used. It is expected that permits for OD vehicles will have exclusion periods to ensure there is no interaction between OD vehicles and school buses/school children.

5.7 Decommissioning

At the time when the wind farm is to be decommissioned, it is not anticipated that the traffic generated by the site will be any more intense than during the construction stage. Any traffic mitigation required as a result of the decommissioning of any of the wind turbines would be managed via a separate decommissioning traffic management plan.

6. Operation impacts

The wind farm is expected to generate significantly less traffic during operation than during construction. It is anticipated that there will be no more than one staff member on-site on a day-to-day basis, generating no more than four light vehicle trips per day (assuming the staff member makes two return trips per day).

Routine maintenance and inspections may draw up to 10 staff members to the site in a day, generating a maximum of 40 trips in a day (conservatively assuming each staff member drives in a private vehicle and makes two return trips to the site). These occurrences would be relatively infrequent.

It is considered that the existing local road network will be more than adequate to accommodate the expected traffic volumes of the operational wind farm.

In the event of a major component change, a permit will be sought from the NHVR (if required) for the delivery of any over-size or over-mass plant and equipment to the site and the conditions of this permit implemented by the haulage contractor.

7. Cumulative impacts

The area of western Victoria in which the proposed Darlington wind farm is proposed also includes several other existing and proposed wind farms. The wind farms in proximity of Darlington and their current status are listed below:

– Dundonnell Wind Farm (complete)
– Mortlake South Wind Farm (complete)
– Golden Plains Wind Farm (under construction)
– Mount Fyans Wind Farm (planning)
– Hexham Wind Farm (early planning)

To ensure the cumulative impacts of the construction of all the wind farms in the area are considered, the construction of each should be coordinated to reduce the overlap. Following discussions with DoT, it is understood that the construction traffic, in particular the trucks from the quarries to the site, typically have the biggest impact on the roads they use. As such, it is important to identify which quarry will be used and the route the trucks will use. Where possible, an on-site quarry should be established.

With consideration of the wind farms in the surrounding area, Dundonnell and Mortlake are now complete and therefore will not contribute to any significant traffic.

While construction of the Golden Plains wind farm is yet to be completed, due to the location of the project, to the northeast of the Darlington site, near Rokewood, there is not expected to be any significant overlap in traffic impacts. The quarry vehicles to the Golden Plains site currently travel on Rokewood-Skipton Road (C143) from just south of Skipton. This section of road is unlikely to be used for the Darlington Wind Farm Project.

The Mount Fyans wind farm is located at the immediate west of the Darlington site with construction expected to commence around 2024 (subject to planning). Due to the timing and proximity of this site when compared to the Darlington site, Construction Traffic Management Planning should consider coordination of proposed haulage routes to ensure that any significant cumulative impacts to the surrounding road network are appropriately identified and mitigated as required in consultation with the relevant authorities.

The Hexham wind farm is to be located approximately 25 km west of the Darlington site, via the Hamilton Highway. The Hexham wind farm is in a similar stage of planning as the Darlington wind farm and may also elect to use similar haulage routes. As such, coordination will also be required with the operators of the Hexham wind farm during construction traffic management planning to assess and mitigate any cumulative impacts.

8. Mitigation measures

In order to minimise the impacts to the local and arterial road network by traffic generated by the construction of the wind farm, mitigation measures should be implemented, as outlined in Table 7.

Table 7 Impacts and mitigation measures

Category	Potential Impact	Mitigation measure	Timing
Construction traffic	Obstructions and roadside infrastructure constraints	**Construction Traffic Management Plan** A detailed Construction Traffic Management Plan (CTMP) is to be prepared prior to the construction of the wind farm. Amongst other items, the TMP should include: - Detours around any overhead obstructions for vehicles which won't make the clearance. - Swept path assessments for all bends in the haulage route and all turns at intersections along the haulage route. - An assessment of the required pre-construction road upgrades. - A plan for routine inspections of road infrastructure.	Prior to commencement of construction
		Assistance crews Traffic management crews will drive ahead of OD vehicles during delivery. The assistance crews will assist by removing in roadside obstructions and holding traffic where required.	During construction
	Increased truck volumes	**Traffic controllers** Traffic controllers will be present to hold up any traffic where OD vehicles are required to occupy more than one traffic lane, drive over the road centre line or turn across oncoming traffic.	During construction
		Truck warning signage To increase awareness of the increased truck volumes and the presence of OD vehicles, truck warning signage should be installed at the following locations: - Six Mile Lane / Hamilton Highway - Darlington-Terang Road / Hamilton Highway - Woorndoo-Dundonnell Road / Hamilton Highway - Woorndoo-Dundonnell Road / Mortlake Ararat Road	During construction
		Additional signage To ensure trucks are not using local roads which have not been approved, signage should be installed stating 'No wind farm construction access' within the site on either side of Woorndoo-Darlington Road where the proposed crossing is to be located, banning construction trucks from turning onto Woorndoo-Darlington Road	During construction
		Speed limit reduction A 60 km/h speed limit should be imposed at the following locations: - Hamilton Highway to the east of Darlington-Terang Road and to the west of Six Mile Lane - Six Mile Lane - Darlington-Terang Road	During construction
		Turn lanes Turn lane treatments should be provided, based on the proposed haulage route, as outlined within Section 5.2.	Prior to construction
	Loading areas	All loading and unloading of materials will be limited to specific loading areas within the site. No loading or unloading is to occur on public roads.	During construction

Category	Potential Impact	Mitigation measure	Timing
Pavement	Damage to road infrastructure and pavement	**Road quality auditor** An independent Road Quality Auditor should be engaged by GPG for the duration of the project. The auditor will be responsible for: - Undertaking a pre-construction pavement condition survey of any roads which are to be used by the wind farm. - Undertake an assessment of all local road culverts along the proposed access routes. - Undertake inspections of each local access road. - Inspect any road upgrade works to ensure that construction is in accordance with the approved engineering drawings to the appropriate standard. - Report the results of all condition surveys and inspections to Moyne Shire Council or VicRoads as relevant.	During construction
		Road rehabilitation Any roads damaged by the construction of the wind farm will be repaired to an acceptable standard, with all costs borne by GPG. A final road condition audit by the Road Quality Auditor will be undertaken to certify all roads have been either maintained or rehabilitated to an acceptable level at the commencement of the project.	During construction
		Road upgrades All local roads will need to be upgraded to an appropriate standard prior to construction. This includes Six Mile Lane, Darlington-Terang Road and Woorndoo-Darlington Road (between Hamilton Highway and the site access points) as well as the pavement of Woorndoo-Darlington Road where trucks will cross to between the site areas to the north and south.	Prior to construction
Dust & mud	Mud and debris tracking onto roads	**Vehicle wash down areas** Wash down areas will be provided within the site near the construction compound base to allow workers to clean construction vehicles on site.	During construction
		Internal access roads Internal roads will be constructed early on, to prevent construction vehicles picking up any materials from the site and transporting it to the surrounding roads. Prior to the road construction, inspections will be undertaken on vehicles to check for any soil or weed materials before entering and exiting the site.	During construction
	Dust on roads	**Dust suppression** The dust impact along the roads (Council roads in particular) will need to be monitored. If required, roads should be sprayed with water (potentially with a wetting or binding agent) to minimise dust in the air.	During construction
Parking	Staff parking	All parking will occur within the site boundaries, in dedicated parking areas. All staff and drivers will be instructed not to park on public roads.	During construction
School bus routes	Interference with school bus routes	Any sections of the haulage route which are identified as school bus routes by Moyne Shire Council, would not be used during school drop off and pick up hours.	During construction

9. Conclusions

This report has investigated potential haulage routes for the construction of the Darlington wind farm as well as outlined the likely traffic impacts of the construction of the site.

The project will generate approximately 268 vehicle trips per day during construction, reducing to no more than 40 vehicle trips per day during operation. This level of additional traffic is expected to result in several potential impacts, as identified in this report, including:

– Construction traffic conflicting with roadside or overhead obstructions
– Adequacy of road infrastructure to accommodate construction traffic
– Increased truck volumes along haulage routes
– Loading and unloading of materials
– Damage to road infrastructure and pavement
– Mud and debris tracking onto roads
– Dust spread
– Staff parking
– Interference with school bus routes

Mitigation strategies have been proposed for all the above impacts which are generally expected to reduce the impact to residents and local road users. While there may be some impact to the amenity of residents due to dust spread, these impacts are expected to be suitably addressed with dust and mud suppression measures.

Of note however, a significant impact to be monitored is the potential for damage to occur to the road infrastructure and pavement because of the volume of heavy vehicles. While this impact would be mitigated through the engagement of a Road Quality Auditor and the provision of road rehabilitation works as required, it will be essential to determine the construction traffic generation of the site and coordinate the projected volumes and routes with the surrounding wind farm developments. The use of an on-site quarry will further assist with mitigating this impact.

With reference to Section 15 of the EES Referral Form Template:

1. *"Is the project likely to generate significant volumes of road traffic, during construction or operation?"*
    - Yes. The project is expected to generate up to 268 vehicle trips per day including 51 heavy vehicles (102 heavy vehicle trips). The construction period would be around 18 months, with the construction peak lasting for approximately 1-2 months. This effect is considered significant with respect to the number of trucks generated onto public roads and the duration of this activity. The main outcome to be considered is with regard to potential pavement damage. The effects may be compounded due to cumulative effects of other wind farm projects in the area that may be in construction during the same period.
2. *"Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?"*
    - Yes. While the measures proposed in this report would result in adequate mitigation of effects due to emissions, dust or odours as well as traffic conditions, the potential for significant effects exists and should be considered.
3. *"Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?"*
    - Yes. Increased truck activity on Hamilton Highway as well as local roads (including Six Mile Lane, Woorndoo-Darlington Road and Darlington-Terang Road) has the potential to result in safety risk. This report has recommended the provision of road and intersection upgrades where appropriate in order to mitigate potential safety hazards associated with the project.

Based on the findings of this report, while there is the potential for significant impacts, it is considered that these can be appropriate mitigated using standard construction traffic management measures and procedures as outlined in this report.

Appendices

Appendix A

Wind farm layout

TURBINE ID	GDA94 - MGA ZONE 54 COORDINATES (m)	
	EASTING (X)	NORTHING (Y)
DG01	670.490	5.796.235
DG02	669.228	5.794.425
DG03	669.387	5.793.225
DG04	670.451	5.793.788
DG05	668.809	5.791.773
DG06	669.540	5.792.022
DG07	670.195	5.792.369
DG08	670.844	5.792.718
DG09	671.505	5.793.062
DG10	672.160	5.793.409
DG11	669.474	5.790.703
DG12	670.059	5.791.013
DG13	670.644	5.791.322
DG14	671.230	5.791.632
DG15	671.784	5.791.926
DG16	672.344	5.792.222
DG17	672.903	5.792.518
DG18	669.693	5.789.534
DG19	670.283	5.789.847
DG20	670.820	5.790.171
DG21	671.494	5.790.488
DG22	672.152	5.790.836
DG23	672.810	5.791.184
DG24	673.468	5.791.533
DG25	674.116	5.791.876
DG26	674.747	5.792.210
DG27	668.414	5.788.341
DG28	669.165	5.788.738
DG29	671.723	5.789.418
DG30	672.494	5.789.733
DG31	673.226	5.790.121
DG32	673.959	5.790.508
DG33	672.659	5.788.536
DG34	672.361	5.787.094
DG35	673.773	5.787.954
DG36	674.610	5.788.285
DG37	668.114	5.785.858
DG38	668.855	5.786.251
DG39	669.596	5.786.643
DG40	667.388	5.784.190
DG41	667.987	5.784.507
DG42	668.586	5.784.824
DG43	669.184	5.785.140
DG44	669.783	5.785.457
DG45	667.826	5.783.137
DG46	668.544	5.783.577
DG47	669.212	5.783.976
DG48	669.942	5.784.258
DG49	670.630	5.784.621
DG50	671.317	5.784.985
DG51	672.004	5.785.349
DG52	667.968	5.781.928
DG53	668.588	5.782.256
DG54	669.208	5.782.585
DG55	670.044	5.783.078
DG56	670.736	5.783.393
DG57	671.428	5.783.760
DG58	672.119	5.784.126
DG59	669.812	5.781.620
DG60	670.618	5.782.047
DG61	672.384	5.783.063

SHEET

LEGEND

- WIND FARM BOUNDARY
- PROPOSED ROAD
- TRANSMISSION LINE 500 kV
- SUBESTATION & CONTROL ROOM (81.486 m²), OFFICE (26.000 m²) AND CONCRETE BATCHING BOXES (26.000 m²)
- WIND TURBINE & HARDSTAND AREA

NOTES

1. CAD FILE AND EXTERNAL REFERENCE FILES ARE IN GDA94 - MGA ZONE 54 COORDINATE SYSTEM.
2. THE LOCATION OF WIND TURBINES, ASSOCIATED INFRASTRUCTURE AND ROAD ALIGNMENTS ARE INDICATIVE ONLY AND SUBJECT TO ADJUSTMENT THROUGH DETAILED DESIGN.

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DIN-A3

SCALE: 1:35.000

GPG Grupo Naturgy

PROJECT: **DARLINGTON WIND FARM**

DRAWING TITLE: INDICATIVE GENERAL LAYOUT WITH TOPOGRAPHY

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