Traffic Management Plan

Flat Rocks Wind Farm

CW1200337 / 304900741

Prepared for
ENEL Green Power Australia Pty Ltd

14 July 2022

Cardno

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Stantec

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1 Introduction

1.1 Background

Cardno now Stantec has been commissioned by Enel Green Power Australia Pty Ltd to prepare a Traffic Management Plan (TMP) for the construction of the proposed Flat Rocks Wind Farm Stage 1 (development area). The proposed FRWF is located approximately 265km southeast of Perth and 25 km southeast of Kojonup Town, abutting various lots within the Shire of Kojonup and Shire of Broomehill-Tambellup.

1.2 Objective

This TMP has been prepared to address the Development Approval Condition 20 set out in both Shire of Broomehill-Tambellup *(IPA12112235)* and Shire of Kojonup *(OCR8220-DB.BDA.8),* which covers a total of 18 turbines (Stage 1).

Condition 20 of the DA approvals extracted below:

"Prior to commencing any works, the Application is to lodge a Traffic Management Plan for approval by the local government. The Traffic Management Plan is to be prepared by a suitably qualified traffic consultant and in the context of the construction phase of the development is to include –

(a) Haulage routes;

(b) Heavy vehicle movements scheduling;

(c) Use of escort vehicles;

(d) Interaction with other road uses, for example, school bus routes;

(e) A Pre-Construction Road Condition Report along the proposed haulage routes, and the obligation to prepare a Post-Construction Road Condition Report once construction is complete."

This TMP aims to:

- Provide a safe environment for all persons working on and traffic travelling along Local Governments' roads within the project scope **(Study Area)**, which includes:
  - Tambellup West Road (between Albany Highway and Great Southern Highway)
  - Warrenup Road (SLK 0.00 – SLK 18.50)
  - Ngopitchup Road (SLK 3.32 – SLK 3.00)
  - Yarranup Road (SLK 8.51 – SLK 13.76)
  - Potts Road (SLK 13.6 – SLK 16.98)
- Minimise impact of the works required for the Flat Rock Wind Farm on the road network and adjacent landowners / occupiers.
- Cater for the needs of all road users
- Communicate the arrangements for, and impacts of, any activities affecting traffic.

All contractors and subcontractors are required to conform to the requirements of this TMP, and in specific instances may be required to produce, to the Relevant Authority's satisfaction, a sub- TMP to demonstrate compliance and mitigation of impact to the local community.

1.3 Related Documents

This TMP has reference to and should be read in conjunction with the following related documentation as part of the broader Flat Rocks Wind Farm Project:

- *Flat Rocks Wind Farm Route Study – EX Port of Bunbury by Rex J Andrews Engineered Transportation (Rev 4 – 13/07/2022)*
- *Flat Rocks Wind Farm DRAFT Construction Management Plan by GHD Pty Ltd (Rev B – 07/07/2022)*

1.4 Development Approval Condition

The following **Table 1-1** summarises the requirements of the condition and relative traffic management references in this TMP report.

Table 1-1 Development Approval Condition

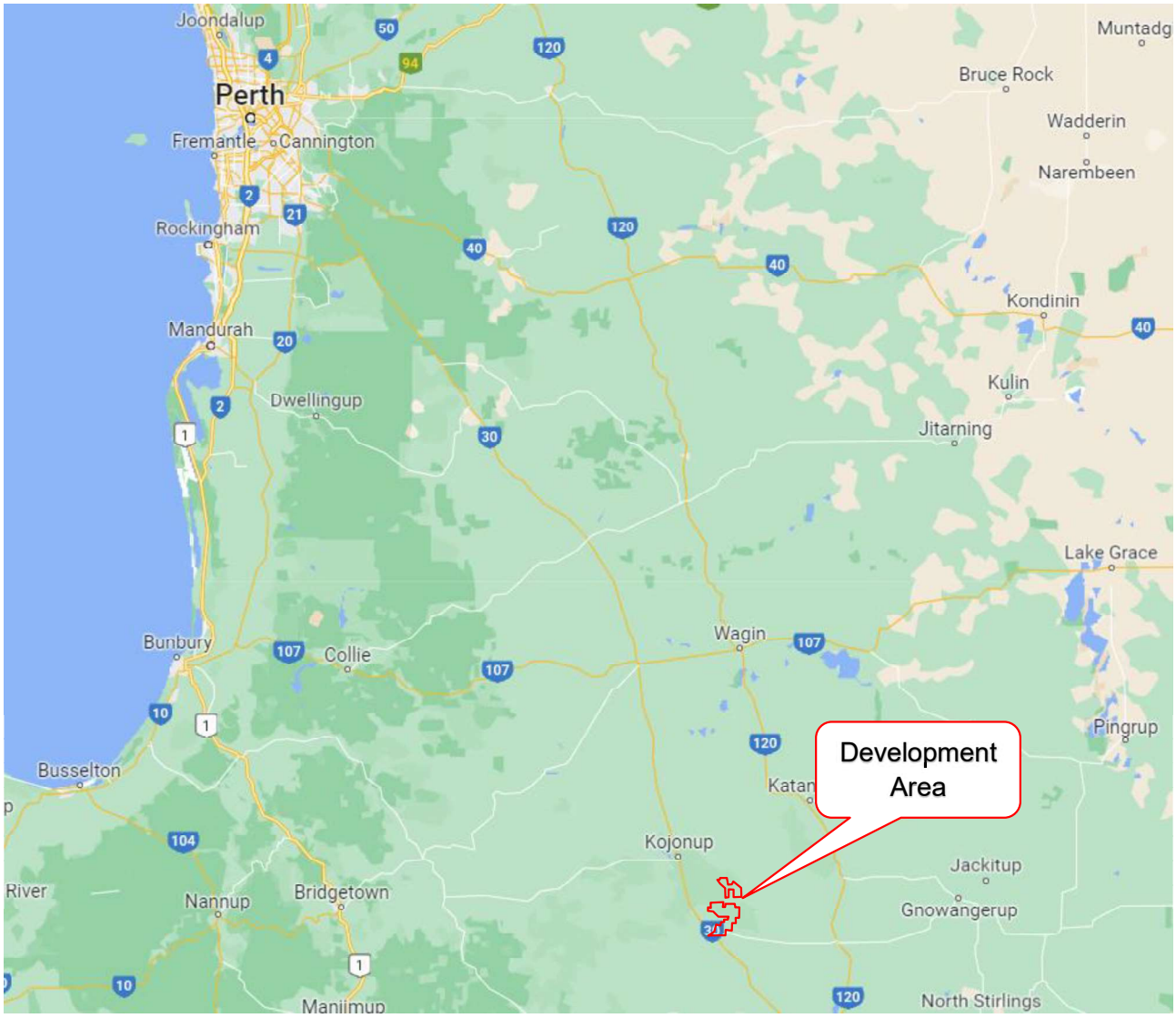
Number	Planning Permit Requirement Details	TMP Reference
20	Prior to commencing any works, the Applicant is to lodge a Traffic Management Plan for approval by the local government. The Traffic Management Plan is to be prepared by a suitably qualified traffic consultant and in the context of the construction phase of the development is to include -	
	(a) Haulage routes	**Section 4**
	(b) Heavy vehicle movements scheduling;	**Section 6**
	(c) Use of escort vehicles;	**Section 6**
	(d) Interaction with other road uses, for example, school bus routes;	**Section 2, 6**
	(e) A Pre-Construction Road Condition Report along the proposed haulage routes, and the obligation to prepare a Post-Construction Road Condition Report once construction is complete.	To be issued prior to construction start date

2 Existing Site Context

2.1 Development Area and Locality

The development area is located approximately 265km southeast of Perth and 25 km southeast of Kojonup Town, abutting various lots within the Shire of Kojonup and Shire of Broomehill-Tambellup.

Figure 2-1 Site Location and greater area

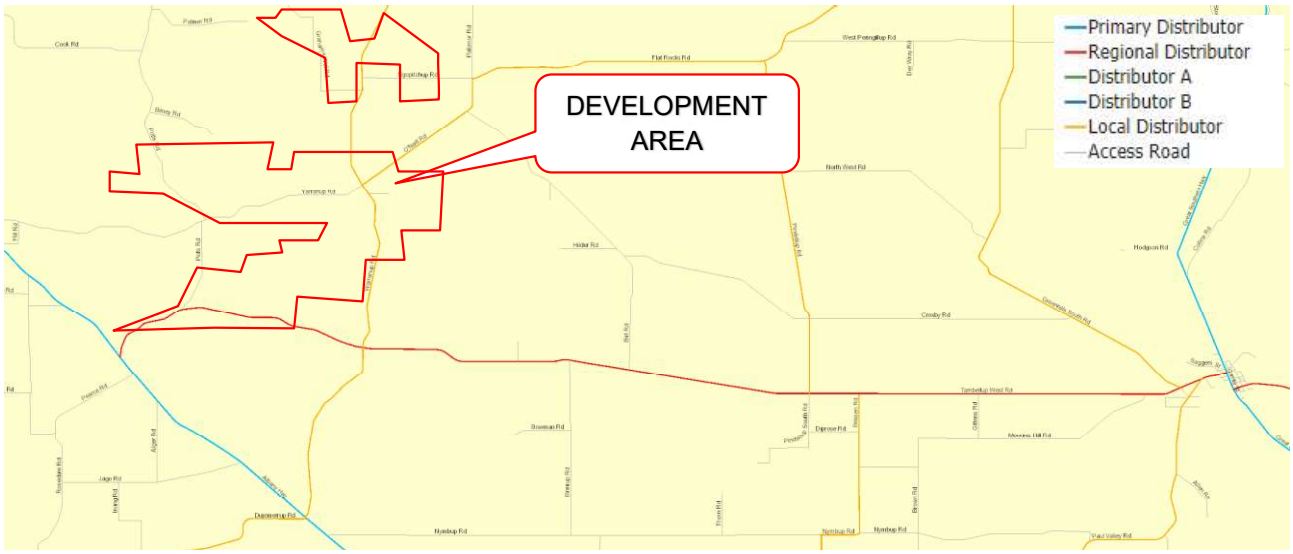


Source: Google Map

2.2 Existing Road Hierarchy

The road hierarchy of the road network in the vicinity of the development area is shown in **Figure 2-2**.

Figure 2-2 Local Road Network Hierarchy



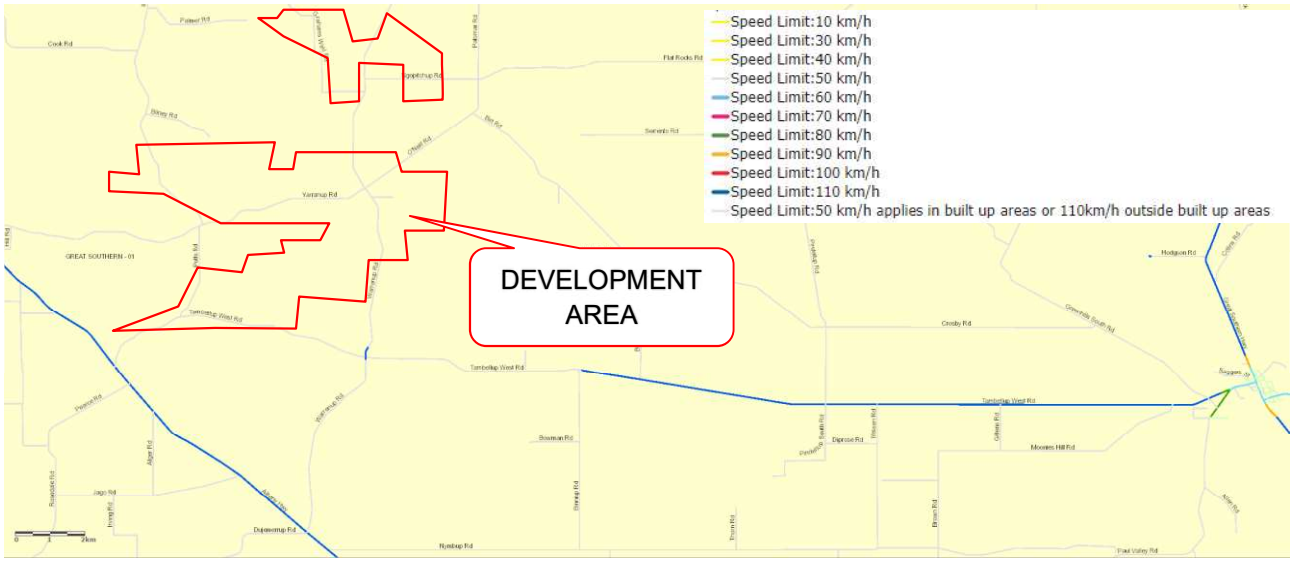
Source: Road Information Mapping System (mainroads.wa.gov.au)

2.3 Existing Speed Zones

The existing posted speed limit on Albany Highway, Great Southern Highway and eastern section of Tambellup West Road are 110km/h. Other access roads are not speed posted and default to 110km/h (outside of built-up areas). It is noted that speed limit signs are currently provided along Tambellup West Road only.

The posted speed limit of the road network in the vicinity of the development area is shown in **Figure 2-3.**

Figure 2-3 Speed Zones



Source: Road Information Mapping System (mainroads.wa.gov.au)

2.4 Existing Road Seal Condition

The existing road seal condition of the road within the Study Area is shown in **Figure 2-4**.

Figure 2-4 Road Seal Condition in Study Area

2.5 Existing Traffic Volumes

Traffic volumes on the road network in the vicinity of the development area has been sourced from the *Main Roads WA Traffic Map* and summarised in the table below.

Table 2-1 Traffic Volume of Precinct Vicinity

Road	Traffic Direction	Year of Data	Average Daily Traffic Volume
Albany Hwy (North of Tamballup West Rd)	North / South	2018/19	1,038 N & 1,055 S Total = 2,093 VPD (12.9% HV)
Albany Hwy (South of Tambellup West Rd)	North / South	2021/22	915 N & 996 S Total = 1,911 VPD (26.8% HV)
Tambellup West Road (East of Albany Hwy)	East / West	2019/20	25 E & 28 W Total = 53 VPD (20.8% HV)
Great Southern Highway (north of Toolbrunup Rd)	North / South	2019/20	256 N & 255 S Total = 511 VPD (23.5% HV)

Source: MRWA Traffic Map

2.6 Existing Road Users within Study Area

2.6.1 Light Vehicles

The light vehicles along the Local Government roads are expected to be used by local traffic (farm access) only, with minimal regional traffic. During the site inspection, the majority of the light vehicles were identified along Tambellup West Road with one vehicle spotted along Warrenup Road (south of Tambellup West Road).

2.6.2 Pedestrians and Cyclists

Pedestrian and cycling facilities are not provided on the road network. The inspection team did not observe any pedestrian or cyclists during the site inspection. It is expected that the demand for active transport facilities within the area is very low or nonexistence.

2.6.3 Farm vehicles

During the site inspection, the inspection team only observed one farm vehicle (tractor trailer) on the road. It is expected that the existing roads are currently used by occasional farm vehicles conducting day-to-day activity. However, it is noted that heavy vehicle volumes related to farming activity is seasonal and for example, will likely be higher during the summer months for harvest transportation.

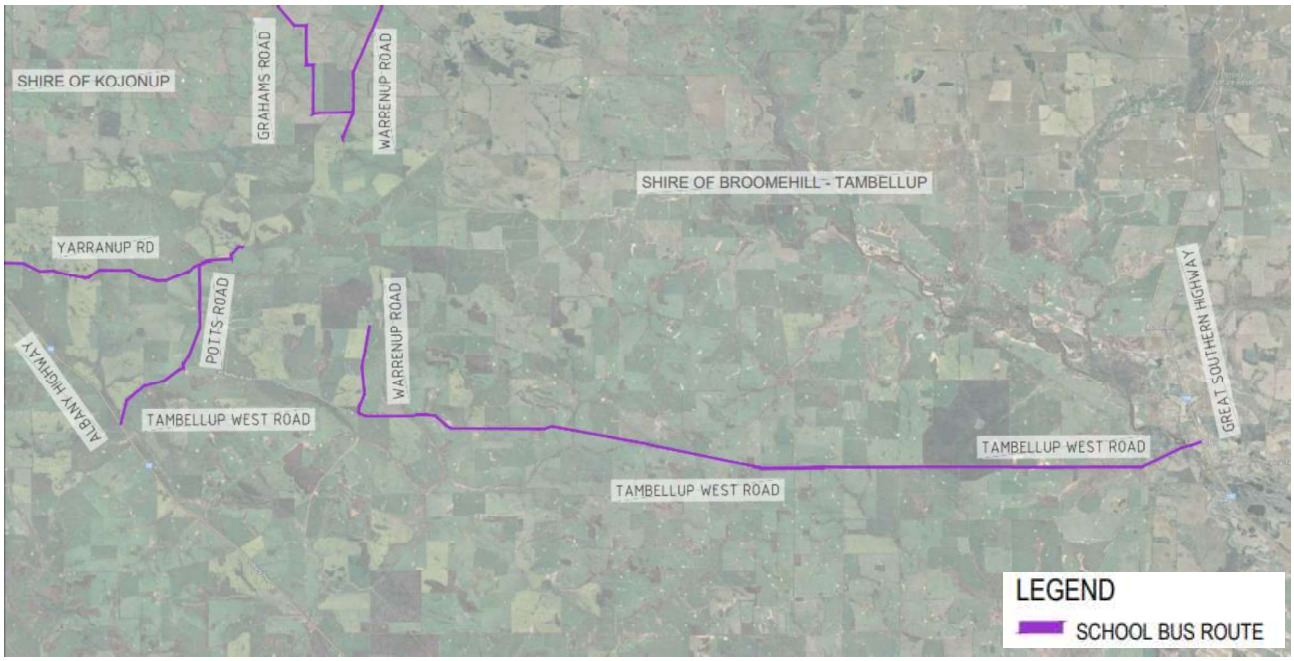
2.6.4 Public transport services

Cardno now Stantec has contacted Kojonup Bus Service and was informed that the road network in the vicinity of the development area is not serviced by public bus services. Only school bus services are provided as required.

2.6.5 School Bus services

Cardno now Stantec contacted the *School Bus Services* and was provided information of the current school bus services. The current (2022) school bus routes in the vicinity of the development area is extracted from *Landgate Locate – public map viewer* and shown in **Figure 2-5**. It is noted that the school bus services generally operated between 6am – 8am and 3pm – 5pm on weekdays.

Figure 2-5 School Bus Route (2022)



2.7 Crash History

A study of the recent crash history has been conducted for the following roads within the Study Area.

- 3030297 (Tambellup West Rd) (0 to 29.45)
- 3100026 (Tambellup West Rd) (0 to 5.62)
- 3030058 (Warrenup Rd) (0 to 20.27)
- 3100034 (Yarranup Rd) (8.51 to 13.76)
- 3100019 (Potts Rd) (13.46 to 16.98)

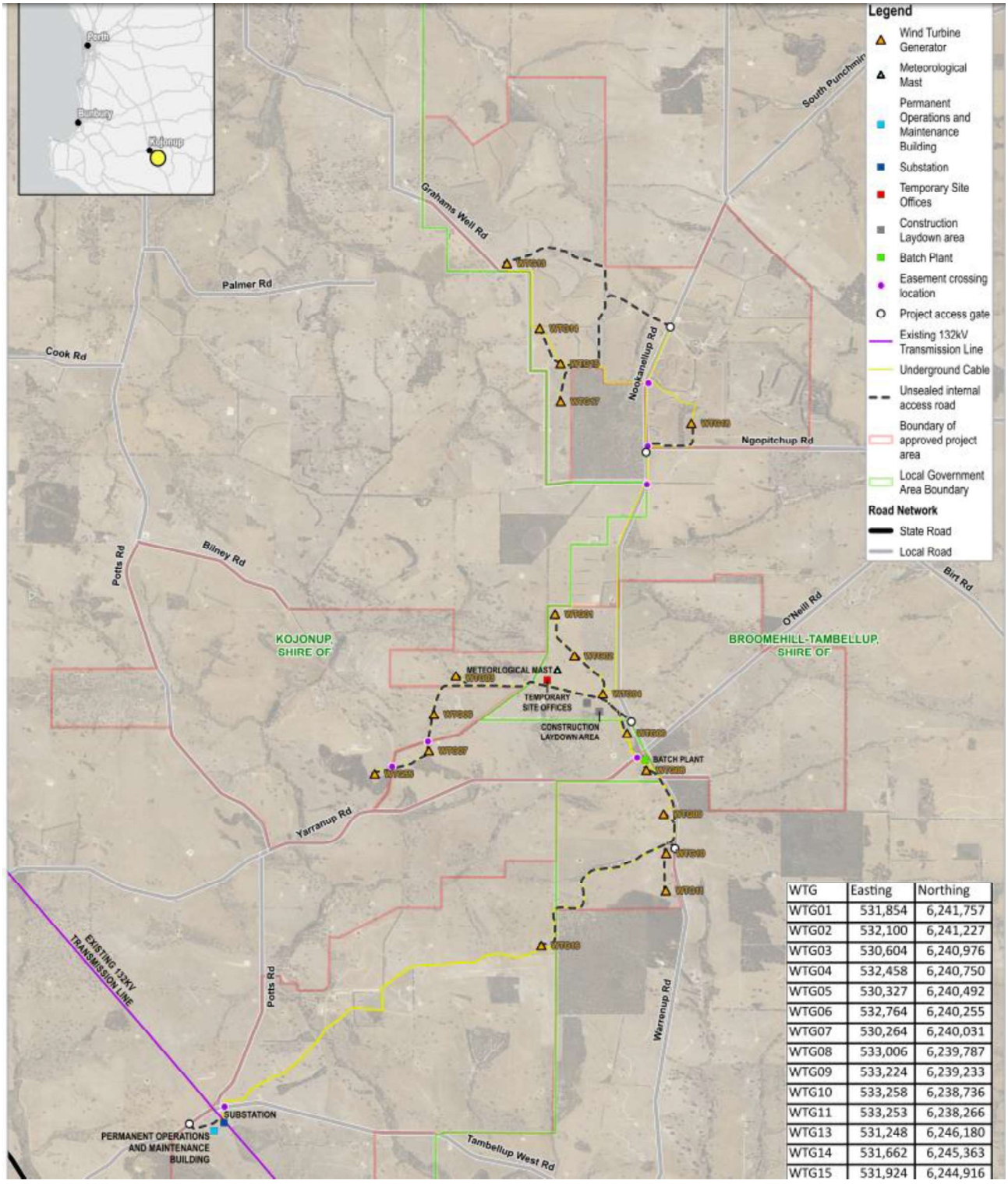
Historical crash data sourced from Main Roads WA Crash Map tool shows no crash data was recorded within the Study Area for the previous five-year period to the end of December 2021

3 Proposed Development

3.1 Site Layout (Stage 1)

The proposed site layout for Stage 1 of the project (total 18 WTG) is shown in **Figure 3-1**.

Figure 3-1 Development Layout Plan



WTG	Easting	Northing
WTG01	531,854	6,241,757
WTG02	532,100	6,241,227
WTG03	530,604	6,240,976
WTG04	532,458	6,240,750
WTG05	530,327	6,240,492
WTG06	532,764	6,240,255
WTG07	530,264	6,240,031
WTG08	533,006	6,239,787
WTG09	533,224	6,239,233
WTG10	533,258	6,238,736
WTG11	533,253	6,238,266
WTG13	531,248	6,246,180
WTG14	531,662	6,245,363
WTG15	531,924	6,244,916

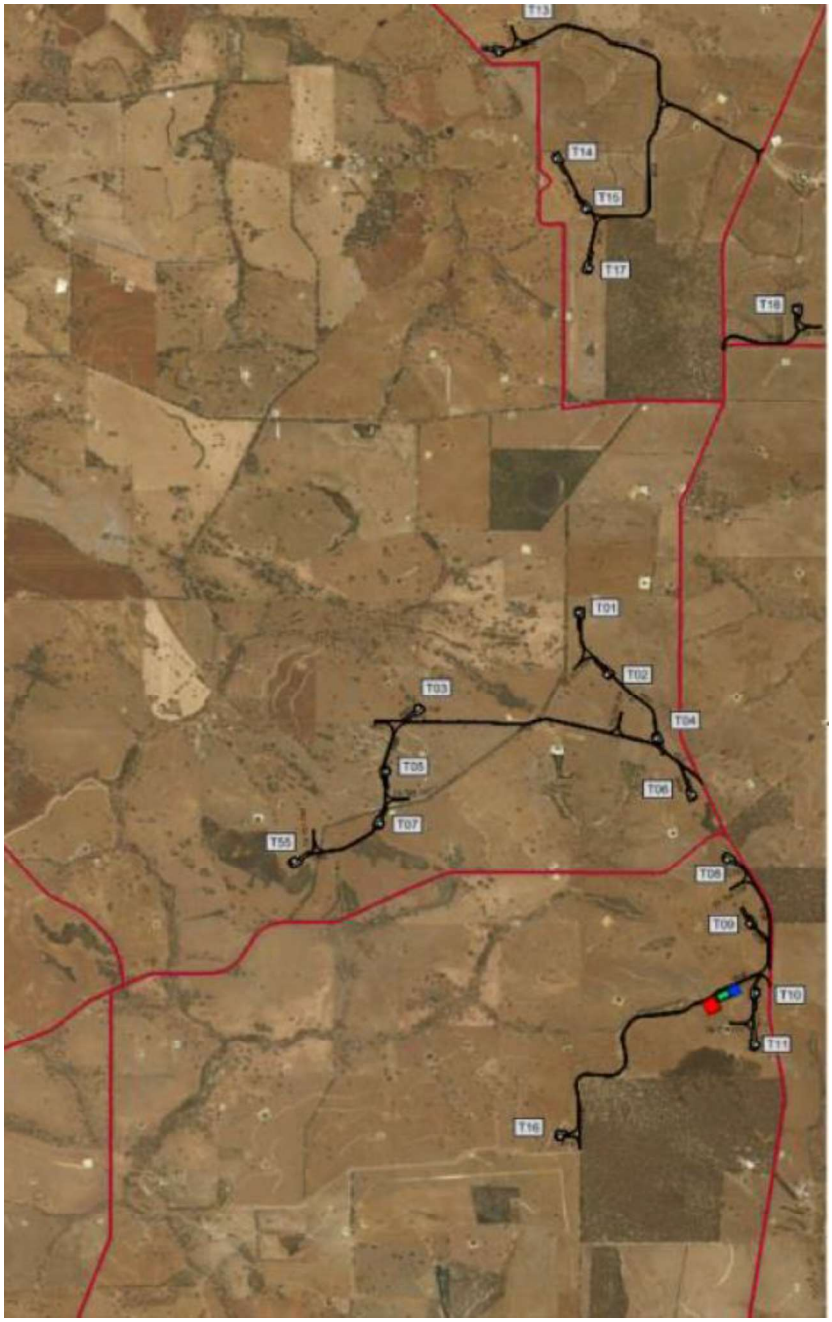
Source: Construction Management Plan, GHD

3.2 Temporary Access Roads (Private Land) and Access Gate

Temporary access roads will be constructed within the development area, with access gates at entry points from public (LG) roads listed below:

- Tambellup West Road – To substation and Permanent Operation and Maintenance Building
- Warrenup Road (South of Yarranup Road) – Access to WTG08, 09, 10, 11, 16
- Warrenup Road (North of O'Neil Road) – Access to temporary site facilities and WTG01, 02, 03, 04, 05, 06, 07, 55
- Warrenup Road (intersection of Ngopitchup Road) – Access to WTG18
- Warrenup Road (South of Nookanellup Road) – Access to WTG13, 14, 15, 17

Figure 3-2 Temporary Access Road WTG locations



Source: Construction Management Plan, GHD

4 Haulage Routes

This TMP covers the local roads between the two State Roads (Albany Highway and Great Southern Highway) leading to the development area only.

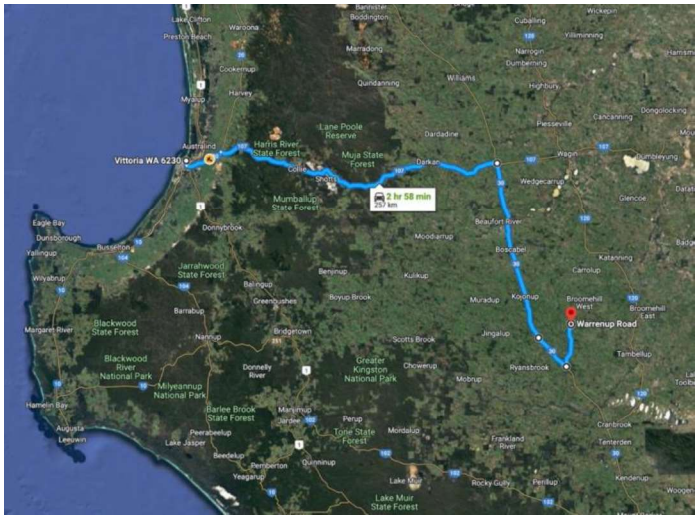
4.1 External Route – Port of Bunbury to development area

In reference to *Transport of Wind turbine equipment Route Study report prepared by Rex J Andrews Engineered Transportation*, the main turbine components (blades and towers) will be transported from the Port of Bunbury with the respective proposed route discussed below.

Two transport routes have been proposed for different WT components as identified in *RJA's Route Study Report*. Both routes proposed to enter the development area via Albany Highway and Warrenup Road intersection, in line with proposed construction heavy vehicle route. For detailed planning of the external route please refer to *RJA's Route Study Report (Rev 4).*

4.1.1 Route 1a: Loads under 5.2m in overall height

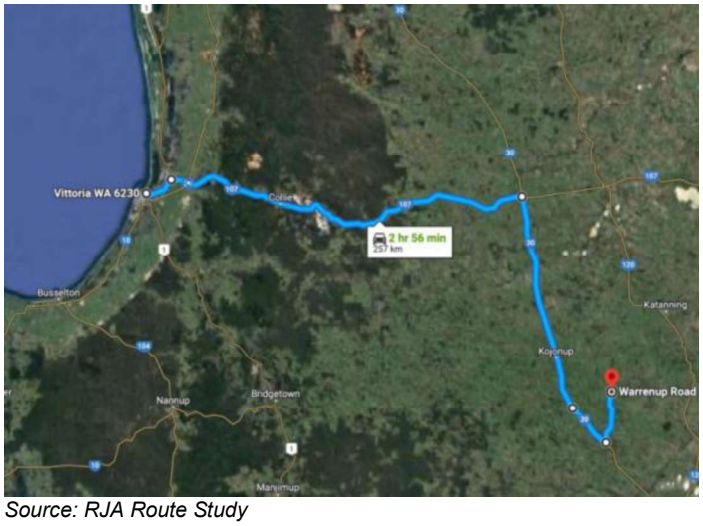
The proposed haulage route is via Leschenault Dr, Estuary Dr, Koombana Dr, Robertson Dr, S Western Hwy, Coalfields Hwy, Albany Hwy, Warrenup Road, with a total distance of approximately 257km.



Source: RJA Route Study

4.1.2 Route 1b: loads over 5.2metres in overall height

The proposed haulage route is via Leschenault Dr, Estuary Dr, Koombana Dr, Forrest Hwy, Raymond Rd, S Western Hwy, Coalfields Hwy, Albany Hwy, Warrenup Road, with a total distance of approximately 257km.



Source: RJA Route Study

4.2 Local Government Roads

4.2.1 Personnel Vehicle Routes (Light vehicles)

It is expected that the majority of light vehicles traffic will access the development area via Albany Highway / Tambellup West Road intersection, and via Great Southern Highway / Tambellup West Road intersection.

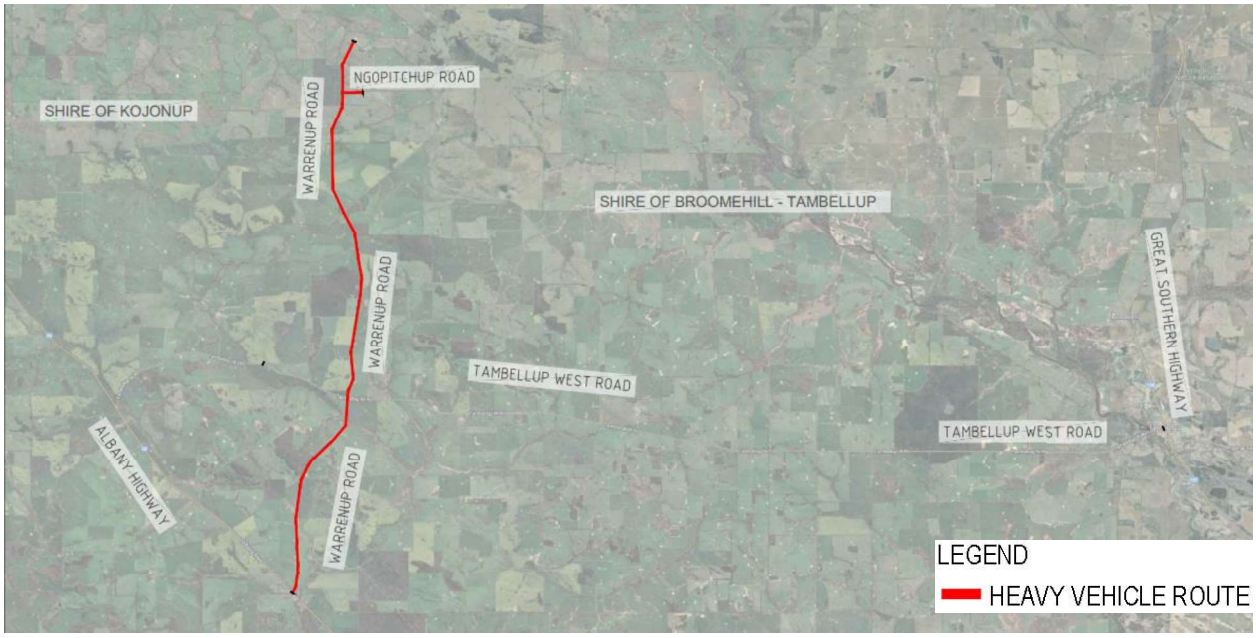
Figure 4-1 Light vehicles Route

4.2.2 Construction Vehicle Routes – Heavy Vehicles

It is noted that construction materials will be sourced from multiple locations outside of the development area.

At this stage, it is expected that majority of the heavy vehicles will access the development area from Albany Highway, via Warrenup Road, with some light vehicle deliveries accessing the development area via Great Southern Highway and Tambellup West Road.

Figure 4-2 Heavy vehicles Route

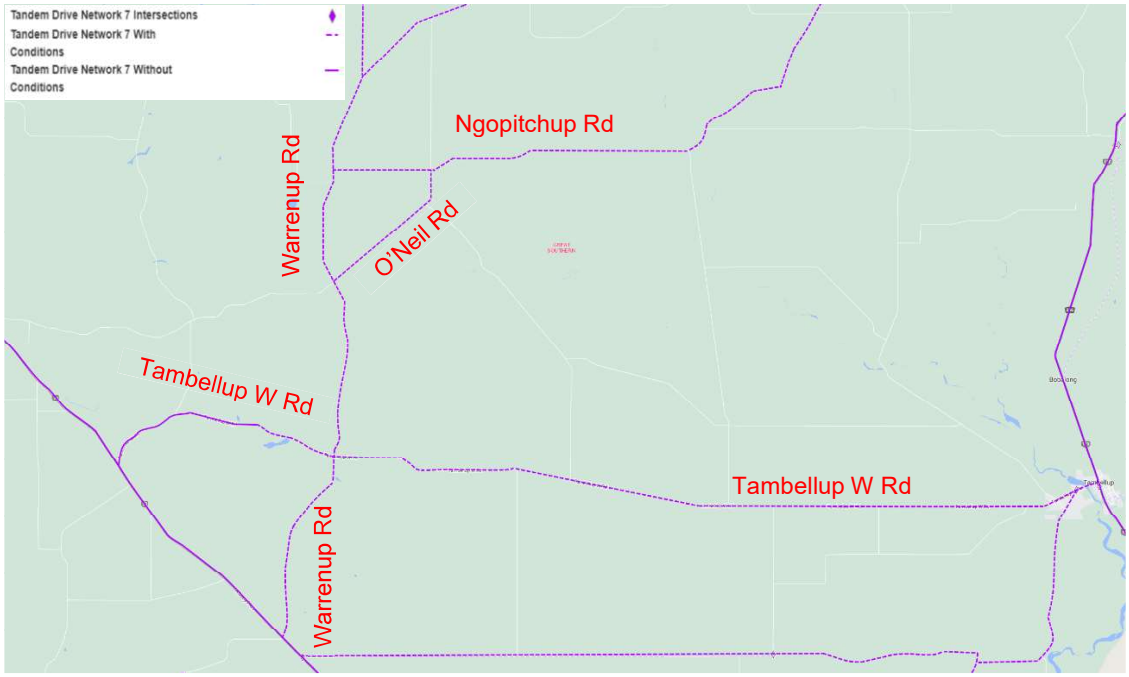


4.3 Restricted Access Vehicles (RAV)

4.3.1 Current RAV Network

The intended haulage routes for construction materials as discussed in **Section 4.2.2** are currently RAV 7 approved routes with and without condition as shown in **Figure 4-3**.

Figure 4-3 RAV Network – MRWA HVS Network Map



The existing RAV 7 network conditions of the proposed haulage routes are extracted from *MRWA HVS Network Map* and summarised below:

4.3.2 Tambellup West Road (3030297) [SLK 0.00 – 29.45]

- RAV vehicles' headlights to be switched on at all times – from the intersection of Great Southern Highway & North Terrace & Grarrity Street to the Kojonup LGA Boundary.

4.3.3 Warrenup Road (3030058) [SLK0.00 – 20.27]

- Maximum speed 80 km/h
- Direct radio contact must be maintained with other restricted access vehicles to establish their position on or near the road (suggested UHF channel 40).
- Headlights to be switched on at all times
- No operation on unsealed road segment when visibly wet, without road owner's approval.
- Low Volume (LV): When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover.

4.3.4 Ngopitchup Road (3030049) [SLK0.00 – 3.32]

- Maximum speed 40 km/h
- Direct radio contact must be maintained with other restricted access vehicles to establish their position on or near the road (suggested UHF channel 40).
- For single lane road, the road must not to be entered until driver has established via radio contact that there is no other RAV on the road travelling in the oncoming direction.
- Headlights to be switched on at all times
- Low Volume (LV) When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover.

5 Traffic Assessment

5.1 Site Inspection

Cardno now Stantec team visited the Site on 4th July 2022. At the time of the site visit, the weather was sunny with dry surface on the majority of the roads.

5.2 General Existing Road Condition

The road condition on sealed roads was generally acceptable with minor defects; unsealed roads were generally in poor condition with minor to medium corrugations throughout the entire length of roads. The following summarises the general road condition and suitability as a haulage route. ***A detailed road condition report will be provided in the Pre-construction Road Condition Report.***

5.2.1 Tambellup West Road

Tambellup West Road is sealed with sufficient width and line marking. The road geometry is suitable for all vehicles including high-wide loads.

5.2.2 Warrenup Road

Warrenup Road is sealed to the south of Tambellup West Road, and is unsealed north of Tambellup West Road. Warrenup Road is generally wide enough to accommodate heavy vehicle deliveries, including high-wide loads. Some locations where trees are located too close to the road (SLK 7.5), or with tree branches overhanging over the road carriageway (SLK 13.0) may need to be trimmed prior to high-wide load access.

5.2.3 Potts Road

Overhanging tree branches and trees located near the road carriageway are more significant along Potts Road. Major tree trimming may be required to accommodate large vehicle traffic. The road forms a vertical crest due to table drain on both sides of the road, reducing its effective width and is suitable for light vehicles and small heavy vehicles only.

5.2.4 Yarranup Road

Road condition similar to Potts Road, with reduced road width (~4m) due to table drain on both sides of the road. Tree branches overhanging the road carriageway may need to be trimmed and is suitable for light vehicles and small heavy vehicles only.

5.2.5 Ngopitchup Road

Road width suitable for one-way traffic only, with trees on both sides of the road. Trees may need to be removed to accommodate turning movements of high-wide loads.

5.3 Upgrades and modifications along Haulage Route

It is noted that at current stage, all heavy vehicles will travel along Warrenup Road to access the temporary access roads as suggested in **Section 3.2**. Swept path analysis for the largest truck (Wind blade transportation) was conducted along the intended haulage route to identify if any modifications such as tree removal is required. A custom Wind blade transport has been created for this swept path analysis, with a similar dimension to the *Blade diagram: V150* extracted from *RJA Route Study* report and is shown below in **Figure 5-1**.

Figure 5-1 Wind Blade Transport Dimension

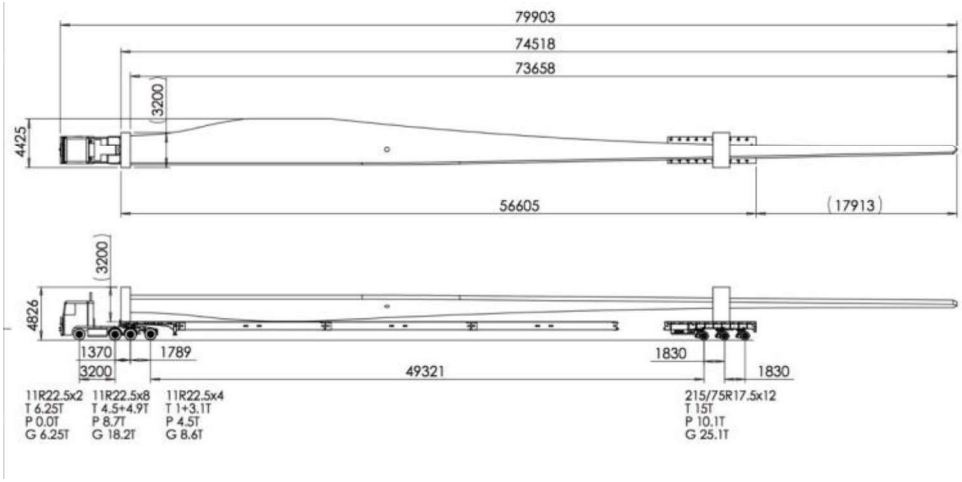
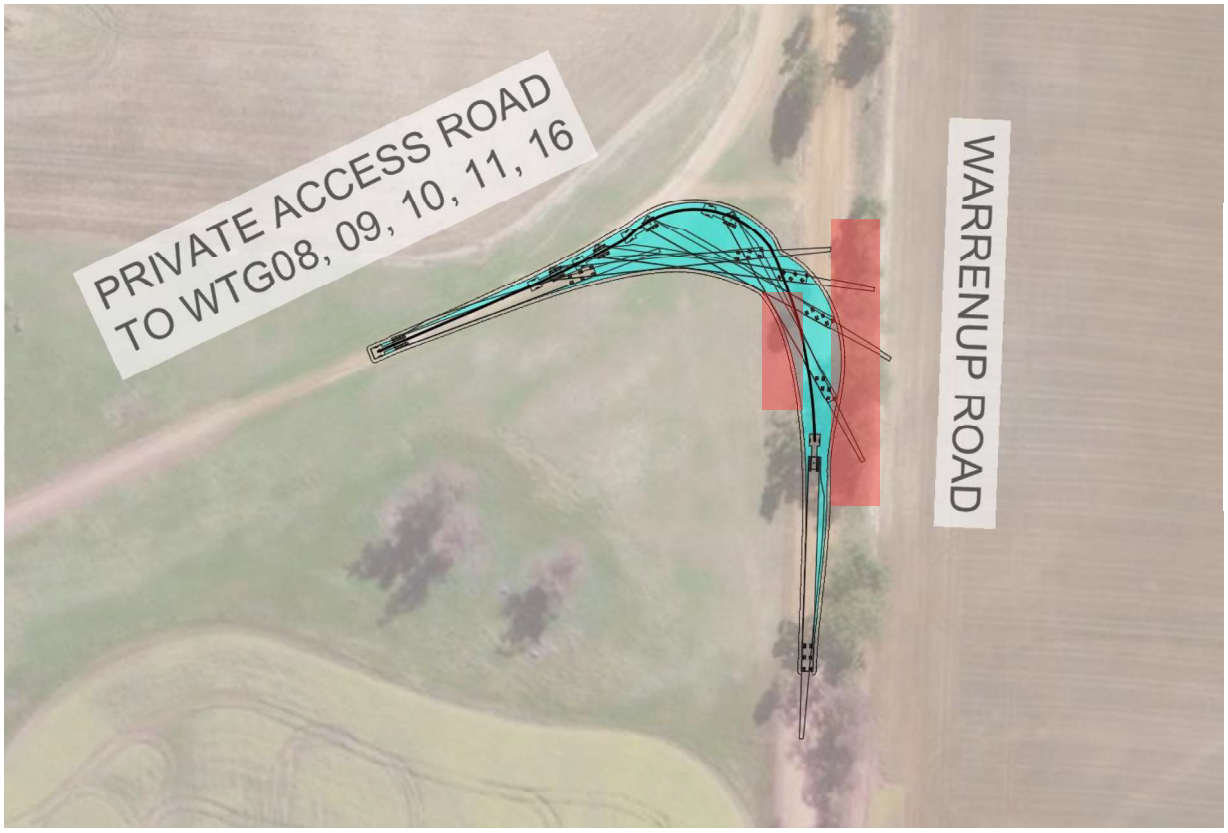


Figure 5-2 Warrenup Road – Private Access Road (WTG08, 09, 10, 11, 16)

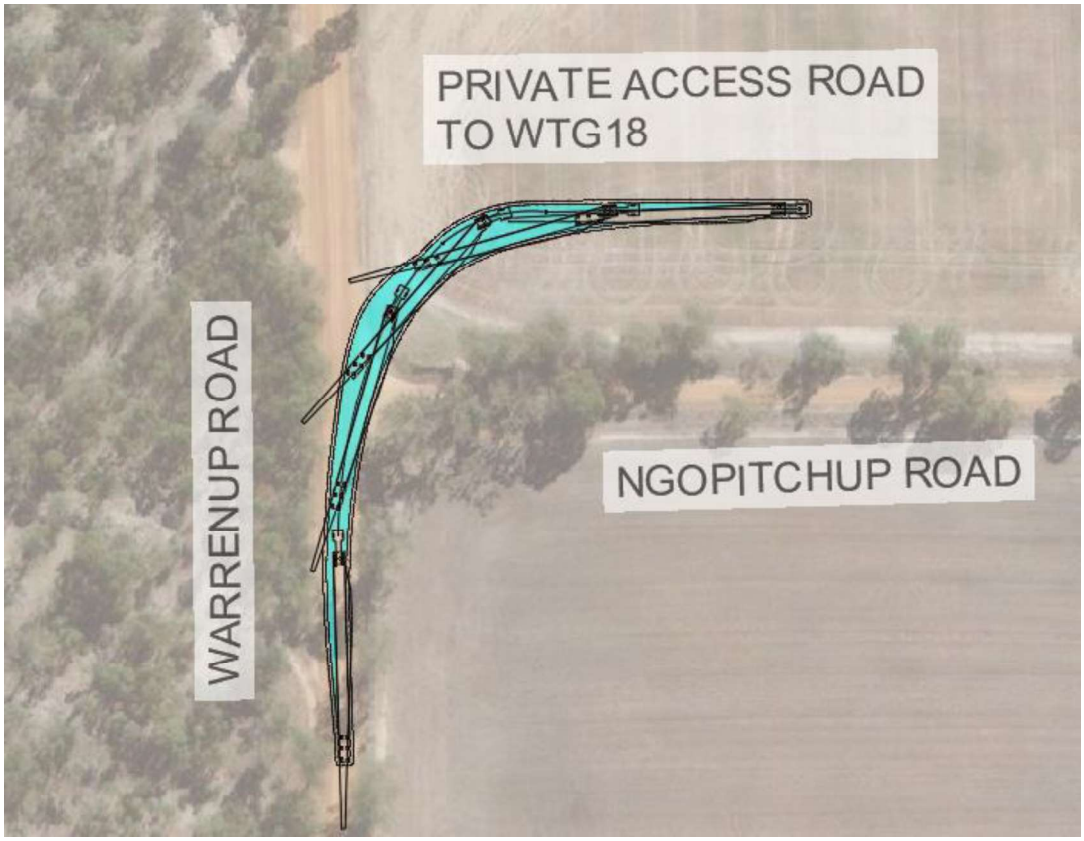


Swept path analysis in **Figure 5-2** shows that existing trees within the (red) marked area may need to be removed at the proposed intersection into private access road to WTG08, 09, 10, 11, 16 via Warrenup Road.

Figure 5-3 Warrenup Road – Private Access Road (WTG01, 05, 06, 04, 05, 06, 07, 55)

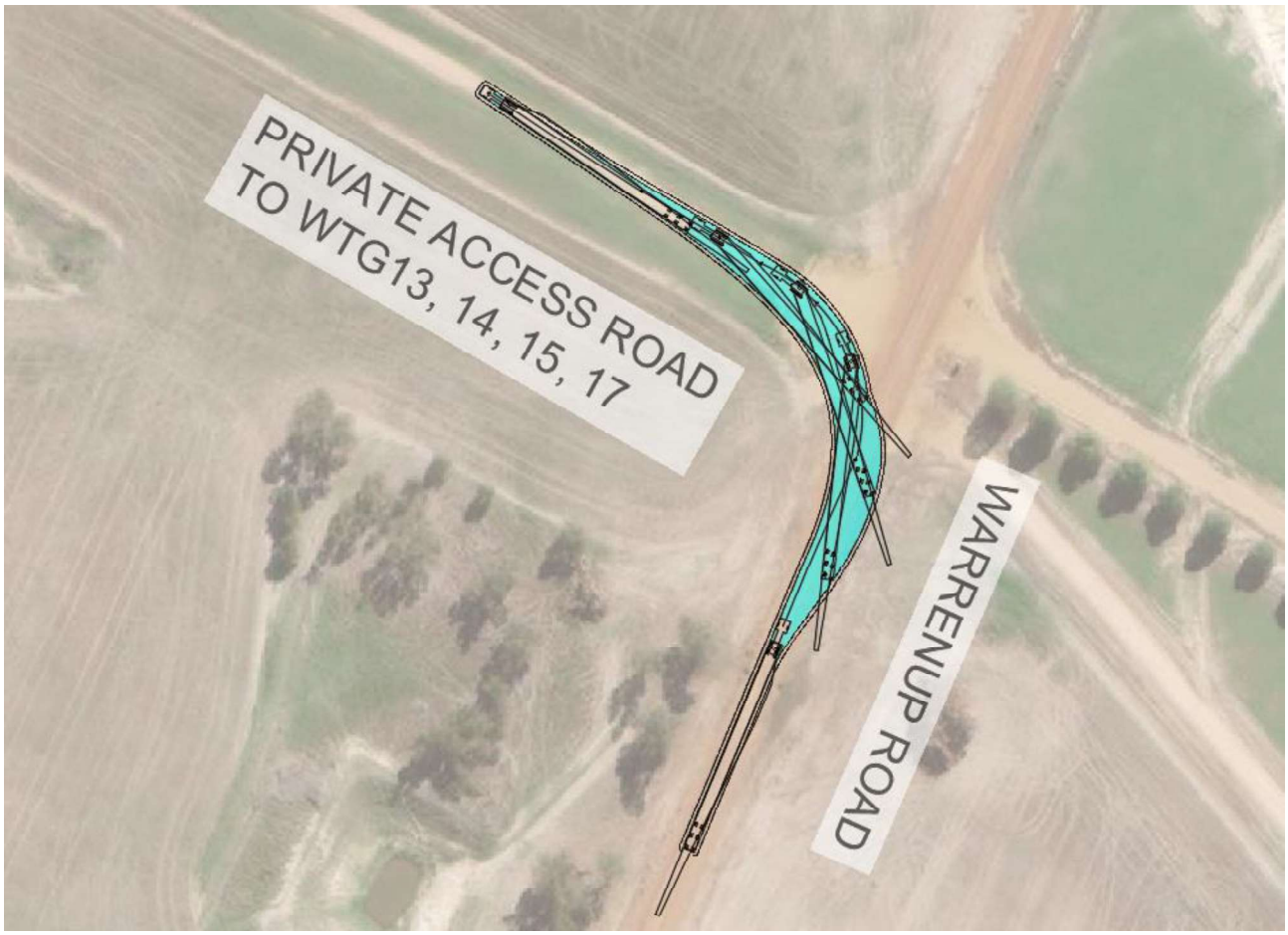
Swept path analysis in **Figure 5-3** shows that existing trees within the (red) marked area may need to be removed at the proposed intersection into private access road to WTG01, 02, 03, 04, 05, 06, 07, 55 via Warrenup Road.

Figure 5-4 Warrenup Road – Private Access Road (WTG18)



It is noted that a private access road will be created to access WTG18 instead of using the existing Ngopitchup Road access. **Figure 5-4** shows an indicative swept path where existing trees are avoided.

Figure 5-5 Warrenup Road – Private Access Road (WTG13, 14, 15, 17)



As shown in **Figure 5-5**, the proposed intersection for Private Access Road to WTG13, 14, 15, 17 is clear of existing trees and vegetation, with wide turning radius which could accommodate a high-wide load such as the wind blade transportation.

6 Traffic Management

6.1 Construction Period and Working Hours

Based on the indicative information provided by the client and respective contractors, the construction of the wind farm will start in July/August 2022, with expected peak construction activity from November 2022 to February 2023. Detailed construction timelines shall refer to the Construction Management Plan prepared by GHD Pty Ltd.

Construction work will be carried out between 6am and 6pm, 7 days a week with potential night works for critical construction work. Out-of-hours work will be conducted under an approved Noise Management Plan.

6.2 Estimated Traffic Generation

During the construction phase, traffic generated by the site will generally include but not limited to the following activities:

- Construction / staff / personnel travelling to and from the site.
- Raw materials for construction (i.e. sand, cement, fuel, steel) transported to the site.
- Major wind turbine components and substation equipment (i.e. transformers, turbine tower sections, turbine generators, nacelles and blades) transported to the site.
- Excavation and construction of the foundations and hardstands for the wind turbines.
- Erection of the wind turbine components and towers.
- Trenching and installation of electric cabling and stringing.
- Operational equipment and buildings
- Water tanks for fire-fighting

The estimated day-to-day traffic generation during the peak construction activities periods are summarised in **Table 6-1**. It is noted that this represent the potential worst-case scenarios, assuming all construction activities occurred simultaneously.

Table 6-1 Estimated Construction Period Traffic Generation

Vehicle Type	Vehicle per day (VPD)	Estimated Trip Generation (2-way trip)
Road trains (53m)	2	4 trips
Articulated vehicles (truck/prime with trailer)	10	20 trips
Rigid Trucks (including concrete truck – during concrete pour day)	15	30 trips
Watercart	2	As required
Light vehicles – contractors / construction personnel travelling to, from and within the development area	multiple	Depending on construction activities

All vehicles will travel to and from the site using the haulage route proposed in **Section 4**.

6.3 Vehicle Scheduling

6.3.1 Wind Turbine Components delivery and erection

It is also understood that the Wind Turbine (WT) component delivery and erection are to commence reasonably soon after completion of the initial site footing and access works. All construction related travels along the WT component delivery route shall be notified and prohibited during the delivery of WT components to minimise unnecessary traffic congestions.

6.3.2 Other deliveries during the construction phase

Various work phases may overlap with each other and be undertaken alongside each other where the construction schedule permits.

6.4 Heavy Vehicle Management

As part of this TMP, it is proposed that all heavy vehicles (including rigid trucks) should comply with the following conditions when accessing and egressing the development area on Local Government roads:

- Travel at maximum speed (in line with RAV condition):
  - Warrenup Road: 80km/h (40km/h when travelling at night)
  - Ngopitchup Road: 40km/h at all times
- When travelling at night, all construction related heavy vehicles must display an amber flashing warning light.
- Maintain direct radio contact to establish their position on or near the road (suggested UHF channel 40)
- Headlights to be switched on at all times

6.5 Use of Escort Vehicles

Pilot and escort vehicles shall be provided for all high-wide load deliveries on Local government roads. Requirements for a pilot and escort vehicle shall be in reference to and in accordance with *Main Roads WA Oversize Vehicle & Pilot Vehicle General Requirements*.

It is expected that the pilot and escort vehicle team on the external route leading to the development area will continue to be at service until the high-wide load (blades and towers) are delivered to the respective turbine locations.

6.6 School Bus

The contractors will liaise with and come to an agreement with school bus provider (School Bus Services – 08 9326 2063) to establish a traffic schedule to avoid potential conflicts with school bus during its morning and afternoon routes.

No truck movements associated with the haulage of material will be undertaken on roads during the times that the school bus services travel the area. Delivery can be resumed once the school bus driver confirms all school drop-off/pick-ups have been completed.

On the rare occasion where the school bus movements occur outside of the typical established times, truck drivers servicing the site will use UHF communication to communicate with the bus driver to ensure school bus operation is not impacted. A maximum speed limit of 40km/h will be required for any trucks that may inadvertently operate in proximity to the school bus service.

6.7 Farm Vehicles

The contractors will liaise with the farm owners to establish the use of UHF communication, especially during summer months where heavy vehicle volumes related to farming activity is likely to be higher. Farmers within the development area will be advised to follow the heavy vehicle management set out in **Section 6.4** of this report and maintain two-way UHF communication to reduce the risk of congestion. The schedule of high-wide-load delivery or construction activities that will take up the entire road width shall be distributed to the residents and farming community in the vicinity of the development area to avoid any unnecessary congestions or conflict. This information must include a contact number that residents can call to check on planned activity.

7 Safety Plan

7.1 Occupational Health and Safety

All persons and organisations undertaking works or attending the site have a duty of care under statute and common law to themselves, their employees, and all site users, lawfully using the site, to take all reasonable measures to prevent accident or injury.

The contractor shall prepare an OSH Risk Assessment and Treatment Register in for OSH hazards associated with the contract.

The OSH Risk Assessment and Treatment Register shall be prepared using competent occupational safety and health persons. The OSH Risk and Treatment Register shall be authorized by the Contractor's representative and the OSH MR, with the completed OSH Risk Assessment and Treatment Register forming part of the OSH Management Plan.

Further, should a formal OSH Management Plan not be prepared, it is expected that OSH hazards in the traffic environment be managed accordingly:

- Personal Protective Equipment (PPE) is to be worn at all times (high visibility clothing, appropriate footwear, sun protection, etc.).
- All plant and equipment must have suitable flashing lights and reversing alarms to warn motorists and personnel on foot of their presence.
- Procedures must be in place to effectively communicate the TMP and safety requirements to personnel and ensure that all pre-start inductions are conducted.

7.2 Training and Site Induction

7.2.1 Driver Induction Training

Prior to commencing construction activities, heavy vehicle drivers of rigid trucks and RAV involving in the construction activities are required to undertake a driver induction. The induction course will need to be developed early to ensure that it is ready prior to construction activity (including any site preparation works) commencing. Irregular and one-off drivers of pick-ups and deliveries would be considered exempt to this induction requirement.

The induction course would cover:

- Suitable and permitted routes to and from the site.
- Applicable traffic management procedures that will need to be in place prior to approaching or departing the site (if required).
- Communications and notification procedures.
- Speed restrictions (on the road network and the site).
- Safety procedures (during transportation and in the evident of an incident / emergency)

7.3 Public Notification

Further to correspondence with Main Roads WA and Local Governments, the following public notification should be conducted prior to the construction:

> Radio advertisements.

> Newspaper advertisements.

> Letter drops to be delivered to all properties in the vicinity of the development area which display a letterbox, including service stations and road houses.

> Variable Message Boards (VMS) are to be positioned on Albany Highway to alert vehicles of the OSOM loads travelling on the highway.

7.4 Worksite Traffic Management

Works personnel will be advised in advance of the location of entry and exit points within the works zone. Traffic controllers will be used to control traffic where construction vehicles entering or departing the work zone are likely to create a hazard for motorists.

7.5 Measures to Ensure Safe Residential / Rural Access

Residents and relevant stakeholders will be notified of construction commencing prior to the start date. Property access is to be maintained where possible, and it is understood that works will not require blocking property access at any point in the project. However, if blocking property access becomes unavoidable, proper notice will be given to the affected landowners, with consultation to arrange a suitable outcome and minimise disruption.

An internal management strategy will be established within the development area. This strategy will form part of the site induction that will be undertaken by all personnel on-site.

The following key items are to be implemented:

- Driving at appropriate and intended speeds on all roads
- Radio communication between construction vehicles available at all times.
- All loads to be correctly restrained.
- Warning signage to be provided critical areas/intersection points.

It is also noted that on-site parking will be provided within the construction compound, to provide a dedicated safe area where personnel can access their vehicles.

8 Monitoring, Inspections & Auditing

8.1 Monitoring and Inspection

In order to ensure the effectiveness of the TMP, the plan must be monitored and traffic management works inspected regularly.

The aim of the TMP is to reduce the impact of the construction traffic on the surrounding road network. Hence it is important to monitor that this is being achieved to reflect any physical or operational changes to the road network.

The monitoring of the TMP should generally occur:

- Before the start of work activities;
- During operation of construction works; and
- Conclusion of any operations occurring at the end of any work activities.

The TMP should also be updated if any notable changes affecting the expected or actual traffic volumes generated by site works occur, or if changes to working hours, delivery scheduling or other factors of consequence affecting site traffic and transport are proposed.

8.2 Road Signs Audit

Regular audit and maintenance of existing signs should be conducted to ensure all guide posts, hazard markers and signs are functional as per existing condition.

8.3 Road Quality Audit

With respect to *Condition 20* of the DA Condition, a Road Condition Report (dilapidation report) is to be prepared prior to the commencement of the project and following completion of the works (on Local Governments' roads).

The pre-construction road condition assessment report is being prepared and will be issued to relevant authorities prior to the commencement of construction works.

A post-construction road conditions assessment will also be undertaken and compared against the pre-construction assessment to determine what, if any, rehabilitation works are required on Council's road.

Pre- Construction Road Condition Report

Flat Rock Wind Farm Stage 1

CW1200337/304900741

Prepared for

Enel Green Power Australia Pty Ltd

3 August 2022

Cardno

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1 Introduction

1.1 Background

Cardno now Stantec have been commissioned by Enel Green Power Australia Pty Ltd to prepare a Traffic Management Plan (TMP) for the construction of the proposed Flat Rocks Wind Farm Stage 1 (FRWF). The TMP has been prepared to address the Development Approval Condition 20 set out in both Shire of Broomehill-Tambellup (*IPA12112235)* and Shire of Kojonup (*OCR8220-DB.DBA.8)*. As part of the DA Condition, an initial visual pavement condition assessment has been carried out to determine the existing pavement condition of the local government roads intended to be used as haulage routes.

The purpose of the investigation was to assess the pre-construction condition of the pavements in order to provide a baseline of assessment. Following the construction of the wind farm, a post-construction visual assessment will be carried out. The objective of the post-construction assessment is to determine what areas are required to be rehabilitated to pre-construction conditions, if required.

This report summarises the findings of our investigation during the pre-construction phase which includes the following:

1. Visual assessment of the pavements along the proposed route;

2. Other visible geotechnical issues which may affect construction and performance of the pavement; and

3. Recommendations for further investigation, if required.

1.2 Limitations of the Report

The report is limited to a visual assessment of the pavement along the proposed route as identified by the client. This report does not include the following:

- Pavement structural assessment/investigations
- Pavement remaining design life projection
- Geotechnical investigation
- Inspection of bridges, culverts, or other road infrastructure assets.

1.3 References

The following documents have been referred to during the preparation of this report:

- Main Roads WA Road Note 9
- Austroads Guide to Pavement Technology Parts 5, 7, 6 and 2
- Austroads Guide to Road Design Part 5

2 Site Description

2.1 Study Area

Flat Rocks Wind Farm is located approximately 265km southeast of Perth and 25 km southeast of Kojonup Town, abutting various lots within the Shire of Kojonup and Shire of Broomehill-Tambellup.

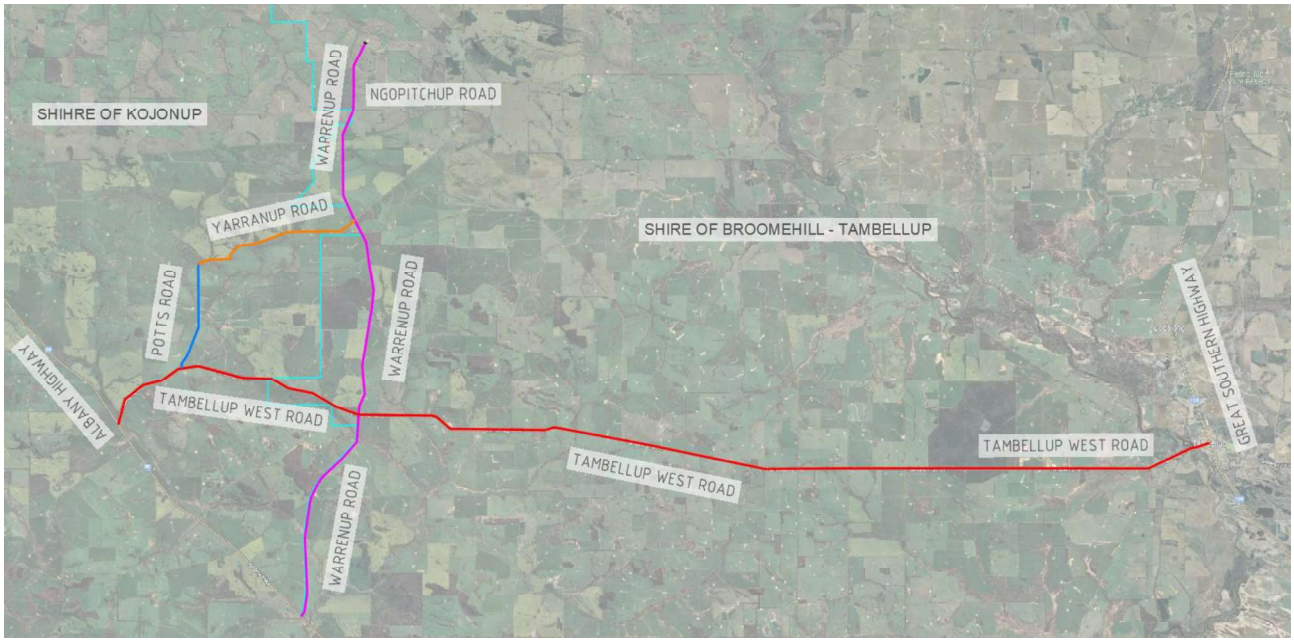
A summary of the road names, locations, lengths, sections, and road classification of the local government roads covered within this report (Study Area) is summarised in **Table 2-1**.

Table 2-1 Local Government Roads within Study Area

No	Road	Section Start	Section End	Sealed Length	Unsealed Length	Classification
1	Tambellup West Road (Red)	Great Southern Highway	Albany Highway	35.1km	-	Regional Distributor
2	Warrenup Road (Magenta)	Albany Highway	1.5km south of Nookanellup Rd	6.8km	11.7km	Local Distributor
3	Potts Road (Blue)	Tambellup West Road	Yarranup Road	0.2km	3.2km	Access Road
4	Yarranup Road (Orange)	Potts Road	Warrenup Road	-	5.25km	Access Road

A map of the roads in the Study Area inspected is shown in **Figure 2-1**.

Figure 2-1 Local Government Roads Inspected



**Existing Ngopitchup Road carriageway is not proposed to be used for construction and future WTG maintenance access. A private access road will be constructed, adjacent to Ngopitchup road for WTG18 access.*

3 Pre-construction Road Condition Assessment

3.1 Site Inspection

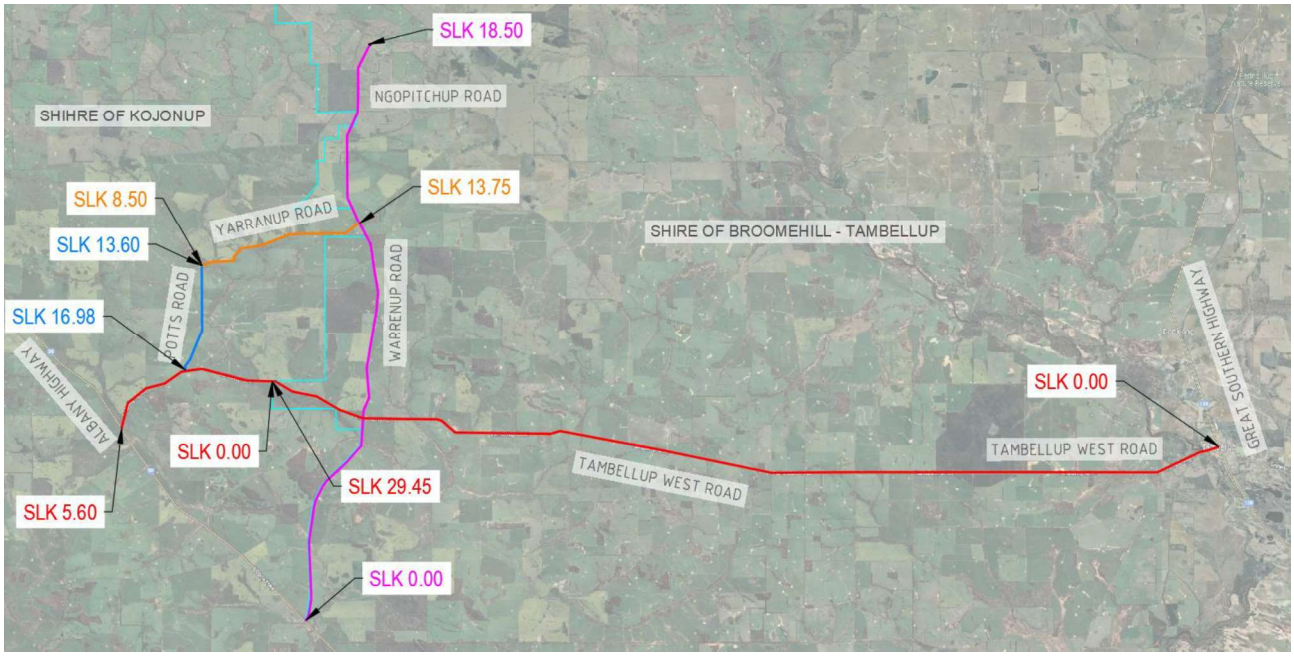
The Cardno now Stantec inspection team visited the site on 4th July 2022 and carried out an inspection of the road features and recorded the pavement features and details.

3.2 Assessment Process

In Western Australia, the statutory authority responsible for state highways is Main Roads WA. As a standard in WA, Main Roads uses SLK (Straight Line Kilo-metre) as the linear reference system, to ensure accuracy, define features along a road, and as an easy-to-use location services for Western Australian roads.

In this assessment, all inspection findings will be reference with the Straight-Line Kilometre (SLK) system as defined by **Main Roads WA GPS-SLK Map**. **Figure 3-1** shows the SLK reference of roads inspected within the Study Area.

Figure 3-1 SLK Reference within Study Area



4 Results of Investigation

4.1 Tambellup West Road

Table 4-1 Summary of the Tambellup West Road Inspection

Road Name	Tambellup West Road
Assessment Date	4/7/2022
Section Length	**~35.10 km** [~29.45km (Tambellup) + ~5.6km (Kojonup)]
Slope	Minimal gradient to Flat throughout the road section
Chainage Start / SLK Start	Intersection of Great Southern Highway **(SLK 0.00 -Tambellup)**
Chainage End / SLK End	Intersection of Albany Highway **(SLK 5.60 – Kojonup)**
Pavement Width	Approximately 6.0m – 7.5m
General Road Condition Comments	The road is seal paved with line marking throughout the road section. The road was generally in reasonable condition and with good rideability. Minor defects such as potholes, edge breaks, minor cracks and flushing were observed throughout the road length.
Defects	***SHIRE OF BROOMHILL-TAMBELLIUP*** ***SLK 0.00 – SLK 0.10 - Great Southern Highway Intersection*** The intersection was in good condition with minor seal wearing due to turning movements. Note: Overhead power cable and signs are installed near the intersection. ***SLK 0.10 – 3.00*** The pavement was generally in good condition with minor flushing (primarily on the Eastbound direction), with mild edge break near **SLK 0.80** and **SLK 3.00**. ***SLK 3.00 - SLK 3.50*** Moderate flushing on both sides of the roads: **SLK 3.00 – SLK 3.30** for westbound and **SLK 3.00 – SLK 3.50** for eastbound direction. ***SLK 3.50 – SLK 6.00*** Potholes forming near **SLK 4.20** along the existing pavement seal overlap. Mild edge break and flushing observed near **SLK 5.90** (Crossover). ***SLK 6.00 – SLK 10.00*** Road in good condition with minor flushing and minor edge break at several locations. ***SLK 10.00 – SLK 14.50*** Visible pavement seal failures with cracks and potholes forming on both sides of the road between **SLK 10.00 – SLK 10.50**. Pavement seal failing with cracks and potholes forming at multiple locations, and edge breaks at crossover and intersections. ***SLK 14.50 – 17.50*** Road pavement generally in good condition with minor flushing only. ***SLK 17.50 – 21.50*** Minor flushing, minor ravelling with cracks and potholes forming along the seal joint in both directions at multiple locations. Minor rutting identified near **SLK 21.40 (WB)**. ***SLK 21.50 – 24.50*** Reasonable pavement condition with rutting and potholes forming near **SLK 24.10** and **SLK 24.20**. ***SLK 24.50 – 29.40 (End of Broomehill-Tambellup)*** Road in good condition with minor edge breaks and flushing at some location. No line marking between **SLK 26.30** and **SLK 26.50** with pothole observed near **SLK 26.30** (Change of seal).

Road Name	Tambellup West Road
	SHIRE OF KOJONUP ***SLK 0.00 – 5.60 (Kojonup)*** Overall in good condition with minor edge breaks and ravelling observed at some locations. Moss observed on pavement seal surface. ***SLK 5.50 – 5.60 – Albany Highway intersection*** The intersection was in good condition with minor ravelling.

4.2 Warrenup Road

Table 4-2 Summary of the Warrenup Road Inspection

Road Name	Warrenup Road
Assessment Date	4/7/2022
Section Length	**~18.50 km**
Slope	Minimal gradient to Flat throughout the road section on sealed section. Minor slop gradient along the travel direction on unsealed section.
Chainage Start / SLK Start	Intersection of Albany Highway (**SLK 0.00**)
Chainage End / SLK End	Existing Farm crossover (**SLK 18.50**)
Pavement Width	Approximately 5.5m – 7.5m
General Road Condition Comments	The road carriageway is sealed between Albany Highway and Tambellup West Road (approximately 6.8km) and is unsealed north of Tambellup West Road. The sealed section was not line marked and was in good condition with minimal defects. The unsealed section was generally corrugated with poor rideability and potholes forming at multiple locations
Defects	***SLK 0.00 – SLK 0.10 – Albany Highway Intersection (Sealed)*** The intersection was in good condition with minor pavement seal ageing. ***SLK 0.10 – 3.00 (Sealed)*** The road is sealed without line marking, and generally in good condition with minor edge break observed near **SLK 2.10**. ***SLK 3.00 - SLK 3.40 (Unsealed)*** Short section of unsealed road noted as being damaged or washed out. Poor rideability due to corrugations. ***SLK 3.40 – SLK 6.80 (Sealed)*** The road is sealed without line marking, and generally in good condition with minor edge and slight uneven road surface around the bend near **SLK 5.80** to **SLK 6.00**. Road intersects with Tambellup West Road at **SLK 6.80**. ***SLK 6.80 – SLK 7.10 (Sealed)*** Short sealed section north of Tambellup West Road, with visible edge breaks. ***SLK 7.10 – SLK 9.50*** Severe corrugations with ravelling and base course exposure along this section of road. Severe potholes were identified at multiple locations such as **SLK 8.00** and **SLK 8.50**. ***SLK 9.50 – 12.90*** Minor corrugations throughout the road section, with severe corrugation and ravelling at multiple locations resulting in poor rideability. Potholes forming at multiple locations, with severe pothole issue identified near **SLK 12.60**. Trees were present along both sides of the road, with some overhanging branches. ***SLK 12.90 – 14.50*** This section of road was in reasonable condition, with minor corrugations and minor ravelling. Moderate corrugations, ravelling and potholes forming around the bend near **SLK 13.70**. ***SLK 14.50 – 15.00*** Major potholes and base course exposure along this section of road. Severe corrugation resulted in very poor rideability. ***SLK 15.00 – 16.80*** Reasonable condition with minor corrugations and minor ravelling only. Moderate corrugation and poor rideability near **SLK 15.60** and **SLK 16.40**. ***SLK 16.80 – 18.50*** Severe potholes, ravelling and corrugations along this section of road resulting in poor rideability. ***SLK 18.50*** Site access was in reasonable condition with minor corrugation only.

4.3 Potts Road

Table 4-3 Summary of the Potts Road Inspection

Road Name	Potts Road
Assessment Date	4/7/2022
Section Length	**~3.40 km**
Slope	Reasonably flat with horizontal sag sections near the majority of the culverts
Chainage Start / SLK Start	Intersection of Yarranup Road **(SLK 13.60)**
Chainage End / SLK End	Intersection of Tambellup West Road **(SLK 16.98)**
Pavement Width	Approximately 5.5m – 7.5m
General Road Condition Comments	The road is unsealed with minor corrugation throughout the road section with poor rideability. Table drains are present for the majority of the road on both sides, forming a vertical crest reduces the effective width of the trafficable road width. Trees are also present on both sides of the roads, with overhanging branches and trees located close to the edge of carriageway.
Defects	***SLK 13.60 – Intersection of Yarranup Road (Unsealed)*** The intersection was slightly corrugated. ***SLK 13.60 – SLK 14.60 (Unsealed)*** Minor corrugation resulting in poor rideability with minor ravelling and potholes forming around **SLK 13.70**, approaching the intersection of Yarranup Road. ***SLK 14.60 – 15.80 (Unsealed)*** Minor corrugation throughout this road section with moderate rutting along the wheel path and moderate corrugation near **SLK 14.70** and **SLK 15.80**. ***SLK 15.80 – 16.80 (Unsealed)*** Reasonable condition with minor corrugation and minor ravelling only. Moderate corrugation and poor rideability identified near **SLK 16.40**. ***SLK 16.80 – SLK 16.98 (Sealed)*** Pavement seal in good condition without line marking.

4.4 Yarranup Road

Table 4-4 Summary of the Yarranup Road Inspection

Road Name	Yarranup Road
Assessment Date	4/7/2022
Section Length	**~5.25 km**
Slope	Reasonably flat with sag near the majority of the culverts
Chainage Start / SLK Start	Intersection of Potts Road **(SLK 8.50)**
Chainage End / SLK End	Intersection of Warrenup Road **(SLK 13.75)**
Pavement Width	Approximately 4.5m – 7.5m
General Road Condition Comments	The road is unsealed with minor corrugation and minor ravelling along the majority of the road sections. Some sections of the road are more corrugated, resulting in poor rideability. Table drains present for the majority of the road on both sides the road. The road forms a crest perpendicular to the direction of travel, reduces the effective width of the trafficable road width.
Defects	***SLK 8.50 – intersection of Potts Road (Unsealed)*** The intersection is slightly corrugated. ***SLK 8.50 – SLK 9.40(Unsealed)*** This road section is generally corrugated with potholes forming near **SLK 8.60** and minor rutting around the bend near **SLK 9.30**. ***SLK 9.40 – SLK 9.60 (Unsealed)*** Moderate corrugation and ravelling around the bend results in poor rideability. Large drainage drop-off with recoverable batter slope along the westbound direction ***SLK 9.60 – SLK 10.30 (Unsealed)*** Lightly corrugated throughout the road section with ravelling and rutting near **SLK 10.10**. ***SLK 10.30 – SLK 12.30 (Unsealed)*** Evidence of water ponding along the eastbound table drain near **SLK 10.40**. Table drain and perpendicular curve road alignment reducing the effective road width down to approximately 4.5m at the bend near **SLK 10.5**0. Moderate corrugations and rutting near **SLK 11.30** and **SLK 12.30** resulting in poor rideability. ***SLK 12.3 – SLK 13.75 (Unsealed)*** Moderate corrugation, rutting and ravelling resulted in uneven road surface and potholes forming near **SLK12.60** and **SLK 12.80**.

5 Conclusions and Recommendations

The contractors shall be responsible for the maintenance of the haulage roads during the construction phase, and the remediation of the roads upon completion of the construction to their pre-construction condition at minimum.

Consideration should be given to the following pre-construction road works that may assist contractors in their maintenance obligations during the construction phase.

5.1 Tambellup West Road

Tambellup West Road was generally considered to be in fair and reasonable condition for the works, despite evidence of minor pavement distress developing along the length such as pavement flushing and edge breaks.

Major upgrades are not likely to be necessary to cater for the increased heavy vehicle traffic of the wind farm construction. However, regular inspections and immediately after heavy rainfall, should be conducted during the construction period to maintain and monitor the existing pavement condition and identify any deterioration or safety issues.

5.2 Warrenup Road

The sealed section of Warrenup Road was generally in good condition and should not require any upgrades prior to the wind farm construction. However, noting that the road is proposed to be the main haulage route for heavy vehicles, it is suggested that regular inspections be conducted to monitor pavement condition.

It is recommended to regrade the unsealed road section with ~50mm of wearing course to protect the base course and improve the rideability prior to the construction activities. Potholes should be excavated and filled with appropriate crushed rock prior to resurfacing. Regular inspection, maintenance and resurfacing of the unsealed section is recommended to minimise the traffic damage and safety risk along the main haulage route.

5.3 Potts Road

Potts Road is not proposed to be the main haulage route but will be used for construction activity. Therefore, regrade of the road is not required based on the visual assessment.

The road may need to be regraded if increased heavy vehicle traffic is expected along the road. Potholes should be excavated and filled with appropriate crushed rock prior to regrading/resurfacing.

5.4 Yarranup Road

Yarranup Road is not proposed to be the main haulage route but will be used for construction activity. Therefore, regrade of the road is not required based on the visual assessment.

The road may need to be regraded if increased heavy vehicle traffic is expected along the road. Potholes should be excavated and filled with appropriate crushed rock prior to regrading/resurfacing.

APPENDIX

A

PAVEMENT VISUAL ASSESSMENT SUMMARY – FIELD NOTES

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Tambellup West Road

SLK 0.80 – Mild edge break (EB Direction)

SLK 1.50 – Flushing near the intersection of Brown Street

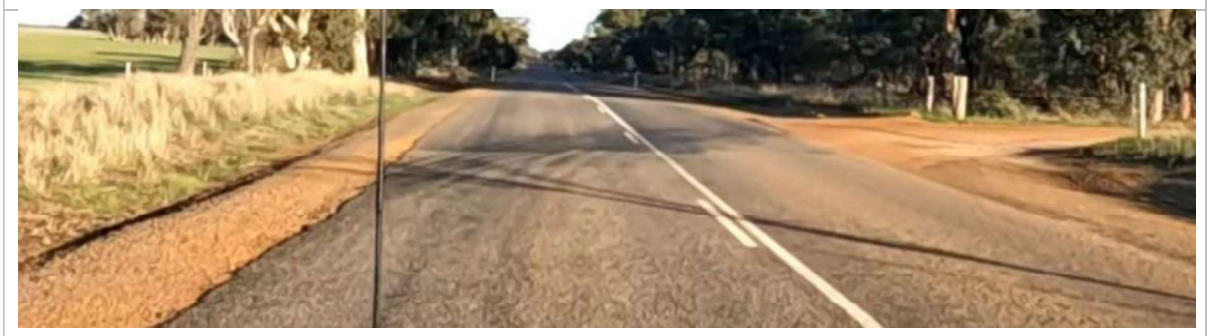
SLK 2.30 - Flushing

SLK 3.00 to SLK 3.30 – Flushing

SLk 3.30 – Minor Rutting (WB Lane)

SLK 4.10 to SLK 4.20 – Flushing and potholes forming (WB Lane)

SLK 4.90 – Pavement seal patch failing with minor cracks

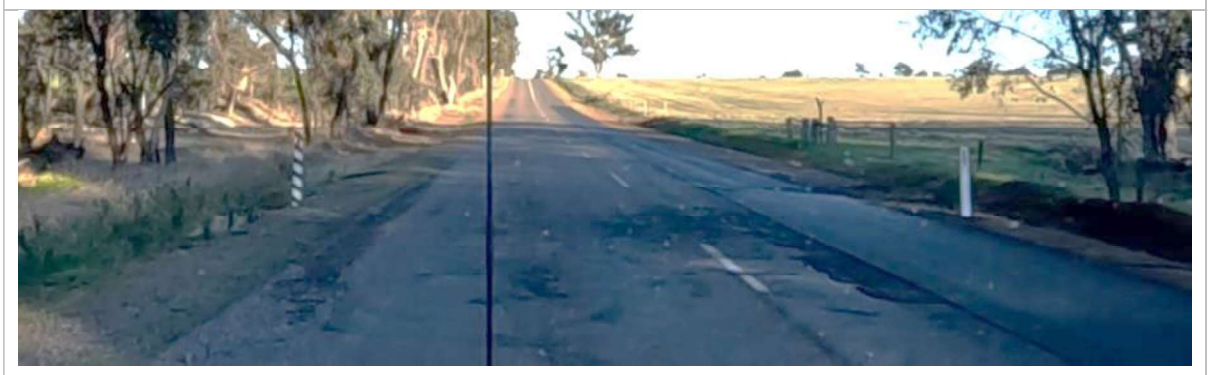


SLK 5.90 – Minor edge break and flushing near the crossover

SLK 7.70 – Flushing near the intersection of Gittens Road

SLK 8.50 – Pothole (EB Lane)

SLK 9.50 – Minor Flushing



SLK 10.40 – Pavement seal failing – rutting, cracking and edge breaks (WB Lane)

SLK 10.50 – Pavement seal patch failing with pothole and longitudinal crack (EB Lane)

SLK 11.30 – Edge break and potholes forming at Bessen Road intersection

SLK 11.40 – Pavement Seal Failing with cracks and base course exposure (EB Lane)

SLK 12.20 – Edge break near the crossover

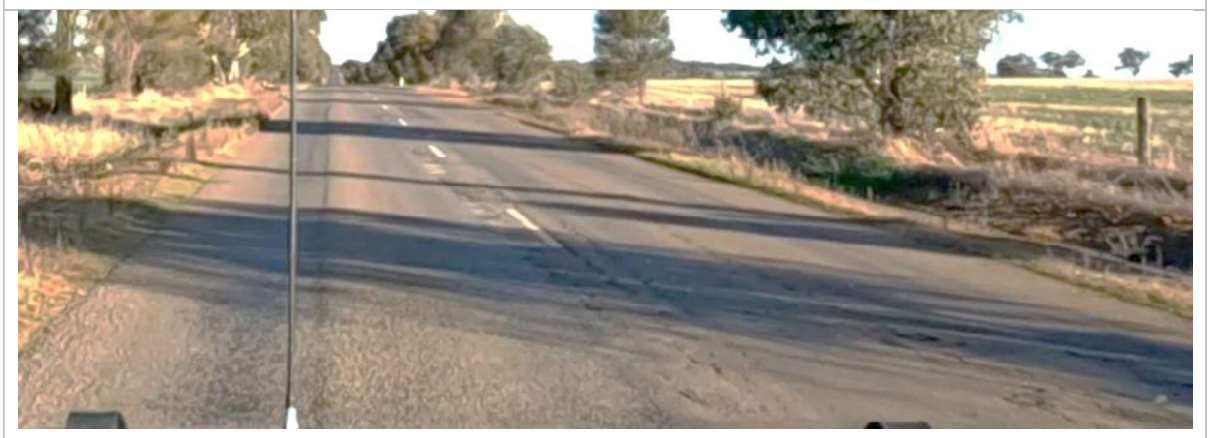
SLK 12.80 – Edge break and ravelling at Pindellup Road intersection

SLK 13.90 – Rutting (EB Lane)

SLK 14.30 – Potholes forming (EB) and minor flushing (WB)

SLK 14.80 – Minor flushing

SLK 17.50 – Minor flushing



SLK 17.90 – Ravelling and potholes forming near the centre line

SLK 18.30 – Flushing and minor cracks forming near Birt Road Intersection

SLK 18.40 – Minor flushing (EB), crack and ravelling (WB)

SLK 18.80 to SLK 18.90 – Minor flushing, minor ravelling with potholes forming

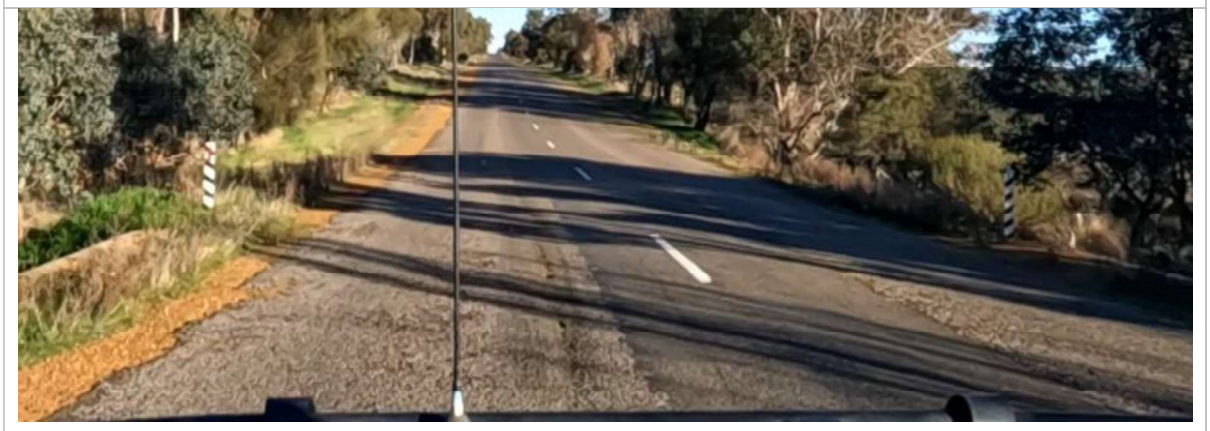
SLK 19.00 to SLK 20.00 – Minor ravelling and rutting along seal joint (WB)

SLK 20.50 – Minor edge break (WB)

SLK20.00 – SLK 21.20 Minor flushing and minor ravelling along seal joint (EB)

SLK 21.40 – Rutting (WB)

SLK 24.20 – Potholes near the centre line



SLK25.00 – Minor edge break and potholes forming (WB)

SLK 26.30 – Pothole forming at change of seal, No Linemarking

SLK 26.50 – Flushing at Warrenup Road intersection

SLK 27.90 – Minor edge break (WB)

START OF KOJONUP

SLK 0.20 – Minor Edge break and minor ravelling

SLK 1.50 – Edge break at crossover

SLK 1.60 – Minor Ravelling

SLK 1.70 – Potholes forming on seal patch

SLK 1.80 – Edge break and crack forming – Change of seal

SLK 2.30 – Minor Edge break

SLK 4.30 – Minor Edge break

SLK 4.50 – Minor Ravelling (WB)

SLK 5.00 – Potholes forming

Warrenup Road

SLK 2.10 – Minor edge break

SLK 3.00 to 3.40 – Unsealed section, potentially washed out or damaged. Moderate corrugations

SLK 5.80 – Uneven road surface with minor ravelling (NB)

SLK 6.00 – Minor edge break (NB)

SLK 6.90 – Minor edge break

SLK 7.10 – End of sealed section. Ravelling and large pot holes near change of seal

SLK 7.40 to SLK 8.00 – Major Corrugation and base course exposure

SLK 8.00 – Corrugation and potholes

SLK 8.50 – Moderate corrugation and potholes

SLK 10.00 to SLK 11.10 – Trees on both sides of the road with overhanging branches

SLK 11.00 to SLK 11.20 – Severe corrugations and poor rideability with uneven surface

SLK 12.40 – Pothole forming

SLK 12.60 – Moderate corrugations with large potholes

SLK 12.80 – Yarranup Road Intersection

SLK 13.00 to 13.10 – Overhanging trees

SLK 13.70 – Corrugation, ravelling and potholes forming near the bend

SLK 14.20 – Large potholes near culvert

SLK 14.70 – Large potholes

SLK14.80 – Moderate corrugations with potholes

SLK 16.40 – Moderate corrugation, ravelling and potholes forming at Grahams Well Road intersection

SLK 16.80 to SLK 17.00 – Severe potholes near Ngopitchup Road intersection

SLK 17.20 – Potholes near culvert

SLK 17.90 to 18.10 – Moderate corrugation, ravelling and potholes forming

SLK 18.40 – Severe potholes

SLK 18.50 – Minor ravelling near site access

Potts Road

SLK 13.60 – Minor corrugations at the intersection of Yarranup Road

SLK 13.65 – Potholes and minor ravelling approaching Yarranup Road

SLK 13.70 – Ravelling and potholes forming

SLK 13.9 – Overhanging tree

SLK 14.2 – Potholes, rutting and base course exposure

SLK 14.70 – Rutting, corrugations, uneven road surface with poor rideability

SLK 14.85 – Corrugation, minor rutting and base course exposure

SLK 15.10 – Rutting, corrugation and potholes near farm crossover

SLK 15.80 – Rutting and potholes forming

Yarranup Road

SLK 8.60 – Minor ravelling and potholes forming

SLK 9.30 – Minor ravelling and corrugation along the wheel path along the bend

SLK 9.40 to SLK 9.60 – Drainage with large drop-off on the edge of carriageway (WB)

SLK 10.10 – Minor corrugation and rutting along the wheel path (EB)

SLK 10.40 – Evidence of water ponding along the eastbound table drain

SLK 10.50 – Effective road width narrowed due to table drains around the bend (~4.5m)

SLK 11.30 – Corrugation, rutting along wheel path

SLK 12.20 – Moderate corrugation, uneven road surface resulting in poor rideability

SLK 12.60 to SLK 12.80 – Moderate corrugation, rutting and ravelling with potholes forming

SLK 13.10 – Corrugations and uneven road surface resulted in poor rideability around bend

SLK 13.30 – Moderate corrugations

Engineering & Construction		GRE CODE **GRE.EEC.G.99.AU.W.08691.03.293.C** PAGE 1 of 1

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Job / Contract No:	12574907
Supplier Name:	Vestas Australian Wind Technology P/L
Supplier Address:	
Supplier Email:	

PROJECT / PLANT	GRE CODE																		
	GROUP	FUNCTION	TYPE	ISSUER		COUNTRY		TEC	PLANT					SYSTEM		PROGRESSIVE			REVISION
	GRE	EEC	G	9	9	A	U	W	0	8	6	9	1	0	3	2	9	3	C

CLASSIFICATION	UTILIZATION SCOPE