

Traffic Impact Assessment

Willatook Wind Farm Project

December 2017

traffic:report

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1 Introduction:

Ration Consultants have been engaged by Wind Prospect Pty Ltd to undertake a review of the traffic and access impact associated with the development and operation of the proposed Willatook Wind Farm Project.

This traffic impact assessment considers the advised Willatook Wind Farm project as a at the time of writing based on a maximum of 89 Wind Turbine Generator (WTG) sites and the largest likely WTG's to be adopted (220 metre high / 78 metre blade length).

As advised by Wind Prospect we understand that, subject to further detailed review closer to the time of project delivery, the number of WTG sites may reduce, and that alternate WTG's may be adopted. On advice from Wind Prospect, this assessment also assumes that the Port of Portland as the preferred port of entry for all WTG and other major imported componentry.

We understand that, subject to a range of factors including the resolution of WTG's, the use of an alternate, or multiple ports, may be considered.

In the course of undertaking this assessment the subject site, its environs and key road links relevant to the movement of materials have been inspected, plans of the wind farm and site access reviewed and relevant traffic data collected and analysed.

To understand specific and local issues, Ratio has liaised with representatives of Moyne Shire Council, and VicRoads as well as having regard to current VicRoads policy relevant to wind farm projects and requirements for over dimensional (OD) and over-size / over-mass (OSAM) transport and associated traffic management.

Documents reviewed and considered as part of this assessment include:

- Moyne Shire Council Municipal Road Management Plan, Version 4, 23 May 2017
- Moyne Shire Road Hierarchy Plan, MSCGIS0011.wor, 2 February 2006
- Policy and Planning Guidelines – Development of Wind Energy Facilities in Victoria, Department of Environment, Land, Water and Planning, November 2017
- VicRoads Heavy Vehicle Network Maps (www.vicroads.vic.gov.au/business-and-industry/heavy-vehicle-industry/heavy-vehicle-map-networks-in-victoria)
- Guidelines and Framework for Assessing Wind Farm Energy Projects and Associated Traffic Management Plans (Draft), Version 6 (VicRoads, 17 February 2015)

2 Willatook Wind Farm

2.1 Location

The Willatook Wind Farm site is located to approximately 25.0 kilometres to the north of Port Fairy and extends across both sides of the Woolsthorpe-Heywood Road, between Penhurst-Warrnambool Road and Hamilton-Port Fairy Road.

The site extends across 7,071 hectares of farming land used for grazing, dairy and cropping centred around the intersection of the Woolsthorpe-Heywood Road and Tarrone North Road.

The 275kV Macarthur Wind Farm high voltage transmission link bisects the site, north to south, linking to the 500kV Moorabool to Portland transmission line at the Tarrone Substation that abuts the southernmost area of the Wind Farm site south of Woolsthorpe-Heywood Road.

The location of the site in the context of the broader region is shown in Figure 2-1.

Figure 2-1 Site Location



2.2 Site Context

As described above, land across the wind farm site is currently used for a mix of sheep and cattle grazing, some dairy and also cropping. The land is typical of pastoral areas of the Western Victorian Volcanic Plains and is largely undulating open farmland with areas of rocky outcrops.

Woolsthorpe – Heywood Road, a VicRoads C class road, is the significant road through the Wind Farm site and extends east from Henty Highway, Heywood to Warrnambool-Caramut Road at Woolsthorpe.

The cross section and construction standard of the road varies along its length and through the Wind Farm site, with older sections typically constructed as a central single 4.0 metre seal with gravelled shoulders (see Figure 2-2) and with newer, reconstructed sections provided within a 7.0 metre two-lane sealed carriageway (see Figure 2-3). Widened two-lane sections of the road have

progressively been delivered along lengths where warranted in response to road geometry (horizontal and vertical) and where pavement failures have necessitated reconstruction.

From traffic volume information provided by VicRoads Woolsthorpe – Heywood Road currently carries in the order of 270 vehicles per day (AADT) with 40 heavy vehicles per day.

Figure 2-2 Woolsthorpe – Heywood Road, east from Macknights Road



Figure 2-3 Woolsthorpe – Heywood Road, east of Tarrone North Road



Tarrone North Road extends south from Woolsthorpe-Heywood Road is a two-lane sealed road (see Figure 2-4) continuing with a central single 4.0 metre seal with gravelled shoulders south of the Tarrone Substation access (see Figure 2-5) to Tarrone Lane.

The construction standard of the road is good noting that the northern section of the road was reconstructed to facilitate the Tarrone Substation, with more recent pavement works undertaken along the southern single width section under the Federal Government Roads to Recovery Program.

The intersection of Tarrone Road North with Woolsthorpe-Heywood Road forms a T-intersection with priority to Woolsthorpe-Heywood Road by way of give-way statutory controls to Tarrone North Road. The intersection of Tarrone Lane with Tarrone North Road is a Y-intersection, with priority to Tarrone Lane.

Figure 2-4 Tarrone North Road, north from Tarrone Substation Access



Figure 2-5 Tarrone North Road, south from Tarrone Substation Access



Nargorckas Road extends between Woolsthorpe – Heywood Road and Moyne Falls – Hawkesdale Road. North from Woolsthorpe – Heywood Road to Kangerton Road, Nargorckas Road has an approximate 4.0 metre wide sealed carriageway with grassed verges. (refer Figure 2-6). Further north from Kangerton Road, Nargorckas Road is unsealed.

The intersection of Nargorckas Roads with Woolsthorpe – Heywood Road is a give-way controlled Y-intersection with priority to Woolsthorpe – Heywood Road.

Figure 2-6 Nargorckas Road, north from Woolsthorpe – Heywood Road



Dunmore Lane runs south-east to north-west between Woolsthorpe – Heywood Road and east of Hamilton – Port Fairy Road as an unsealed local access road. Dunmore Lane forms a T-intersection with Woolsthorpe – Heywood Road with priority to Woolsthorpe – Heywood Road.

Figure 2-7 Dunmore Lane, north from Woolsthorpe – Heywood Road



Macknights Road extends south from Woolsthorpe – Heywood Road as an unmade track to Frys Road. Give-way signage is provided at the intersection with Woolsthorpe – Heywood Road.

Figure 2-8 Macknights Road, south from Woolsthorpe – Heywood Road



Other roads in proximity to the Wind Farm site include **Kangerton Road** as well as **Old Dunmore Road**, **Riordans Road**, **Landers Land** and **Hopcrafts Road**.

Kangerton Road extends across the norther edge of the Wind Farm site and runs east-west between Hamilton – Port Fairy Road and Moyne Falls – Hawkesdale Road. Kangerton Road will not provide access to the Wind Farm or be used by construction related traffic.

Old Dunmore Road, Riordans Road, Landers Land and Hopcrafts Road are all of which are lower order access roads that border or extend through / within the Wind Farm site and provide for local property access only.

Table 2.1 Wind Farm Site Local Road Classification and Status

Road	Section	Classification	Construction Standard
VicRoads			
Woolsthorpe - Heywood Road	Hamilton – Port Fairy Road to No 3261. Woolsthorpe-Heywood Road [3.2 km]	Arterial	Sealed – Single lane
	No 3261. Woolsthorpe -Heywood Road to No 2923. Woolsthorpe-Heywood Road	Arterial	Sealed – Two lane
	No 2923. Woolsthorpe -Heywood Road to Shaw River bridge (approx.) [2.6 km]	Arterial	Sealed – Single lane
	Shaw River bridge (approx.) to Tarrone No 2169. Woolsthorpe - Heywood Road	Arterial	Sealed – Two lane
	East of No 2169. Woolsthorpe - Heywood Road to Poynton Road [2.4 km]	Arterial	Sealed – Single lane
	Poynton Road to Penhurst – Warrnambool Road	Arterial	Sealed – Two lane
Moyne Shire Council			
Tarrone North Road	Woolsthorpe-Heywood Road to Tarrone Substation Access	Sub Arterial	Sealed – Two lane
	Tarrone Substation Access to Tarrone Lane	Sub Arterial	Sealed – Single lane
Nargorckas Road	North of Woolsthorpe-Heywood Road	Sub Arterial	Sealed – Single lane
Kangerton Road	West of Nargorckas Road	Sub Arterial	Sealed – Single lane
Macknights Road	South of Woolsthorpe-Heywood Road	Access	Formed / Unpaved
Dunmore Lane	North of Woolsthorpe-Heywood Road	Access	Gravel (Level 2)
Old Dunmore Road	South of Woolsthorpe-Heywood Road	Access	Unformed
Riordans Road	West of Tarrone North Road	Access	Gravel (Level 1)
Landers Lane	North of Riordans Road	Access	Gravel (Level 1)
Hopcrafts Road	North of Woolsthorpe-Heywood Road	Access	Gravel (Level 2)

2.3 Planning Policy and Context

Planning Context

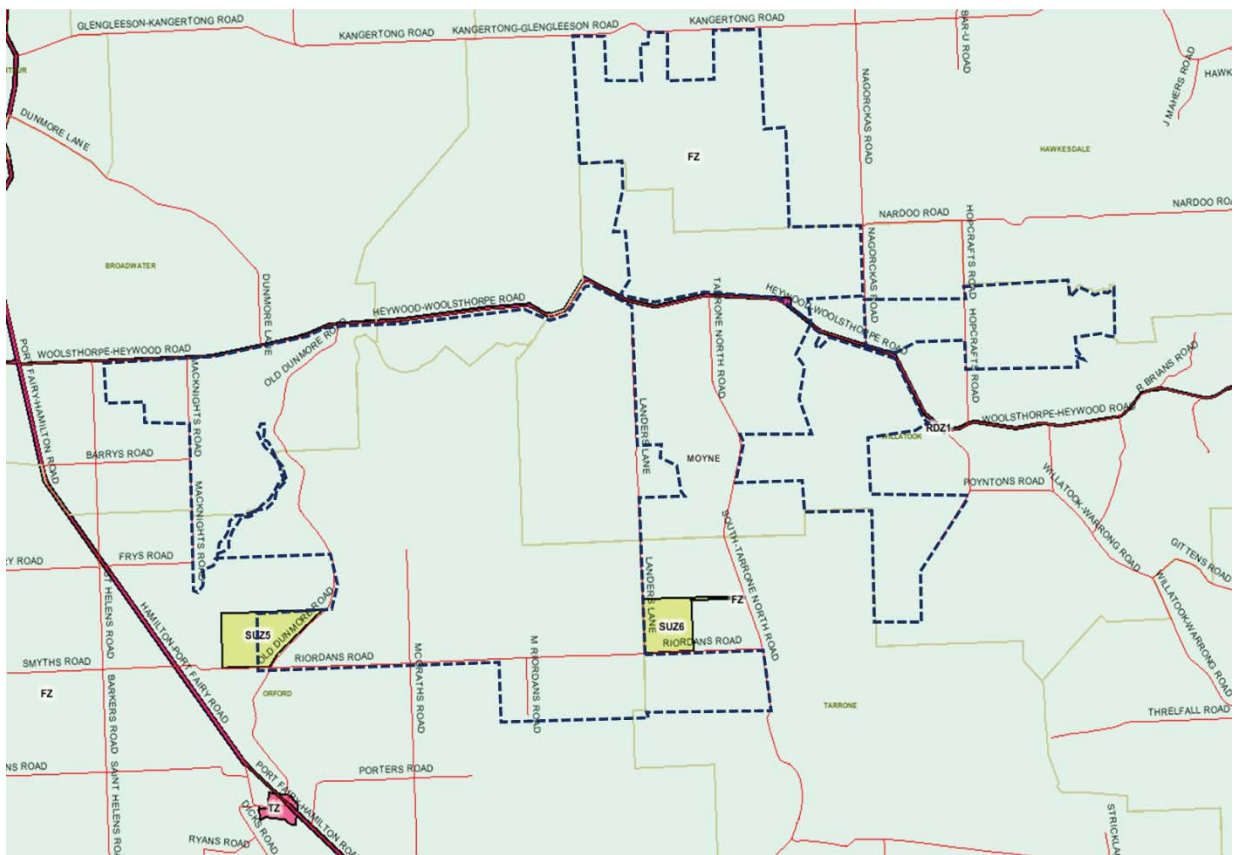
All land within and bordering the Wind Farm area is Farming Zone with the exception of two Special Use Zone areas that provide for the development of the Shaw River gas fired power station (SUZ4) and Tarrone Sub Station and proposed Tarrone gas fired power station (SUZ5).

A Wind Energy Facility is a section 2 use with the Farming Zone subject to meeting the requirements of Clause 52.32.

Relevant to access for the proposed wind energy facility, in considering an application for use and buildings and works, the decision guidelines listed under Clause 35.06-6 include:

- *How the use and development makes use of existing infrastructure and services.*

Figure 2-9 Planning Zones



Clause 52.32 – Wind Energy Facilities

Clause 52.32 of the Victorian Planning Provisions outlines the relevant application requirements associated with the development of Wind Energy Facilities. Relevant to traffic and access matters, considerations under Clause 53.32 include:

Clause 52.32-4 - Application requirements

- *Site and context analysis*

In relation to the surrounding area:

- *Access to infrastructure*

2.4 Wind Farm Description

The proposed Wind Farm layout is shown in Figure 2-10.

The project will consist of a wind energy facility comprising of up to 89 wind turbine generators (WTG's), four (4) wind mast sites and a central substation connecting to the 275kV Macarthur Wind Farm high voltage transmission line.

Turbines will be three bladed and reach a maximum height to the tip of the rotor not exceeding 220 metres. The turbines will comprise of sectioned towers (3 - 7 sections dependant on tower design and configuration), a nacelle containing the generator, gear box and electrical equipment. Each turbine will require a transformer and switchgear which will be housed inside the tower base, or externally, immediately adjacent to the base. Hardstand crane pads of approximately 40 metres by 60 metres will be located at the base of each turbine tower.

WTG sites will be accessed via a network of internal access tracks primarily extending from Woolsthorpe-Heywood Road, with an access also from Tarrone North Road to the Wind Farm area south of Woolsthorpe - Heywood Road and west of Tarrone North Road. Internal access tracks will be approximately 6.0m wide to allow access for construction and for ongoing maintenance throughout the life time of the Wind Farm. It is estimated that there will be approximately 66 kilometres of new tracks.

Subject to further investigation and agreement with Moyne Shire Council, the initial section of Macknights Road may be used to access WTG sites in the west of the Wind Farm. If used, this section of road would be upgraded to formed gravel rural standard access road to Council construction standards.

Access treatments to Woolsthorpe - Heywood Road and Tarrone North Road would be provided in accordance with VicRoads Type B - 'Truck Access to Rural Property' access detail rural property truck access (see Appendix A)

The Wind Farm will also include a utility area, collector/ switch yard and terminal substation which will be co-located centrally to the Wind Farm site, to the south of Woolsthorpe - Heywood Road. Access to this area will be via Access Point 3 (see Figure 2-10).

The utility area will be in a secure enclosed compound and will comprise of an operations and maintenance building, car parking, a site office, warehousing/workshop facility and an external yard area for storage which may include a bunded area for fuel storage, and other ancillary equipment. The collector/switchyard will be in a secure enclosed compound and will be where overhead and underground cables from the wind farm collection system will be terminated.

The terminal substation will also be in a secure enclosed compound and will house equipment to enable connection to the adjacent 275kV transmission line. Internally, electricity will be distributed from each wind turbine to the terminal station via a network of medium voltage 33 kilovolt underground cables.

Additional to the above, there will be other temporary infrastructure associated with the construction of the wind farm including:

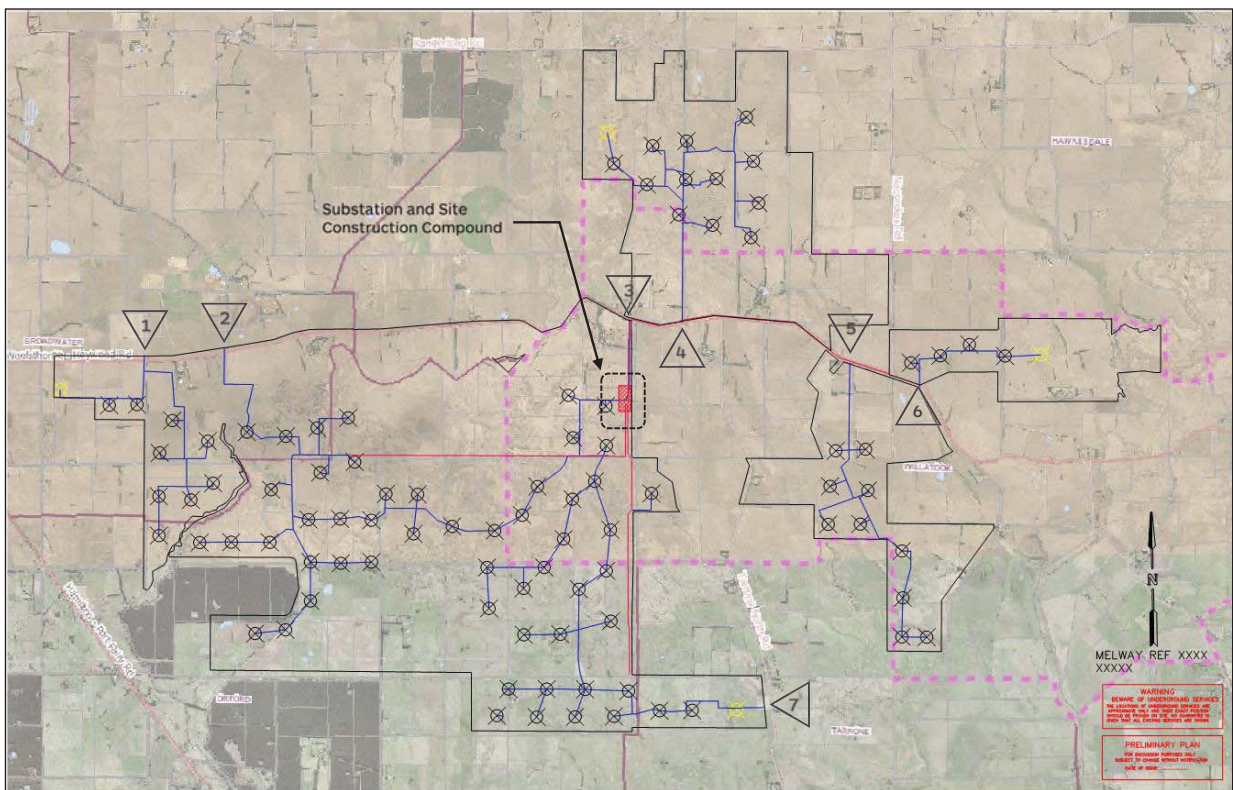
- A site compound including temporary site office and associated staff facilities
- A concrete batching plants
- Storage sheds and workshop
- Fuel storage; and
- Water storage.

Wind Prospect have advised that, subject to further detailed investigation, on-site sourcing of coarse aggregate (for road/hardstand construction and potentially concrete production) and non-potable water is likely. Additional temporary infrastructure to support this on-site sourcing would include a quarry / mobile crushing plant and water storage dam/s.

All temporary infrastructure will be removed at the end of the construction programme and areas rehabilitated where required.

The Wind Farm will have an expected operating life of operate for 20 years.

Figure 2-10 Wind Farm Site



2.5 Wind Farm Project Construction

As discussed above, during construction, the Wind Farm will include a centrally located construction compound that will incorporate a range of temporary infrastructure including a offices/staff facilities and temporary concrete batching plant.

Wind Prospect has also advised that up to 150 staff would be required on-site during times of peak construction activity.

We are advised that the construction and delivery of the Willatook Wind Farm would occur across a 24 month period (approximately) and include the following key work phases and indicative included tasks:

- Site Establishment – includes establishment of the temporary concrete batching plant, delivery of key plant and construction vehicles and the construction of initial internal access tracks required for the delivery of materials and goods for further construction. Also includes the establishment of on-site quarrying and water sourcing (if pursued);
- Civil Construction Works – includes the construction of the balance of internal access roads, WTG site hardstand areas, WTG footings, terminal station construction and internal power infrastructure;
- WTG Component Delivery; and
- WTG Erection.

Significant overlap between each work phase is expected, with site preparation, WTG component delivery and erection to be undertaken on a rolling basis.

2.6 Construction Traffic Access

External Construction Materials Delivery

Externally sourced materials required for construction will primarily access the Wind Farm site via Woolsthorpe – Heywood Road from Penhurst – Warrnambool Road and/or Hamilton – Port Fairy Road.

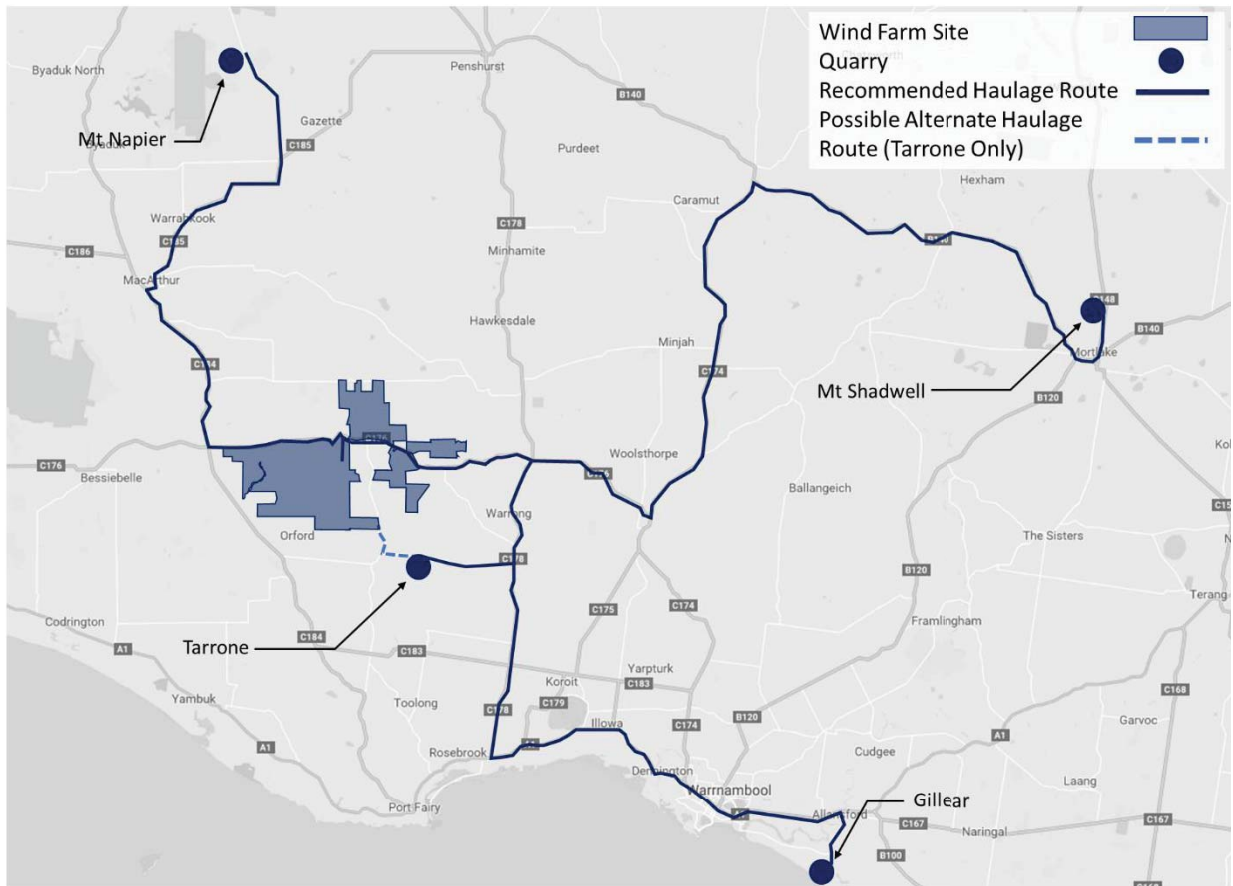
With the exception of some road/hardstand construction material and some WTG components (which may be delivered direction to the relevant work-site) all external construction material deliveries will be to the main construction site compound in the first instance. Materials deliveries would then proceed to the various areas across the Wind Farm site via the internal Wind Farm access track network and Woolsthorpe – Heywood Road within the Wind Farm site.

Wind Prospect have advised that, where practical, construction materials not sourced on-site will be sourced within the local region. Four quarries have been identified as potential sources, being Tarrone Quarry to the south, as well as Mt Napier to the north, Mt Shadwell to the north-east near Mortlake and Gilleard sand and limestone quarry at Allansford to the south-east. (see Figure 2-11).

Recommended access routes to the Wind Farm from all quarry sites are via declared arterial roads. Local access between the Tarrone Quarry and Wind Farm site using Tarrone Lane and Tarrone North Road (to the southern Wind Farm access only) may be considered subject to the volume of material sourced from Tarrone Quarry and subject to agreement with Moyne Shire Council.

Cement and other key construction materials will likely be sourced from Warrnambool.

Figure 2-11 External Quarry Locations and Recommended Haulage Routes



WTG/Substation Components

Wind Prospect have advised that the Port of Portland is currently the preferred port of entry for WTG and other major imported componentry. On this basis, an over-dimensional (OD) vehicle haulage route has been identified between the Port of the Portland and the Wind Farm site based on the largest expected WTG component being a 78.0 metre turbine blade.

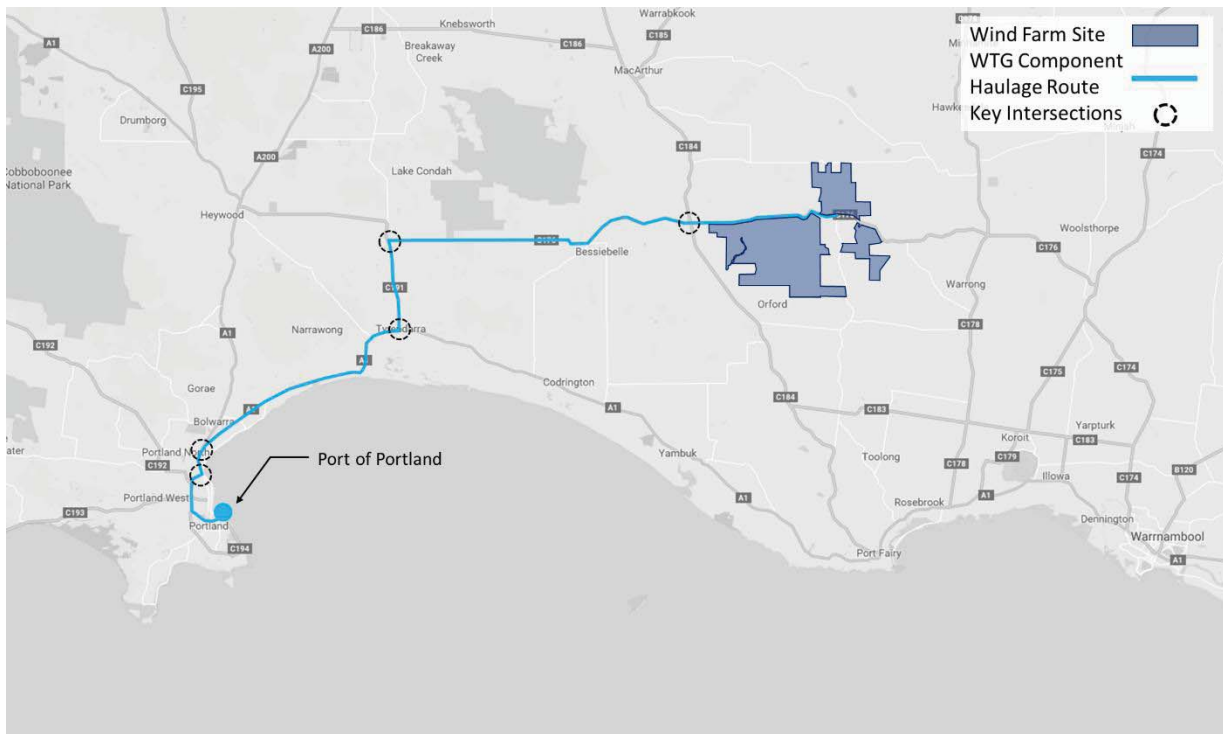
From the Port of Portland this route (see Figure 2-12), extends along approved or conditionally approved Over Size and Over Mass (OSOM) declared main roads declared via Henty Highway to Princes Highway, and then Tyrendarra-Ettrick Road to Woolsthorpe-Heywood Road, approaching the Wind Farm site from the west.

The suitability of this route has been confirmed by way of inspection and swept path analysis at key locations as discussed in Section 4 of this report.

From discussion with VicRoads, a secondary route that would allow vehicles to approach the Wind Farm site from the east using Princes Highway through Port Fairy and then Penhurst – Port Fairy Road and Penhurst – Warrnambool Road has been identified, but is unlikely to be used at this time.

It is noted that some WTG components may be delivered directly to WTG sites rather than to the main construction compound.

Figure 2-12 Recommended WTG Component Haulage Route



Construction Staff

During delivery construction staff will likely be accommodated in Port Fairy, Warrnambool and possibly Koroit. Staff accommodated in Port Fairy will access the Wind Farm site from the west via Hamilton – Port Fairy Road. Staff accommodated in Warrnambool and Koroit will likely approach from the east via Woolsthorpe and/or Penhurst – Warrnambool Road.

Local and Internal Access

During construction all other vehicle movements, including water cartage and the haulage of any material quarried on-site, will use the new internal Wind Farm access tracks and, where necessary sections of Woolsthorpe – Heywood Road within the Wind Farm site.

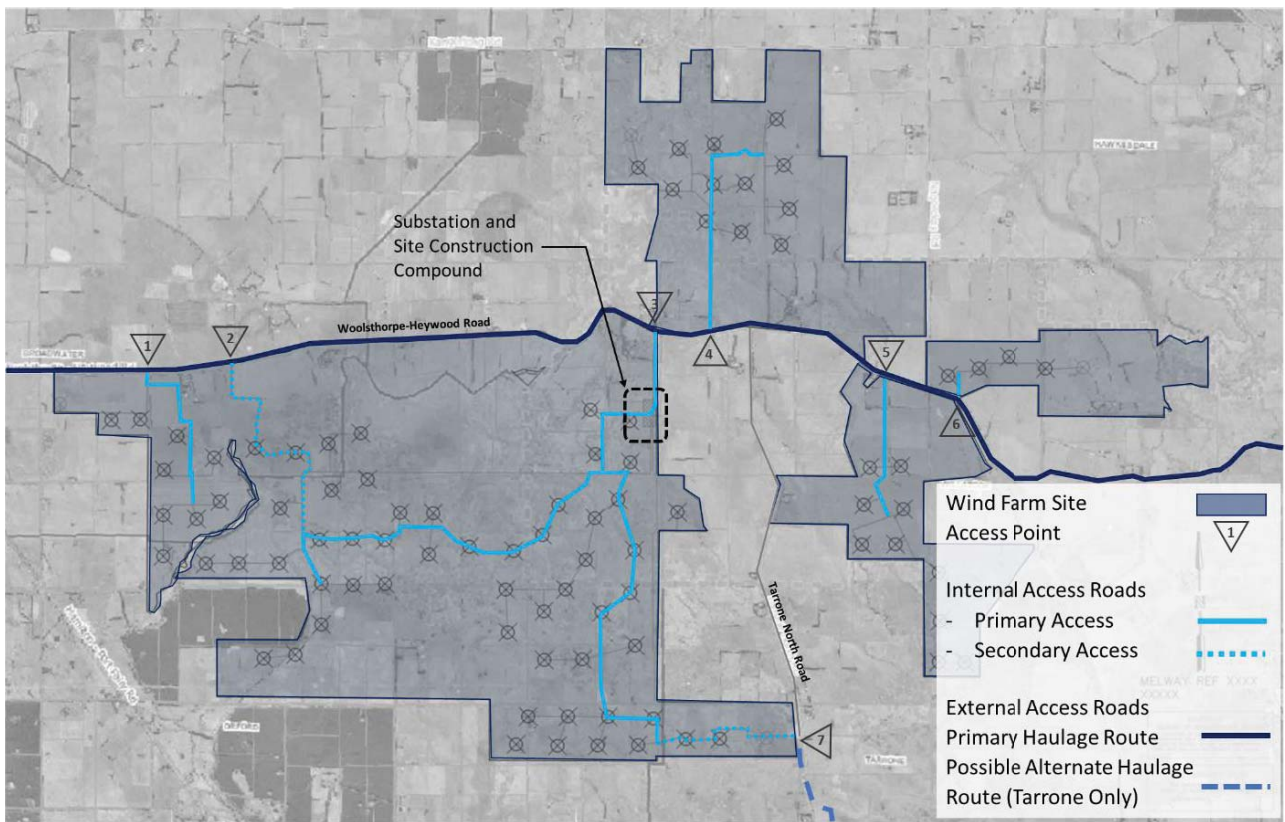
Tarrone North Road will not be used by internal Wind Farm traffic.

The use of Woolsthorpe – Heywood Road by internal construction traffic will be limited to the movement of stored construction materials between the central construction compound and Wind Farm areas not accessible by internal access roads

As noted earlier, to avoid additional handling and heavy vehicle movements, externally sourced material for road and hardstand construction as well as WTG components would be delivered directly work sites in each relevant area of the Wind Farm.

The key internal access roads and Wind Farm access points are shown in Figure 2-13.

Figure 2-13 Wind Farm Site Local Access



3 Traffic Impact Review

Traffic generated by the Wind Farm during construction will consist of:

- General traffic generated by staff travelling to / from the site (i.e. utes, vans and private cars);
- OD vehicles used for the delivery of large WTG components; and
- Other heavy vehicles (HV) which are used for the delivery of the smaller WTG components and importing construction materials such as aggregate and cement for the concrete.

3.1 Adopted Wind Farm Delivery Timeframes

With the exception of site establishment works, work phases will overlap and will be undertaken in tandem, with WTG component delivery and WTG erection to commence reasonably soon after the completion of the initial site footing and access works. Based on advice from Wind Prospect, the following indicative timeframes for each work phase as identified in Section 2.5 is assumed.

— Site Establishment	Weeks 1 – 12
— Civil Construction Works	Weeks 11 – 94
— WTG Component Delivery	Weeks 48 - 90
— WTG Erection	Weeks 50 – 98
— Site Disbandment	Weeks 95 - 104

3.2 Materials Assumptions

Access Roads and Hardstand Areas

Subject to resolving the establishment on an on-site quarry, unsealed internal access roads, hardstand areas and the upgrade/upkeep of local external roads used for Wind Farm construction traffic will be constructed from material sourced on-site.

Prior to the establishment of the on-site quarry, or in the event that on-site materials sourcing is not possible, material for road and hardstand construction will be sourced externally from one or more of the four quarries identified in Figure 2-11.

Advice from Wind Prospect is that access road and hardstand area works will (subject to final design) comprise of:

- Approximately 66 kilometres of internal access roads with typical pavement widths of 6.0 metres and depth of 0.55 metres;
- 89 WTG site hardstands at 60 metres by 40 metres and with a pavement depth of 0.55 metres;
- A 250 metre by 250 metre temporary construction compound hardstand area with a pavement depth of 0.55 metres; and
- A 360 metre by 110 metre substation hardstand area with a pavement depth of 0.55 metres.

All access road and hardstand material sourced on-site quarry will be transported throughout the Wind Farm site using internal access tracks in preference to external roads. Woolsthorpe – Heywood Road would be used to transfer material between the various Wind Farm areas as required.

Where material is sourced externally, material would be delivered directly work sites in each relevant area of the Wind Farm.

WTG Footings

Concrete for WTG footings will be produced internally within the on-site concrete batching plant(s) from externally sourced aggregate, cement and reinforcement. Each WTG footing will require approximately 525 cubic metres of concrete and include 50 tonnes of reinforcing steel. It is assumed that cement required for concrete will be sourced from nearby townships, most likely Portland and/or Warrnambool.

Concrete aggregate will likely be sourced from one or more of the four quarries identified in Figure 2-11.

WTG Components

Each of the 89 WTG's will comprise the following components:

- 3 blades (up to 70 metres);
- A hub and nacelle;
- An internal or external transformer; and
- WTG tower sections.

Components excluding transformers/power storage units and base tower sections will be delivered by OD vehicles. Towers will be delivered in multiple sections, with up to 7 sections per tower subject to the final WTG model specification. Tower sections would be up to 30 metres in length.

Other

Other materials delivery required for the construction of the Wind Farm will include:

- Electrical cabling and other materials/equipment for the internal distribution network;
- The substation transformer;
- Construction equipment and plant;
- Meteorological masts; and
- Plant fuel and other miscellaneous items.

3.3 External Wind Farm Construction Traffic Generation

External traffic generated by the site is will be split across three broad categories:

- General traffic generated by staff travelling to / from the site (i.e. utes, vans and private cars);
- Over Dimensional (OD) used for the delivery of large WTG components; and
- Other heavy vehicles (HV) which are used for the delivery of the smaller WTG components and externally sourced construction materials such as aggregate and cement for the concrete.

Wind Prospect have advised that the establishment on an on-site quarry and water sourcing would cater for approximately 80 percent of road / hardstand construction material and most non-potable water needs.

On this basis, and considering estimated project timeframes, expected external material requirements and typical vehicle types to be used across the project as advised by Wind Prospect estimated external daily vehicle movements across the various stages of the Wind Farm delivery are summarised in Table 3-1.

Adopted staff movements conservatively assume that all staff will access the Wind Farm site by private vehicle with an average occupancy of 1.5 persons per vehicle. Staff movements to and from the Wind Farm site would be substantially reduced should communal transport be provided.

Table 3.1 External Daily Vehicle Movements – Willatook Wind Farm (On-site Materials Sourcing)

Phase	Staff	OD Vehicles	Heavy Vehicles	Total
Weeks 1-10	80	-	15	95
Weeks 11-48	130	-	23	153
Weeks 49-90	200	2-3	24	227
Weeks 91-94	170	-	23	193
Weeks 95-98	120	-	2	122
Weeks 99-104	80	-	2	82

Should on-site materials sourcing not be possible, estimated external daily traffic volumes are presented in Table 3.2, with the significant difference an increase in up to 40 heavy vehicle movements per day during the peak construction period.

Table 3.2 External Daily Vehicle Movements – Willatook Wind Farm (No On-site Materials Sourcing)

Phase	Staff	OD Vehicles	Heavy Vehicles	Total
Weeks 1-10	80	-	65	145
Weeks 11-48	130	-	63	193
Weeks 49-90	200	2-3	64	267
Weeks 91-94	170	-	63	233
Weeks 95-98	120	-	6	126
Weeks 99-104	80	-	2	82

3.4 Wind Farm Construction Traffic Impact

From Table 3.1 and Table 3.2 the substantive portion of daily Wind Farm traffic across all work stages is associated with staff movements to and from the site. This traffic will be concentrated at particular times of each day as staff move to and from the site, with comparatively little such activity at other times.

Heavy vehicle traffic will be more broadly spread, with expected daily volumes translating to an average 2-3 heavy vehicles per hour where road / hardstand materials are sourced on-site and 6-8 heavy vehicles per hour where material is all off-site.

External traffic activity will be concentrated to Woolsthorpe – Heywood Road.

Traffic to the west of Access Point 3 will primarily be OD and OSOM traffic associated with WTG components, with limited staff and heavy vehicles (subject to staff being housed in Port Fairy and external materials sourcing from the Mt Napier Quarry). External traffic volumes to the east of the

Access 3 will be higher do to the greater likelihood of staff accommodation in Warrnambool and Koroit as well as the identified access routes for quarries to the east and south as per Figure 2-11.

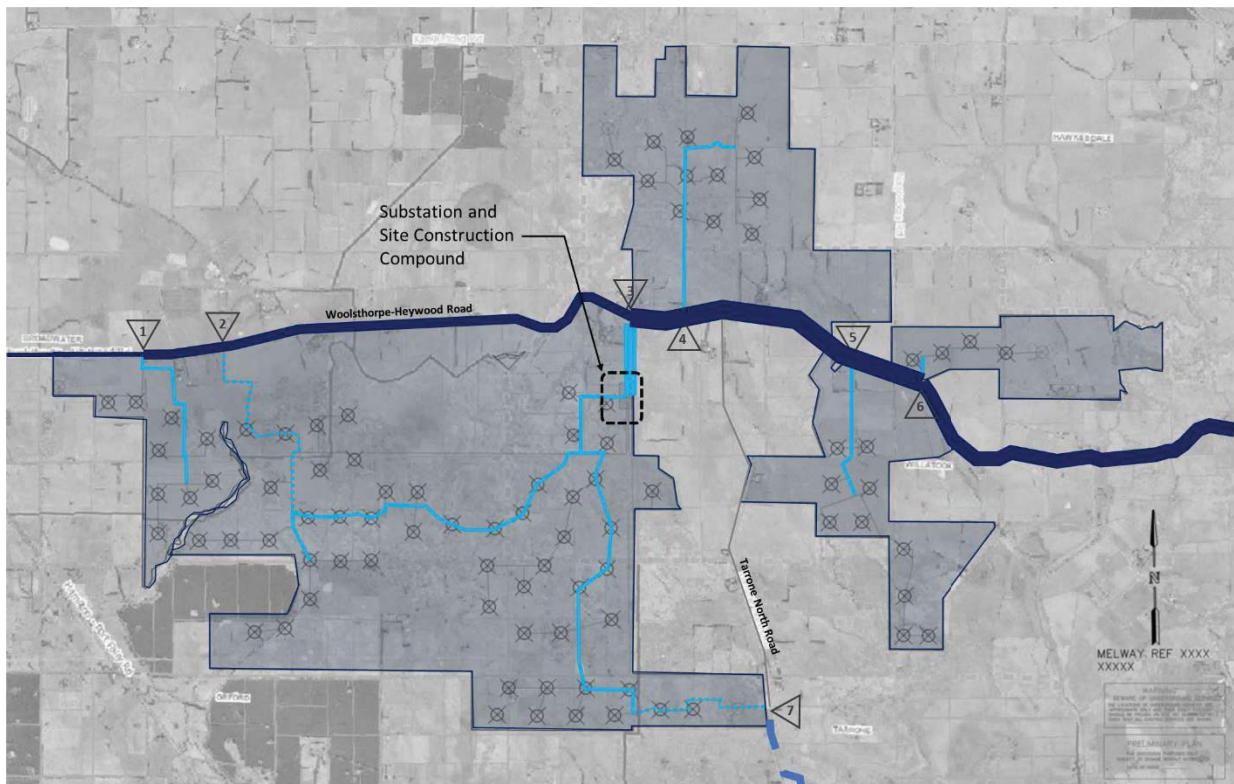
From the above, assuming 30 percent of Wind Farm staff are based in Port Fairy, external construction traffic would generate in the order of 50-70 vehicle movements per day to Woolsthorpe – Heywood Road to the west of Access 3. Additional volumes to the east would be between 160 and 220 vehicles per day subject to the level of on-site materials sourcing.

Additional traffic will also be generated to Woolsthorpe – Heywood Road due to internal construction movements between the various areas of the Wind Farm. The volume of this traffic will vary significantly across the construction period and the intensity of traffic will be dependant on the level of on-site materials sourcing.

This traffic will be most significant between Access 3 and Access 6 to the west due to the reliance on Woolsthorpe – Heywood Road as the single common access route between the central construction compound and Wind Farm areas to the east.

Figure 3-1 provides a relative illustration of Wind Farm construction traffic activity on Woolsthorpe – Heywood Road.

Figure 3-1 Wind Farm Anticipated Construction Traffic Activity



Considering the above, traffic volumes on Woolsthorpe – Heywood Road would increase to up to 490 vehicle movements per day between Access 3 and Penhurst – Warrnambool Road.

These volumes can comfortably be accommodated within the existing two-lane sections of Woolsthorpe – Heywood Road east of Access 3.

Wind Farm construction traffic will increase the likely incidence of passing traffic along the 2.4-kilometre single lane sealed length of Woolsthorpe – Heywood Road between Poyntons Road and No 2169 Woolsthorpe – Heywood Road. The capacity of shoulders to reasonably cater for this traffic will be dependent on the increase in heavy vehicle traffic which, in turn, will be dependent on the level of on-site materials sourcing.

Options to manage Wind Farm traffic along this section of Woolsthorpe – Heywood Road are:

- Retain the existing cross section and seek to maintain the gravel shoulders during the Wind Farm construction period; or

- Reconstruct and widen the pavement to provide two sealed traffic lanes.

Determination of the preferred option should be resolved with VicRoads once on-site materials sourcing is also resolved.

3.5 Wind Farm Operating Traffic Generation

For the majority of time, wind farms operate with limited staff and generate minimal traffic movements. Accordingly, apart from the initial construction phase, the proposal is anticipated to have a negligible impact upon traffic on the local road network. Details of likely traffic generation during operation are detailed as follows:

- Daily routine maintenance to be carried out by two to five people. It will be assumed that the daily traffic generation will not exceed four vehicle movements per day to the local road network, with all other movements being internal to the site.
- Weekly/fortnightly regular minor maintenance to be carried out by a small team. This will involve a team of no more than fifteen people attending the site, with up to four vehicles. This is expected to increase the daily traffic generation of the site up to a maximum of approximately 10 vehicle movements. Again, the majority of movements will be internal to the site and will not affect the surrounding road network.
- Occasional maintenance will occur when components of the development need to be replaced, such as replacing a blade or gearbox. This is expected to only occur very occasionally and will be subject to approval processes with the relevant authorities.
- Visitors to the site such as office based staff and courier delivers etc.

In the context of Wind Farm construction traffic and background traffic on Woolsthorpe – Heywood Road and Tarrone North Road, operating traffic will be minimal. By virtue of the minimal use of other local roads, Wind Farm operating traffic will be noticeable, but will have no material impact.

3.6 Wind Farm Decommissioning

The eventual decommissioning of the Wind Farm site will involve the removal of any structure above ground and to a depth of one metre. This excludes the portion of foundations deeper than 1 metre and access tracks kept in agreement with landowners.

In comparison to the construction period, the traffic generated during decommissioning of the site will be significantly less but will include the use of OD and OSAM vehicles to remove WTG and other major components.

The specific impacts and mitigation measures would be reviewed and resolved at the time of decommissioning.

4 Haulage Route Review

4.1 WTG Haulage Route Review

A review of the primary haulage route as described in Section 2.6 has been undertaken by way of a swept path analysis conducted utilising a 78 metre blade truck as the design vehicle. The findings of this review are discussed as follows, with swept path diagrams included as Appendix B.

Following inspection, the following intersections were considered during this review:

- Henty Highway / New Street, Portland
- Princes Highway / Henty Highway, Portland
- Princes Highway / Tyrendarra-Ettrick Road, Tyrendarra
- Tyrendarra-Ettrick Road / Woolsthorpe-Heywood Road, Homerton
- Woolsthorpe-Heywood Road / Hamilton – Port Fairy Road, Broadwater

As shown on the swept path diagrams included in Appendix A, all above intersections will require some median and/or roadside infill works, potential roadside furniture removal and traffic management works to cater for 78 metre turbine blade vehicles.

Additional higher order traffic management works will be required to cater for these vehicles at key intersections as detailed in Table 4.1.

Table 4.1 Key Intersection Traffic Management

Intersection	Movement	Traffic Management
Henty Highway / New Street, Portland	Vehicles approaching from the west will require the full width of New Street on approach to intersection during left turn.	Temporary closure of right and left turns from Henty Highway to New Street during transit.
Princes Highway / Henty Highway, Portland	To avoid street lighting and power poles, vehicles will cross median and median islands during right turn from Henty Highway to Princes Highway	Temporary removal of signage. Infill within Henty Highway centre median swale (impact on drainage to be considered). Temporary closure of Henty Highway southbound and Princes Highway right turn during transit.
Princes Highway / Tyrendarra-Ettrick Road, Tyrendarra	Vehicles approaching from the west will require the full width of Princes Highway and on approach and Tyrendarra – Ettrick Road in departure to intersection during left turn.	Temporary closure of intersection to all traffic during transit. Infill and temporary removal of signage on north-west corner.
Tyrendarra-Ettrick Road / Woolsthorpe-Heywood Road, Homerton	Right turn from south requires full width of Tyrendarra-Ettrick Road on approach, road reserve area on south-east corner and full width of Woolsthorpe-Heywood Road on departure.	Temporary closure of intersection to all traffic during transit. Temporary removal of signage on Woolsthorpe-Heywood Road approach. Infill required on south-east corner of intersection.

<p>Woolsthorpe- Heywood Road / Hamilton – Port Fairy Road, Broadwater</p>	<p>Vehicles to cut across southern verge on west approach to undertake a continuous movement west to east across Hamilton – Port Fairy Road.</p>	<p>Temporary closure of intersection to all traffic during transit. Infill required on south-west corner of intersection. Temporary removal of signage may be required.</p>
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5 Traffic Management Plan

Subject to appointment of a supplier of WTG's and other considerations, aspects of the Wind Farm project may be subject to review. In addition, construction/work programs for the Wind Farm will not be resolved until closer to project commencement. As such, subject to commencement timeframes, there is potential for changes to existing road conditions and Wind Farm haulage assumptions as considered with this report.

Therefore, it is recommended that a detailed Traffic Management Plan (TMP) be prepared prior to commencement of the project to confirm any mitigation and management works required at that time.

This TMP should be implemented as a condition of any Planning Permit issued for the wind farm and be developed in consultation with VicRoads, Moyne Shire Council, Wind Prospect and any other relevant stakeholders to provide more accurate indication of traffic impacts and generally identify responsibilities for road maintenance and upgrades throughout the construction period.

In general this TMP would include:

- Confirmation of the Wind Farm construction timeframe and works stages;
- Confirmation of expected traffic volumes generated by the wind farm for all work stages;
- Identification/qualification of all HV and OD vehicle haulage routes for all work stages;
- A mechanism to review identified haulage route road conditions prior to the commencement of works;
- Mechanisms/agreements to maintain haulage route roads and road infrastructure, including local public roads used by internal site traffic, during construction works and to reinstate roads to at least pre-construction conditions;
- Qualify any requirement for specific work stage construction traffic management plans; and
- Qualify and identify relevant mechanisms for OD vehicle permits and traffic management requirements.

Specific items identified by VicRoads and Moyne Shire Council that must be addressed within this TMP are as follows, noting that this is not an exhaustive list.

VicRoads

- The configuration and treatment of site access points from Woolsthorpe-Heywood Road (in consultation with Moyne Shire Council);
- Confirmation of arterial road OD routes to be used and expected associated traffic volumes (as AADT);
- Confirmation of arterial heavy vehicle haulage routes to be used and expected associated traffic volumes (as AADT);
- The preparation of suitable construction traffic management plans (or an agreed equivalent) detailing works required at intersections where works are required to accommodate OD vehicles including; and
- The preparation of a developer funded road maintenance levy or agreed alternative (such as road improvement works) in accordance with the draft VicRoads Guidelines and Framework for Assessing Wind Farm Energy Project guidelines.

Council Items

- Review and confirmation of existing local road conditions and use (surface condition, traffic management, school bus routes etc.);
- Confirmation of the use of and expected traffic volumes to be generated on local roads relied on during construction, nominally Tarrone Lane, Tarrone North Road and Macknights Road, for each relevant works stage;
- The preparation of suitable construction traffic management plans (or an agreed equivalent) detailing works/measures to be implemented on public roads within the Wind Farm site during each identified work stage that includes:

- Any signage/line marking requirements;
 - Expected haulage hours, including identification of non-activity periods during school bus times;
 - The recognition and management of stock crossing points on haulage routes;
 - An on-site contact responsible for the implementation and maintenance of the CTMP; and
 - The preparation of a CTMP post implementation RSA for each work stage CTMP.
- Confirmation and the preparation of functional plans for agreed pre-commencement road upgrade/improvement works required to cater for Wind Farm traffic, including (as required):
- The construction of Macknights Lane within the Wind Farm site;
 - Widening/upgrade works on Tarrone North Road between the Tarrone Sub Station access and Tarrone Lane; and
 - Improvement of the intersections of Tarrone Lane and Tarrone North Road.
- The preparation of a workable road maintenance agreement between Moyne Shire Council and Wind Prospect Pty Ltd for the relevant sections of local roads relied on for Wind Farm construction traffic that:
- Establishes existing road conditions prior to the commencement of works on-site;
 - Establishes a regular inspection and reporting schedule of haulage route road conditions;
 - Nominates an appropriate on-site contact for the reporting of road maintenance issues identified outside of regular inspections;
 - Establishes timeframes and procedures for rectification of identified issues; and
 - Identifies the standard and extent of post construction rectification works of roads (to existing conditions or an agreed alternative).

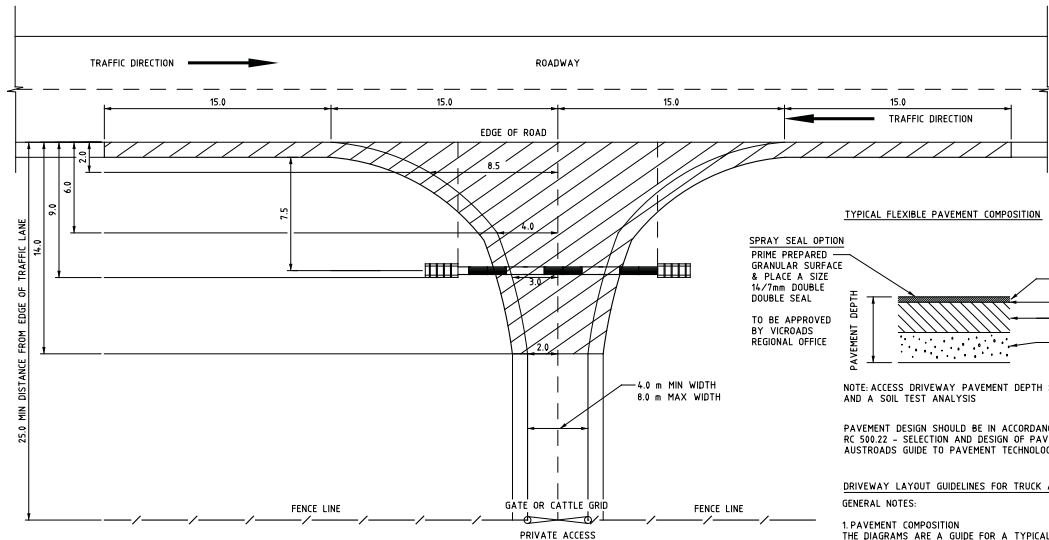
6 Conclusions

In consideration of the forgoing, it is our view that:

- Wind Farm traffic generated to external roads during construction will be limited to staff vehicles, HV traffic associated with external bulk materials haulage and OD/OSAM vehicles associated with WTG and other major component delivery. Additional traffic associated with internal Wind Farm traffic will also be generated to local sections of Woolsthorpe – Heywood Road within the Wind Farm site;
- At the time of peak construction activity, external Wind Farm traffic will add a maximum of between 160 - 220 vehicles per day on Woolsthorpe – Heywood Road to the east of site Access 3 subject to the level of on-site materials sourcing. This traffic can comfortably be catered for within Woolsthorpe – Heywood Road east of the site with the exception of the 2.4-kilometre single lane section of road between Poyntons Road and No 2169 Woolsthorpe – Heywood Road. The decision to upgrade or maintain this section of road is dependant the level of on-site materials sourcing and would be subject to further discussion with VicRoads prior to project commencement;
- Additional traffic generated to Woolsthorpe – Heywood Road to the west of the site will be limited to between 50-70 vehicle movements per day. This additional traffic does not warrant significant road improvements acknowledging that maintenance of the road pavement and shoulders will be undertaken by Wind Prospect for the duration of construction works;
- Wind Farm construction related traffic will not rely on Tarrone Road North unless use of the southern section of the road is sought to access Tarrone Quarry. Any such use would be subject to agreement with Moyne Shire Council;
- Having consideration of base traffic and usage, and upgrades to be provided to support Wind Farm construction traffic, traffic generated by the Wind Farm during operation to public roads can reasonably be accommodated;
- Subject to the resolution of specific traffic management requirements and procedures, the identified over dimensional vehicle route option from the Port of Portland to the Wind Farm site for the transport for WTG and other imported major components have been assessed and are suitable for OD and OSOM transport vehicles; and
- By way of any permit issued, the preparation of a detailed traffic management plan is recommended. This traffic management plan should outline specific traffic management measures across all work phases during the Wind Farm construction and include measures to minimise impacts to existing road users during works and to identify maintenance and rectification works during/post construction. The preparation of this traffic management plan should also consider the relevant Wind Farm project scope and existing conditions at the time of project commencement.

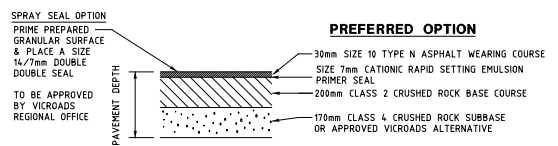
**Appendix A VicRoads Type B Access
Standard Drawing**

ISSUE	APP'D	DATE	AMENDMENT
A	DC	08/12	GENERAL DETAIL & NOTES



PLAN - DRIVEWAY ACCESS LAYOUT

TYPICAL FLEXIBLE PAVEMENT COMPOSITION



NOTE: ACCESS DRIVEWAY PAVEMENT DEPTH SHOULD BE DETERMINED FROM EXISTING PAVEMENT AND A SOIL TEST ANALYSIS

PAVEMENT DESIGN SHOULD BE IN ACCORDANCE WITH VICROADS CODE OF PRACTICE RC 500.22 - SELECTION AND DESIGN OF PAVEMENTS AND SURFACINGS AND AUSTRROADS GUIDE TO PAVEMENT TECHNOLOGY PART 2 - PAVEMENT STRUCTURAL DESIGN.

DRIVEWAY LAYOUT GUIDELINES FOR TRUCK ACCESS

- GENERAL NOTES:
- PAVEMENT COMPOSITION
THE DIAGRAMS ARE A GUIDE FOR A TYPICAL LAYOUT OF A DRIVEWAY ACCESS FOR A RURAL PROPERTY FOR THE DESIGN VEHICLE LISTED. THIS GUIDE WAS DEVELOPED IN THE INTEREST OF ROAD SAFETY AND TO PROTECT THE ROAD PAVEMENT AT THE ACCESS LOCATION. FINAL PAVEMENT COMPOSITION SHOULD BE DETERMINED BY EXISTING PAVEMENT AND SOIL TESTS, AND APPROVED BY VICROADS REGIONAL OFFICE.
 - A PLANNING PERMIT IS REQUIRED FOR A NEW ACCESS OR ALTERATION TO AN EXISTING DRIVEWAY AND MAY BE REQUIRED FOR THE REMOVAL OF NATIVE VEGETATION.
 - A TRAFFIC MANAGEMENT PLAN MUST COMPLY WITH THE RMA 2004 CODE OF PRACTICE FOR WORKSITE SAFETY TRAFFIC MANAGEMENT IN RELATION TO ANY WORKS UNDERTAKEN WITHIN THE ROAD RESERVE.
 - TRUCK WARNING SIGNS & GUIDE POSTS SHOULD BE INSTALLED IN ACCORDANCE WITH VICROADS TRAFFIC ENGINEERING MANUAL VOLUME 2 CHAPTER 9.
 - THE DRIVEWAY ACCESS CONSTRUCTION AND MAINTENANCE IS THE RESPONSIBILITY OF THE PROPERTY OWNER. MAINTENANCE ALSO INCLUDES ASSOCIATED DRAINAGE WORKS.

SIGHT DISTANCE

THE TRUCK DRIVER WHEN LOCATED 3m FROM THE EDGE OF THE TRAFFIC LANE NEEDS TO BE ABLE TO SEE A VEHICLE APPROACHING IN EITHER DIRECTION WHEN EXITING FROM A DRIVEWAY. REFER TO TABLE 1 FOR APPROPRIATE SIGHT DISTANCES. TREE CANOPIES, BUSHES OR OTHER OBJECTS SHALL BE REMOVED TO PROVIDE GOOD VISIBILITY AND TO PREVENT TRUCK DAMAGE. ANY TREE CANOPIES OVERHANGING THE PATH OF A TRUCK SHALL BE A MINIMUM OF 5m ABOVE THE GROUND SURFACE.

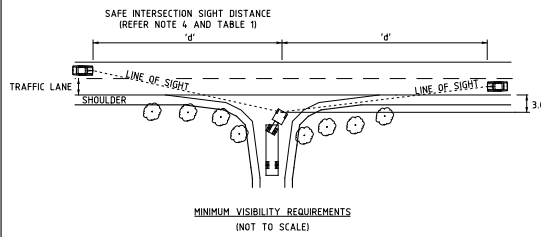


TABLE 1

DESIGN SPEED (Km/h)	'd' SAFE INTERSECTION SIGHT DISTANCE (m)
60	123
70	151
80	181
90	226
100	262
110	300

- REFERENCES AND NOTES:
- ALL DIMENSIONS ARE IN METRES
 - DESIGNED FOR: 19m LONG MINI-B-D-OUBLE, 12.5m LONG RIGID TRUCKS AND TRUCK AND TRAILER COMBINATIONS
 - AGRD PART 4 AND VR SUPPLEMENT TO AGRD PART 4 (PROPERTY ACCESS AND MEDIAN OPENINGS)
 - AGRD PART 4A AND VR SUPPLEMENT TO AGRD PART 4A (SECTION 3 SIGHT DISTANCE AND TABLE 3.2)

VICROADS GUIDELINES FOR ACCESS TO RURAL PROPERTIES
 AGAM PART 5
 AGPT PART 2
 VICROADS TEM VOL 2
 VICROADS RC 500.22
 SD 1991 DRIVEABLE CULVERT ENDWALLS - TYPE 1

TECHNICAL CONSULTING
 3 PROSPECT HILL ROAD
 CARBONELL
 VICTORIA 3104
 PHONE 03 9491 8955
 FAX 03 9491 8929



ACCESS & STOPPING BAYS SD2064
 TRUCK ACCESS TO RURAL PROPERTIES
 TYPE A

0 2.5 5.0 APPROVED
 DANIEL CASSAR (PRDE) 13-8-12 SD NO. SD2064 ISSUE A

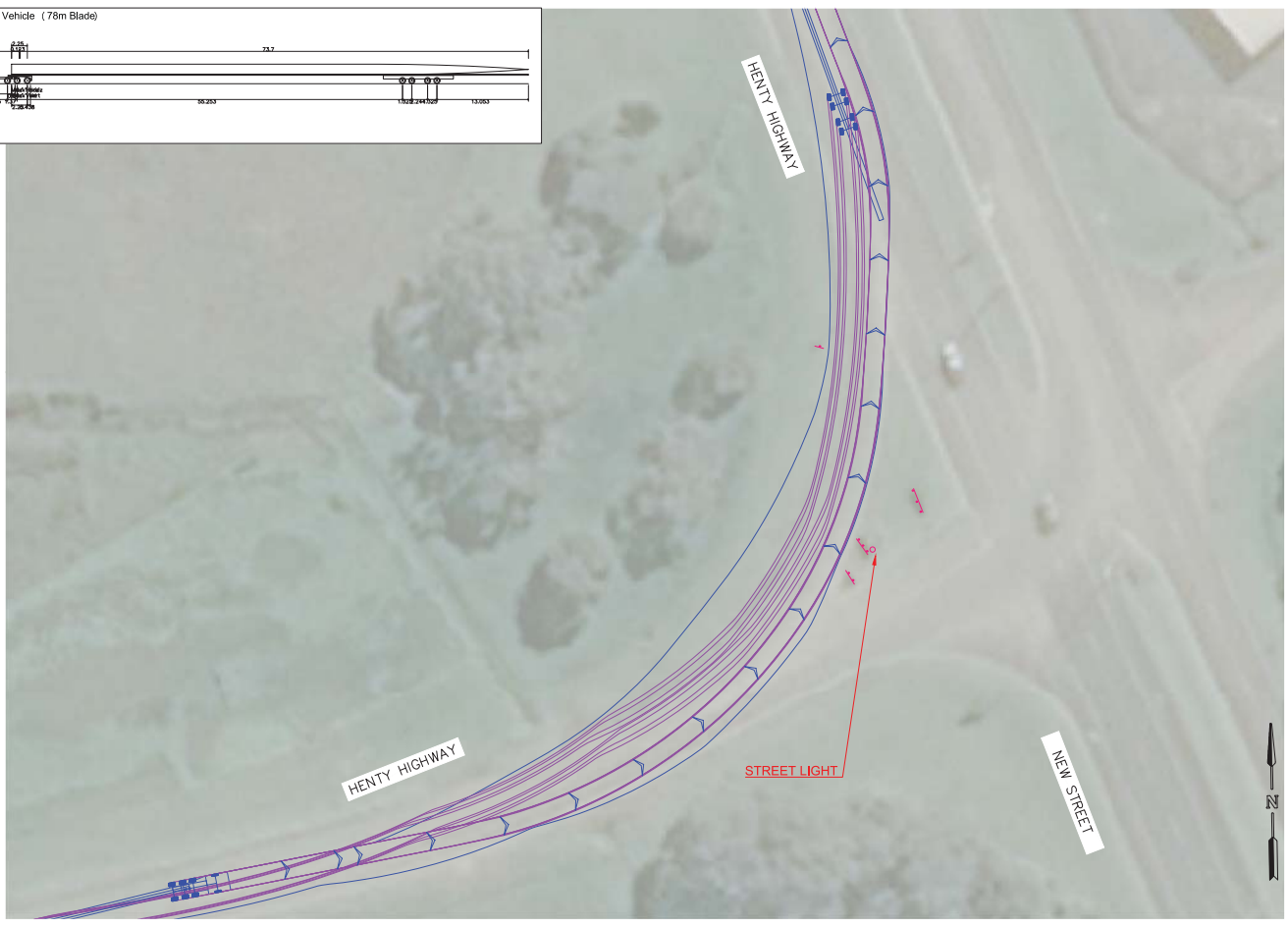
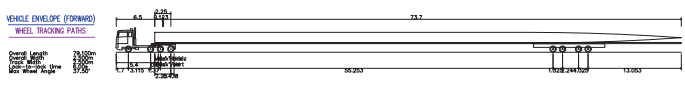
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Appendix B Haulage Route Swept Paths – Blade Vehicles:

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WTG Blade Transport Design Vehicle (78m Blade)



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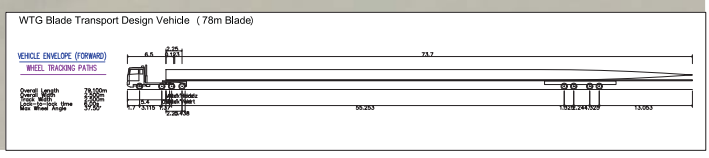
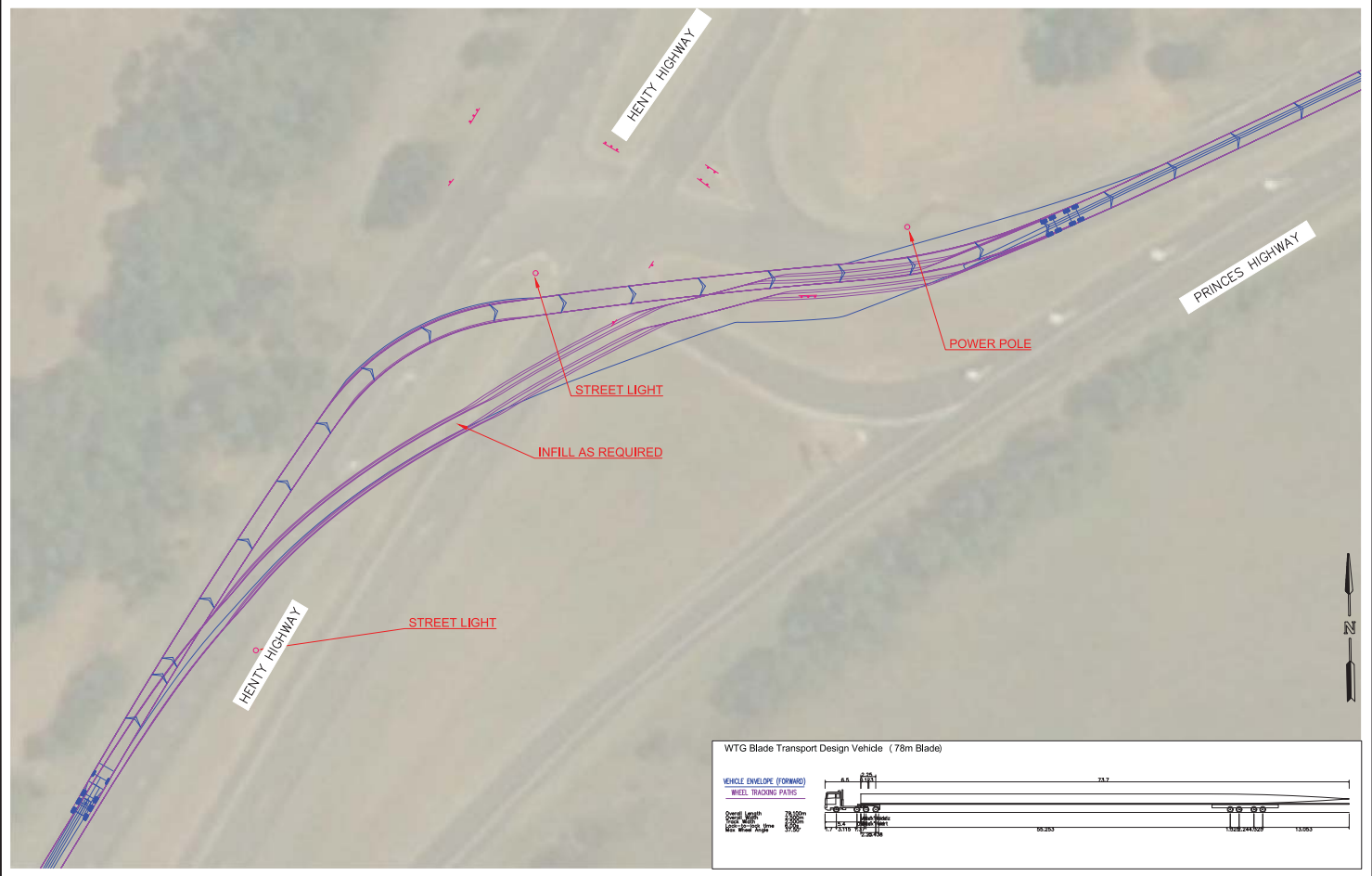
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HENTY HWY / NEW ST			
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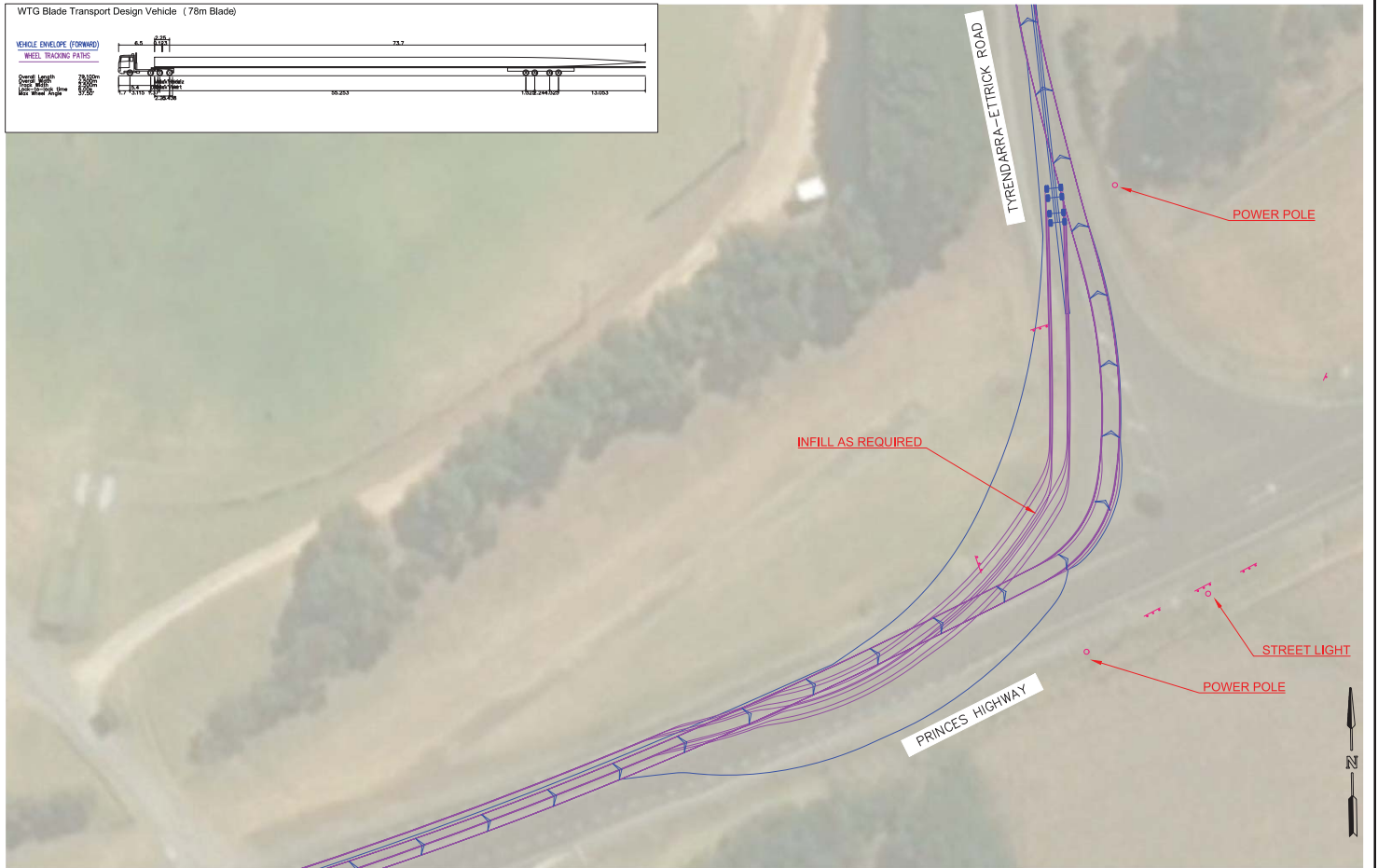
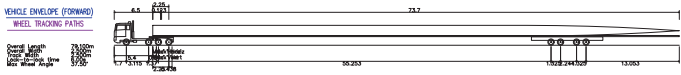
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WTG Blade Transport Design Vehicle (78m Blade)



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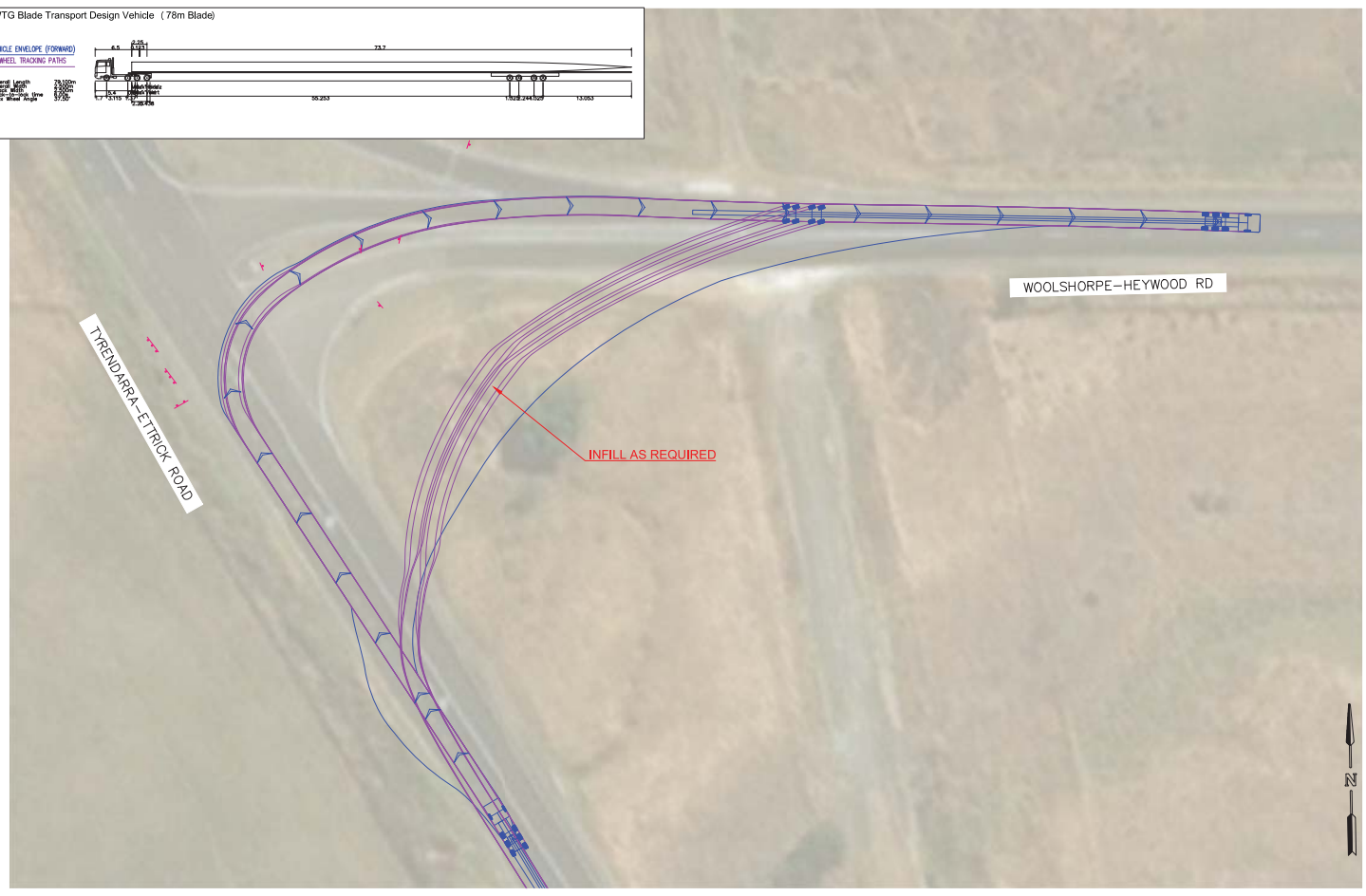
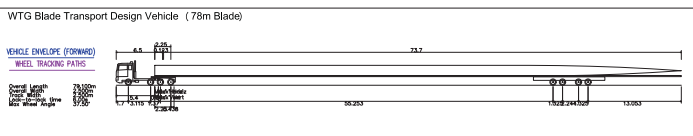
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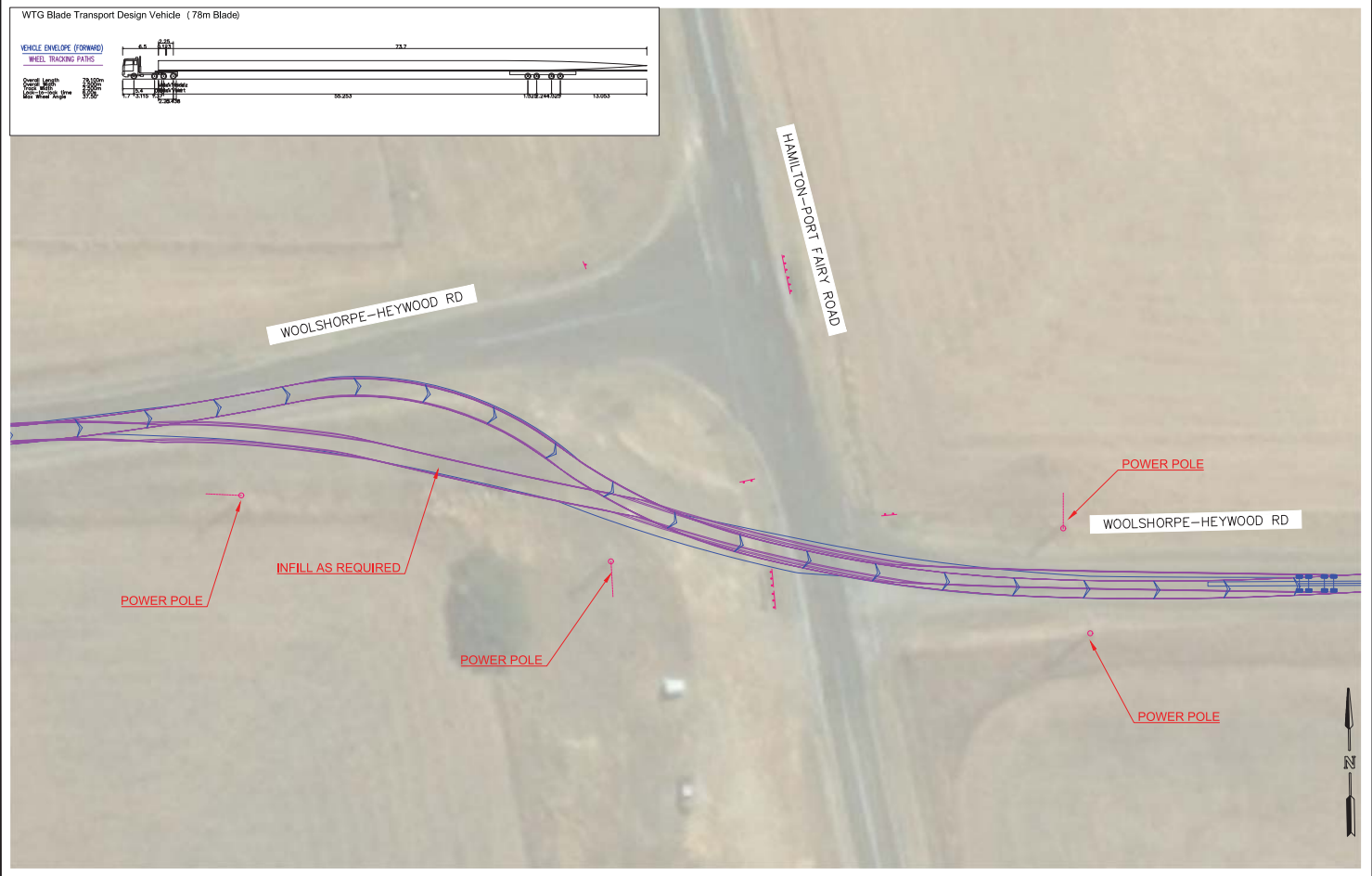
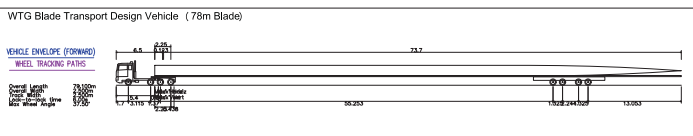
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