KWF KOJONUP WIND FARM

Transport Route Overview

Kojonup Wind Farm

Kojonup Wind Farm Pty Ltd

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1 Introduction

1.1 Purpose

This document describes observations and previous experience on route and explains the Transport of Wind turbine equipment from Bunbury Port to Kojonup Wind Farm.

This preliminary study is based on the turbine components and towers being delivered via the Port of Bunbury for offloading and delivery to the Project Site located on the Jingalup Road, 20 km south of Kojonup.

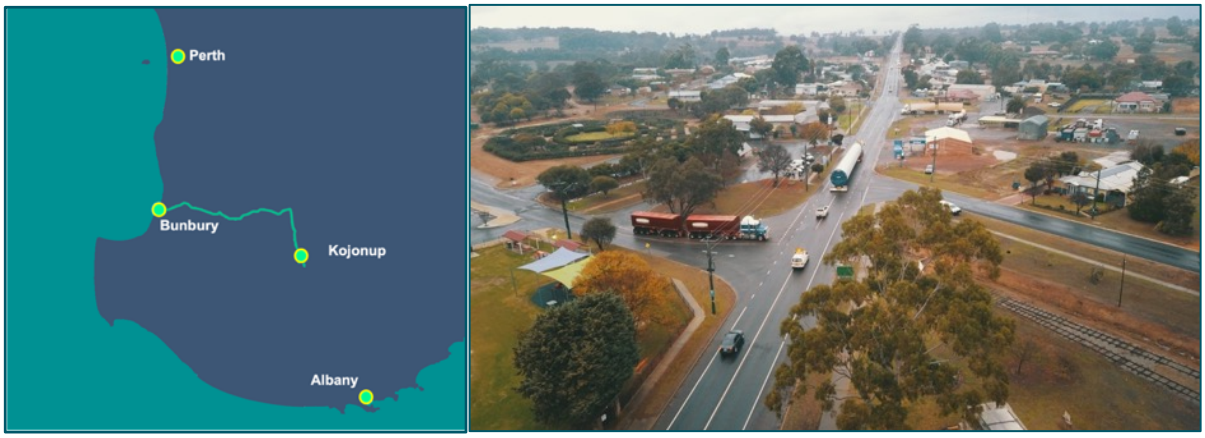
This document summarises the expected these components, and the restraints that they may encounter on the route.

This Transport Route Overview document has been prepared by Moonies Hill New Energy Pty Ltd (ACN 664 489 310) in its role as Project Manager for the Kojonup Wind Farm.

1.2 Transport Task

The transportation task involves the delivery of 33 x Vestas V162 6.2MW turbines with a 125m Hub Height.

Figure 1: Delivery of Turbines, Albany Highway Kojonup



1.3 Route Summary

The turbines will need to be transported 233km from the Port of Bunbury to the Project Site. The main roads that will be used are the South Western Highway, the Coalfields Road and the Albany Highway. The transport route is summarised in Table 1 below.

Table 1: Port of Bunbury to Kojonup Wind Farm Transport Route

Bunbury Port:	Leschenault Drive	1.9 km
	Koombana Drive	2.4 km
	National Route 1	1.5 km
	SouthWestern Hwy/State Route 20	16.2 km
	Coalfields Rd/State Route 107	130.0 km
	Albany Hwy/State Route 107/State Route 30	73.4 km
Project Site	Jingalup Rd, Jingalup WA 6395, Australia	7.8 km
TOTAL DISTANCE:		**233.5 km**
GPS LINK:	https://www.google.com/maps/d/u/0/edit?mid=1v3SzqbH5gs0-lzJ4XWeaBFxzsw0vxW8&usp=sharing	

2 Evaluation

The transportation will essentially follow the same route as that used for the successful delivery of the Flat Rock Wind Farm Stage 1 Project and will be able to utilise the work conducted to facilitate the delivery including lifting of powerlines and civil work. The turn of west from the Albany Highway onto Jingalup road at the southern end of the route is actually [ ][km short of where the FRWF1 route turned east of the Albany Highway on [ ] Road.

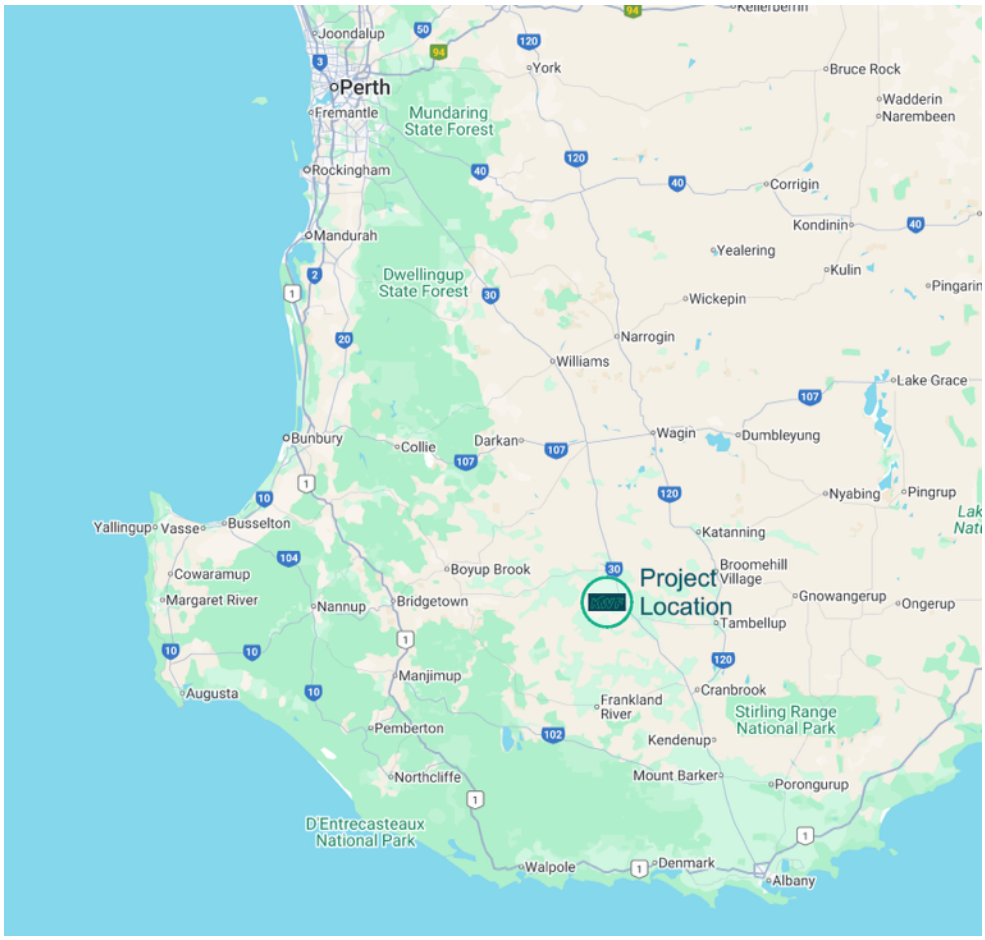
Table 2: Port of Bunbury to Kojonup Wind Farm

		Limited Work Required	Some Work Required	Moderate Work Requirement	Significant Work Required
A	Harbour		X		
B	Road Modification			X	
C	Road Furnishings			X	
D	Bridge Calculations			X	
E	Overhead Utilities			X	
F	Trees		X		
G	Site Entrance		X		
H	Traffic Control	X			

2.1 Site Location

The Kojonup Wind Farm is located approx. 25 Kilometres south of Kojonup, in the Shire of Kojonup on the western side of the Albany Highway, the main transport route through the Great Southern region of western Australia..

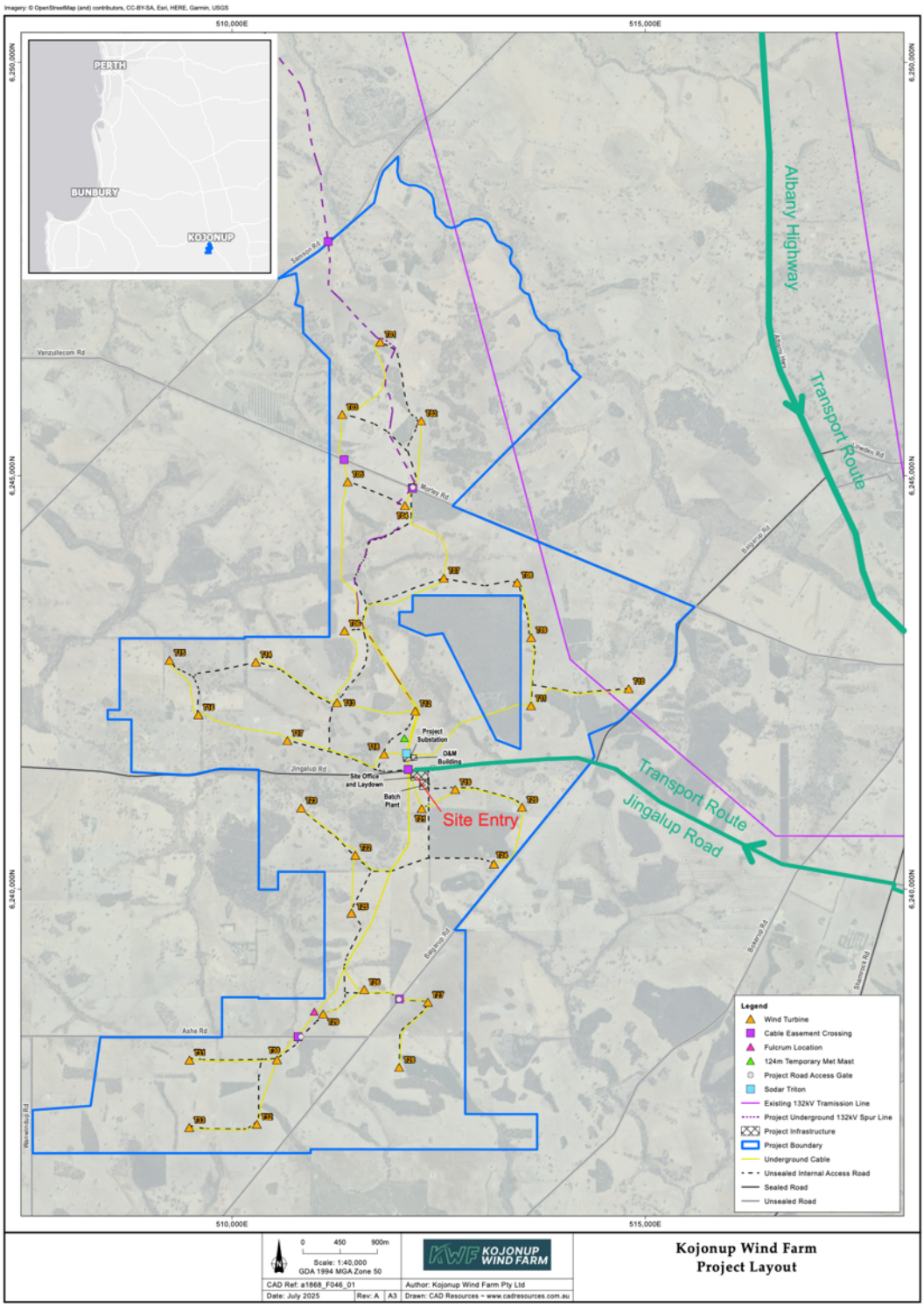
Figure 2: Project Location



2.2 Turbine Layout and Site Access Routes

The Kojonup Wind Farm is accessed from a central location off the Jingalup Road. Trucks will turn either south or north off Jingalup Road onto the internal access tracks that will then be used to distribute components to the 33 turbine sites. The Site layout is shown below in Figure 3

Figure 3: Site Layout



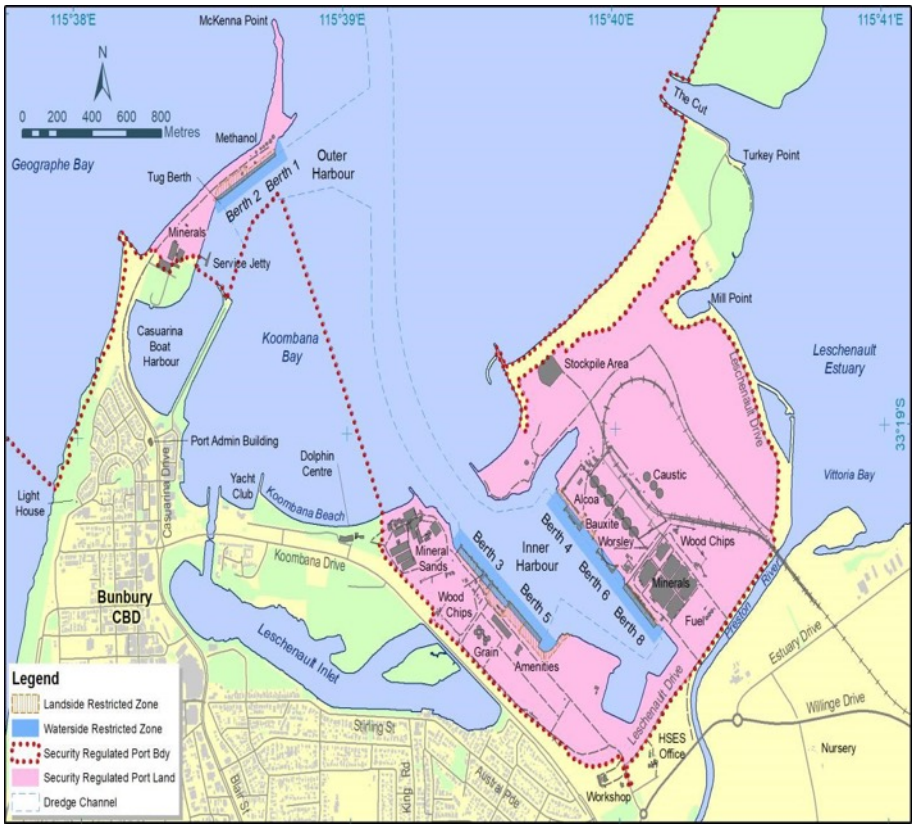
3 Bunbury Port

3.1 Point of Import

The wind turbine and associated components for the Kojonup Wind Farm will be imported from various countries and through the Port of Bunbury.

The proposed berth for these shipments is berth # 5. This facility has a hardstand storage area of roughly 30,000 s/q meters, adjacent to the berth and was used for the successful import for the 18 wind turbines for the Flat Rocks Wind Farm.

Figure 4: 0.2kms: Leschenault Drive onto Estuary Drive



Blades can be delivered to the exiting Bunbury Port berth # 5, located at the south eastern end of the port, where they can be unloaded onto the storage area and back onto the port access road (see Figure 5 below)

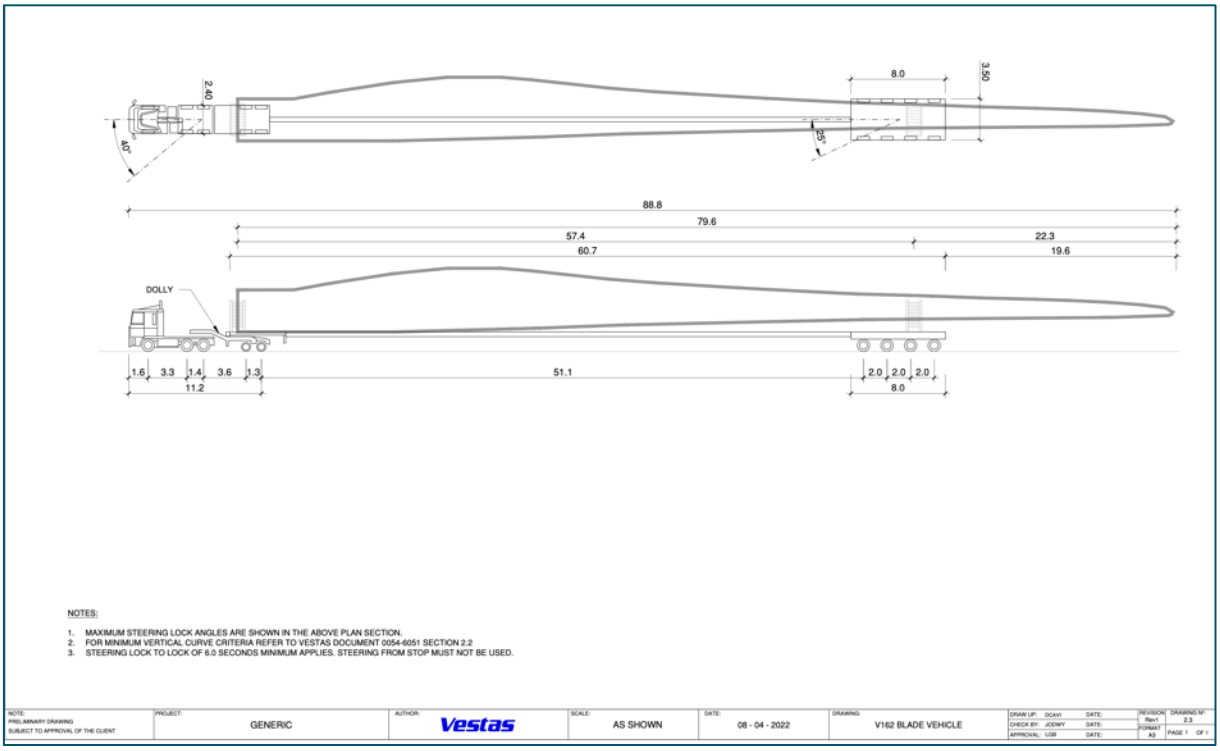
Figure 5: Port Exit

4 Transport Details

Drawings are provided in this section of the larger wind turbine components and the size of the transport unit required to transport from the Port of Bunbury to the Project Site. These are from Vestas's standard traport specifications and the final truck and trailer selection may be different to those show below depending upon availability and final Transport Management Plan.

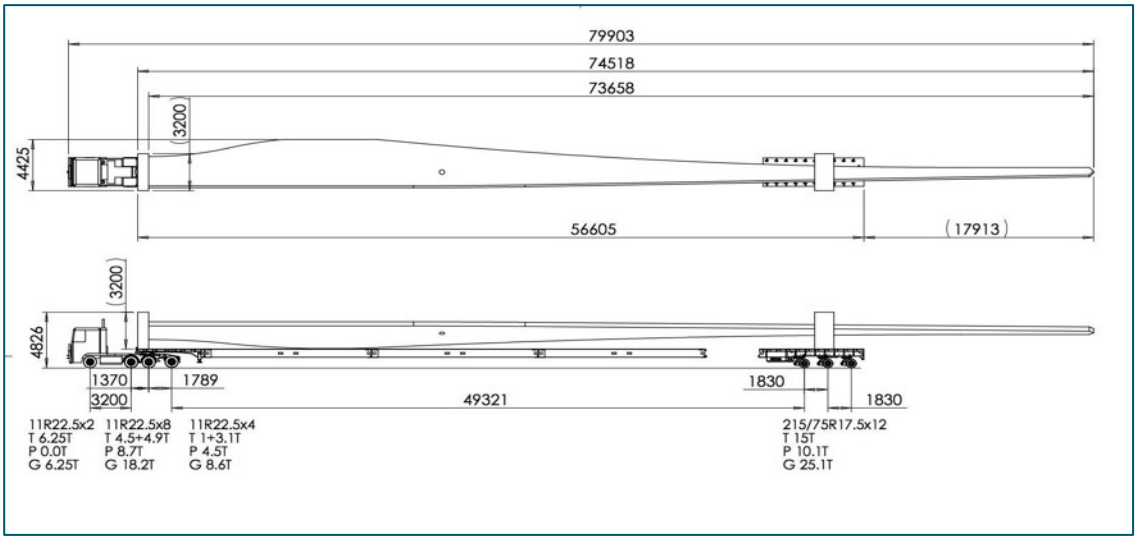
4.1 Blades

The blades have a total length of 79.6m. The total length of the transport unit is 88.8m. This is 9 metres longer than the length of the blade transport unit used for the FRWF1 Project (refer to Figure 6) due to the larger size of turbines selected for the Kojonup Wind Farm.[1] As the largest sized component the blades are the critical factor for the determination of the modifications required on the transport route.



The size of the blade transport units for the FRWF1 Transport Route Study are shown in Figure 6 below.

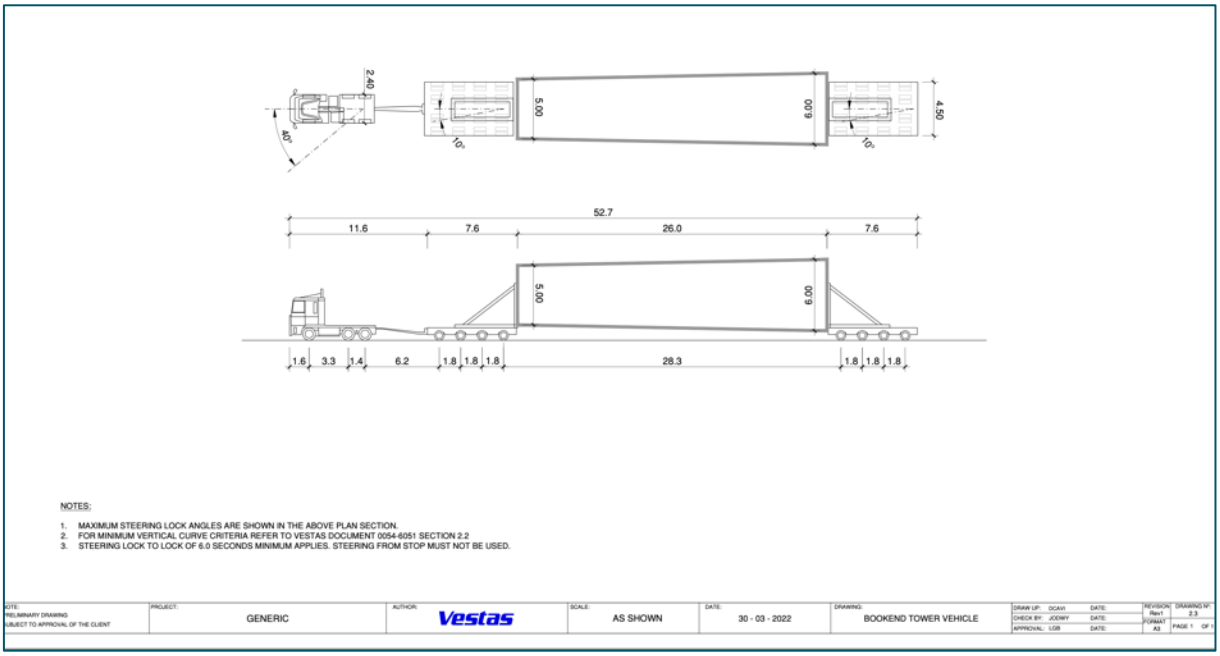
Figure 6: FRWF1 Transport Unit (Vestas V150 4.2MW)



[1] Kojonup Wind Farm will utilise Vestas V162 6.2 MW turbines, whereas FRWF1 had Vestas V150 4.2MW WTGs installed.

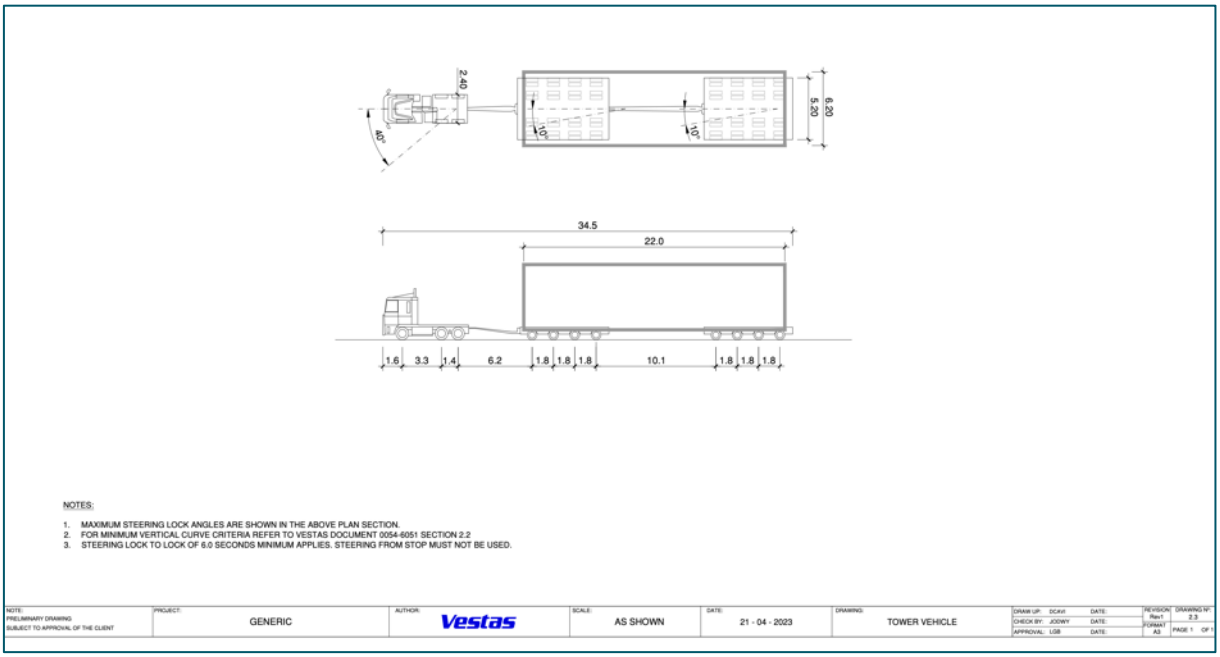
4.2 Tower Sections

The towers sections have a 26m length with a total transport unit length of 52.7m .



4.3 Base

The WTG tower base components are of 22m length with a total transport unit length of 34.5m.



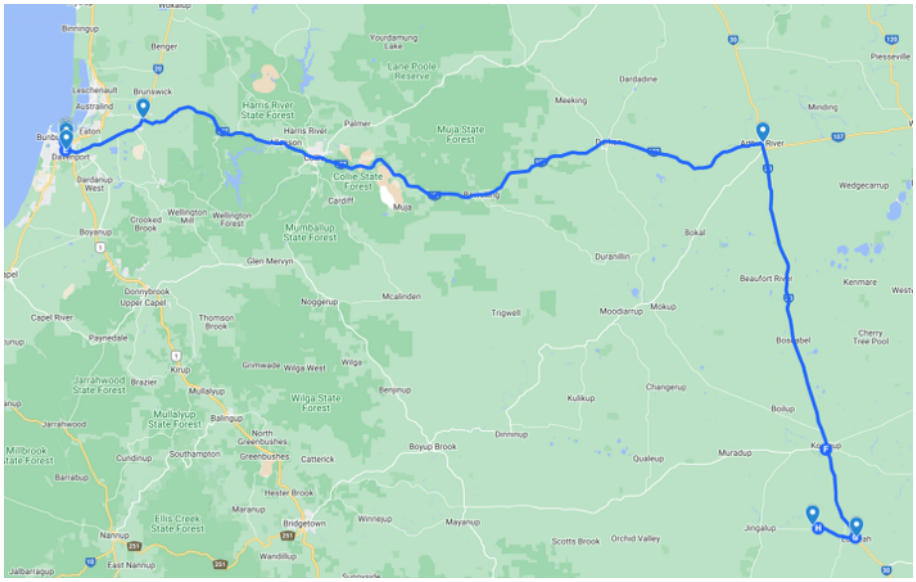
5 PreliminaryRoute Survey: Port of Bunbury to Kojonup Wind Farm

The turbines will be transported by trucks from the Port of Bunbury to the Project site located south of Kojonup on existing sealed roads, mostly on substantial main roads, including the South Western Highway/Coal Field Road and the Albany Highway.

5.1 Transport Route

The transport route is shown in Figure 7 below. Other than the right hand turn off on Jingalup Road Lumeah for the last 7km of the route this is the same route used for transport of FRWF1's WTGs.

Figure 7: Transport Route



The detail provided in Table 3 below based on FRWF1 is provided in the table below. KWF will be able to take advantage of modifications made to facilitate the transport of WTGs for FRWF1 to improve overall efficiency of transport logistics. However, due to the passage of time since the 2023 delivery of the FRWF1 components some of the work conducted may need to be reinstated.

Table 3: Detailed Travel Route Information

KM index	Location	Section of road	Procedure	Notes
0.0	Port of Bunbury	Port access road onto Leschenault Drive while traveling over rail crossing.	Travel directly ahead from the Port Access Road onto Leschenault Drive.	Travel over the rail crossing and onto Leschenault Drive. Port Access Road is 8.0 Metres wide at the narrowest point. Rail crossing to be crossed with caution. Some hardstand may be required.
0.6	Bunbury (Figure 9)	Leschenault Drive onto Estuary Drive	Right hand turn from the incorrect side of Leschenault Street back to the correct side of Estuary Drive.	Loads to cut through the inside of the roundabout. Spotter to watch the pole on the inside of the turn, and the blade overhang on the trees at the rear. No material road modifications required.
0.6	Bunbury Figure 10	Estuary Drive onto Koombana Drive	Left hand turn from the correct side of Estuary DriveDrive onto the incorrect side of Koombana Drive.	Hardstand is required on the inside of the corner, and a sign made removable. Truck is to cross over and return to the correct side by travelling over the centre median strip. The centre median strip looks okay in its current form.
1.0	Bunbury Figure 11	Koombana Drive onto Robertson Drive	Travel directly ahead through the roundabout on the correct side. Taking the second exit.	Spotter to guide the load through the poles and signs. No road modifications required.
2.4	Bunbury Figure 12	Robertson Drive onto South Western Highway	Left hand turn from the correct side of Robertson Drive onto the incorrect side of the South Western Highway.	Signs will need to be relocated or made removable. Truck is to cross over and return to the correct side by travelling over the centre median strip. The centre median strip looks okay in its current form.
13.1	Waterloo Figure 13	Wilman Wadandi Highway bridge (May Holman Bridge)	Left hand turn around two roundabouts before and after crossing under the Wilman Wadandi Highway bridge	To be confirmed
18.5	Bunbury Figure 14	South Western Highway onto Coalfields Highway	Right hand turn from the correct side of the South Western Highway onto the incorrect side of the Coalfields Highway.	Hardstand is required in the centre median strip and on the inside of the corner. A light pole will need to be relocated and some signs relocated or made removable.
18.6	Bunbury	Coalfields Highway over rail line	Travel directly ahead	Cross with caution likely.
152	Arthur River Figure 15	Coalfields Highway onto Albany Highway	Right hand turn from the correct side of the Coalfields Highway across to the incorrect side of the Albany Highway.	Loads to travel across the inside of the corner on the incorrect side of the road. No road modifications required.

KM index	Location	Section of road	Procedure	Notes
225	Lumeah Figure 16	Albany Highway onto Jingalup Road[2]	Right hand turn from Albany Highway onto Jingalup Road	Some clearing of young regrowth and earthworks to north western corner of intersection. Some earthworks may be required to southern border of Jingalup Road.
	Lumeah Figure 18	Shamrock Road Intersection	Right hand turn on to Shamrock Road followed by quick left hand turnback on to Jingalup Road.	Loads to cross over land to the northern side of Jingalup Road. Reasonable temporary earthworks required.
217.5	Jingalup The entry to the Northern portion of the Project Site (see below) will require removal of some road verge trees and further pruning of trees adjacent to the entry. The trucks will exit from the sealed Jingalup Road onto new gravel access tracks that can be constructed to accommodate the swing required for trucks to enter the site with minimal tree removal. Figure 20 and Figure 21	Off Jingalup Road to site[3]	Right hand turn from Jingalup Road to serve northern portion of Project or left hand turn to service southern section of Project.	Trucks to transit from sealed Jingalup Road onto new unsealed internal access tracks

5.2 Details

Details of critical road intersections are provided below in Figure 8 through to The nature of the roadside vegetation on Jingalup Road at the Project Site entry is shown in Figure 22 below.

Figure 22. The Transport Units have been superimposed onto these intersections.

[2] The transport route for FRWF1 proceeded further south on the Albany Highway past the turn off to the Kojonup Wind Farm Site at Jingalup Road.

[3] While there are alternative routes to the Project location to the north of Jingalup Road (Morley and Balgarup), preliminary assessment indicates that the level of vegetation clearing required and the concern over the load bearing capacity of local traffic bridges makes Jingalup the preferred option at this stage.

Figure 8: Port Access Road onto Leschenault Drive

The turn from Leschenault Road onto Estuary Drive will require the transport units to cross on the wrong side of the roundabout. This may require the removal or relocation of some street signs and lighting once final transport equipment is selected.

Figure 9: Leschenault Drive onto Estuary Driv

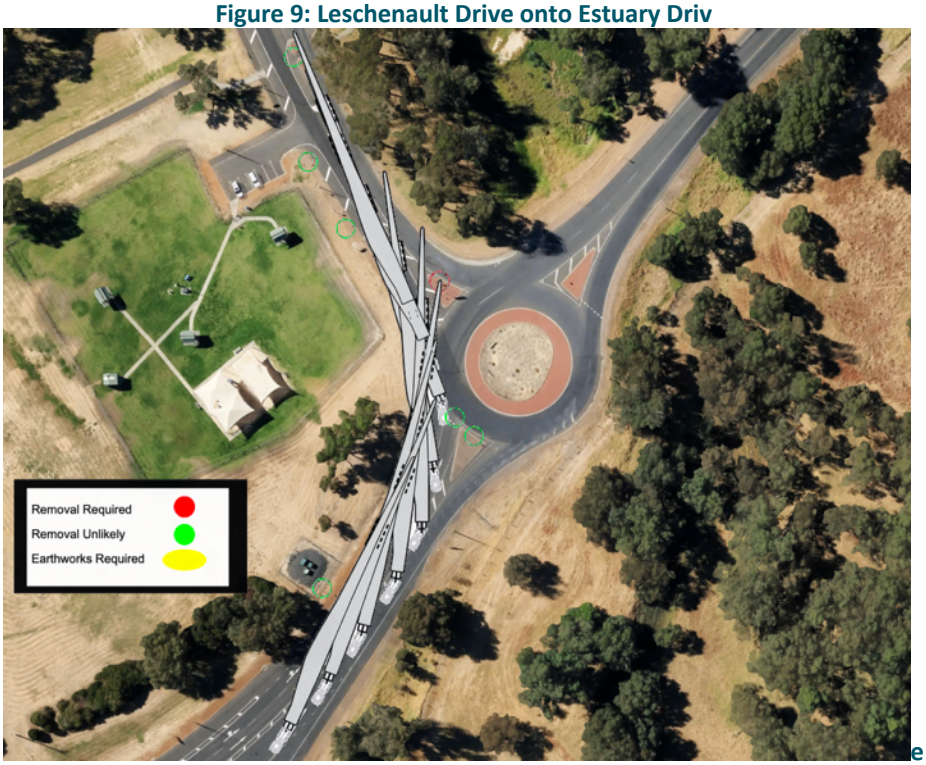


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Figure 10: Estuary Drive onto Koombana Drive

Figure 11: Koombana Drive onto Robertson Drive

Figure 12: Robertson Drive onto South Western Highway

The May Holman Bridge on the Bunbury Outer Ring Road has been constructed since the delivery of the FRWF1 WTGs. The South Western Highway passes under neath the new bridge and the transport units must pass through two roundabouts either side of the bridge as shown below in Figure 13.

Figure 13: South West Highway under May Holman Bridge

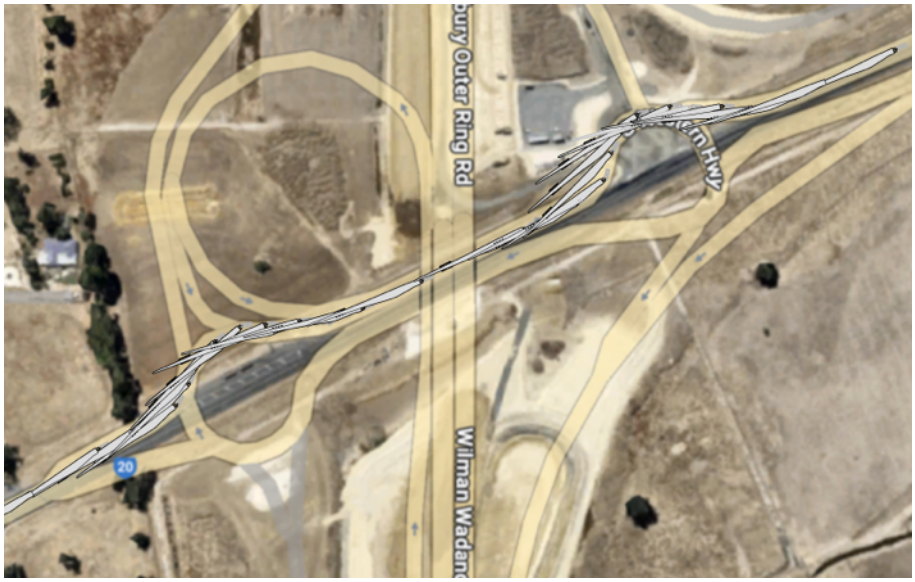

Figure 14: South Western Highway onto Coalfields Road

At the intersection of the Coalfield Road and Albany Highway near Arthur River, the trucks will need to crossover the incoming lane.

Figure 15:Coalfield Road onto Albany Highway

The turn off from the Albany Highway onto the Jingalup Road at Lumeah will require the removal of some regrowth vegetation that has regrown since the Jingalup Road alignment was modified in the 2000s. A street view is shown in Figure 17 that shows the relatively young trees that will be disturbed..

Figure 16: Albany Highway onto Jingalup Road.

The intersection of the Jingalup Road and Shamrock Road has been previously modified to convert a simple cross through intersection into two T sections by realigning Jingalup Road. A portion of the land to the north of

the new road alignment (not cropped) may need to be utilised for the manoeuvring of the WTGs to navigate the intersection. The photograph below shows the trees are relatively insubstantial.

Figure 17: Albany Highway onto Jingalup Road (Street View).

The Shamrock Road intersection was modified at the same time as the Albany Highway intersection to create a dog leg that will need to be navigated. This will require some temporary earthworks on the north eastern corner.

Figure 18: Shamrock Road Intersection

Figure 19 below shows the view looking west of the Shamrock Road intersection. The road on the left coming up to the T section is the new alignment with the previous alignment on the right.

Figure 19: Shamrock Road Intersection (Street View)

The entry to the Northern portion of the Project Site (see below) will require removal of some road verge trees and further pruning of trees adjacent to the entry. The trucks will exit from the sealed Jingalup Road onto new gravel access tracks that can be constructed to accommodate the swing required for trucks to enter the site with minimal tree removal.

Figure 20: Site Entry North

The entry to the southern portion of the Project site will require removal of some trees and pruning of trees adjacent to the entry to allow the turbine blades to pass.

Figure 21: Site Entry South

The nature of the roadside vegetation on Jingalup Road at the Project Site entry is shown in Figure 22 below.

Figure 22: Site Entry (Street View)

6 Conclusion

After studying all options and undertaking a route survey, we believe the loads could be transported on this route with a significant number of upgrades.

The following are the key points that need to be taken into consideration for the development of this route.

Table 4: Summary

	Comments
Port of Bunbury	Based upon experience with the FRWF1 Project the Port of Bunbury should have sufficient storage and access from the berth through to the storage area, then onto the road network.
Bunbury	A small number of intersections required reasonable levels of work for the delivery of the FRWF1 WTGs. This included the relocation of a light poles and two corners required earthworks.
Outer Ring Road	The transport route passes underneath the new Wilman Wadandi Highway bridge (May Holman Bridge. The bridge has sufficient clearance for the loads to travel underneath.
Lumeah (Turn Off Albany Highway)	The turn off to the west will require some clearing of vegetation on the road verge of the north western corner of the intersection
Bridges	Given the successful transport of FRWF1 over all the bridges in the Bunbury to FRWF1 route no issue is expected with the strength of bridge infrastructure to handle the KWF loads. should not be an issue.
Overhead Structures	There are no overhead structures on this route other than the Bunbury Outer Ring Road/ Wilman Wadandi Hwy May Holman bridge that runs over the South Western Highway/State Route 20 that has a clearance of 6.1m[4] .
Overhead Utilities	This route will need to be checked by Western Power for a likely travel height of 5.5 metres for the highest load. Given powerlines were raised for FRWF1 no further work is expected
Rail Assets	There is 1 rail crossing on route that will require approval from authorities before loads can access the routes.
Vegetation	The route up until Jingalup Road turnoff to the Project Site is clear of vegetation. Regrowth vegetation will need to be cleared on the northwestern corner of the Jingalup Road turn off. Additional clearing will be required at the site entry although the central site entry has been chosen to minimise the need to remove remnant vegetation.
Pavement Quality	The pavement up to Jingalup Road is of suitable highway grade. Jingalup Road is used extensively by trucks delivering grain to the local oil refinery. Jingalup Road is sealed and well maintained and is expected to be capable of withstanding the transport load.
New Roadworks	The project will need to start discussions with government authorities at least 18 months prior to turbine transport to confirm if the project would conflict with any upcoming roadworks. Following the completion and approval of the Transport Management Plan the movement dates will need to be communicated with Main Roads WA and local councils to ensure road stakeholders will be aware of the movements.

[4] See https://reportingcentreresources.mainroads.wa.gov.au/public/data/HVS/RSTR/Structure%20Heights.pdf

7 APPROVALS:

The following approvals will be required for approval of the Traffic Management Plan.

- NHVR;
- Main Roads WA;
- WA Traffic Escort Division;
- Local Councils;
- Western Power;
- Telstra.

8 Disclaimer:

This route study is a guide only; government approvals would be required before these routes could be deemed suitable for transporting the components over the listed routes.

This study was undertaken by MHNE based on previous transport studies conducted for the nearby Flat Rocks Wind Farm Stage 1 project. The transportation task for this was the delivery of 18 off Vestas V150 4.2MW wind turbines and associated infrastructure.

Equipment and swept paths may vary depending upon the final transport methodology and equipment.

Kojonup Pty Ltd

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