Appendix 3-1

Turbine Delivery Route Assessment

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Shronowen Wind Farm

Analysis for
Turbine Access Report

Client: EMP Group

Project	Document	Revision	Prepared	Checked	Date
19876	6001	A	Paul Nealon	Cormac Murphy	April 2019
19876	6001	B	Paddy Curran	Cormac Murphy	October 2020

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1 Turbine Delivery Route Assessment

1.1 Project and Delivery Route Overview

The proposed Shronowen Wind Farm at Shronowen, County Kerry is proposed to consist of 12 no. Wind Turbines. The proposed turbine is a Vestas V136.

Malachy Walsh and Partners (MWP) have been requested to provide a study on the viability of delivering components for this class of turbine to the Shronowen site.

Pinch points were identified during a desk survey. As a fundamental element of this report all pinch points identified were assessed with the turbine blade configuration, as the turbine blade component is the most onerous to deliver to a wind farm site. The Swept Path Analysis (SPA) was completed with this blade configuration using Autodesk Vehicle Tracking (formally called AutoTrack) software. A 68m long blade was used for the assessment.

This report does not identify items such as telephone lines and hedge cutting required in order to achieve the 5m wide by 6m high clearance envelope specified by component delivery contractors.

1.2 Proposed Route

The proposed delivery route for oversized loads from Foynes Port to the eastern site entrance at Shronowen is shown on Figure 1-1.

It is anticipated that the turbines will be delivered by sea to the Port of Foynes, County Limerick. From Foynes, delivery vehicles will take the N69 National Secondary Road to Tarbert, County Kerry where they will then divert west onto the R551 Regional Road. The delivery route has been previously proven from Foynes to Tarbert along this section with GE 2.85 and Nordex N100/3300 turbines. Afterwards deliveries will follow the R551 until reaching the *Cross of the Wood* junction and turn south towards Shronowen onto the L-6021 Local Road.

MWP have experience in delivering GE 2.85 and Nordex N100/3300 components to the nearby Tullahennel and Kilathmoy Wind Farms near Ballylongford and Moyvane respectively which previously used sections of the proposed transport route for deliveries. Tullahennel Wind Farm was built by Ronover Energy Ltd. in 2017 and subsequently sold in 2018 to Microsoft. Tullahennel Wind Farm consisted of 9 no. GE 2.85 turbines with 103m rotor; 70m Hub Height (HH) and 4 no. GE 2.85 turbines with 103m rotor; 70m HH. Kilathmoy Wind Farm has also recently been constructed in North Kerry and used portions of this route. It consists of 7 no. Nordex N100/3300 turbines with 100m rotor; 75m HH.

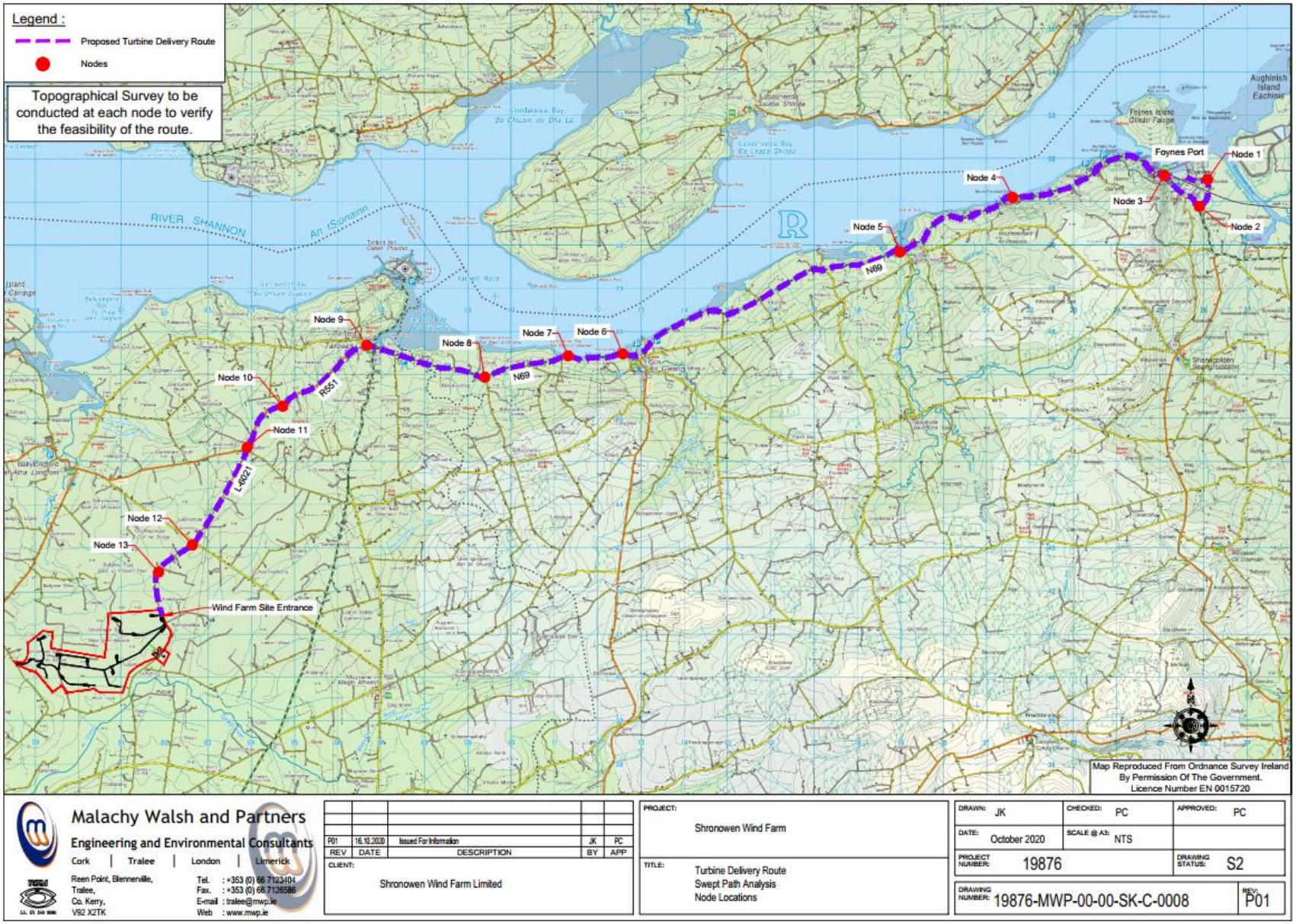


Figure 1-1 Turbine Delivery Route

1.3 Swept Path Analysis

A Swept Path Analysis (SPA) was completed using Autodesk Vehicle Tracking (formally called AutoTrack) software.

Pinch points along the route were identified using aerial photography, topographical survey information where available and site visits.

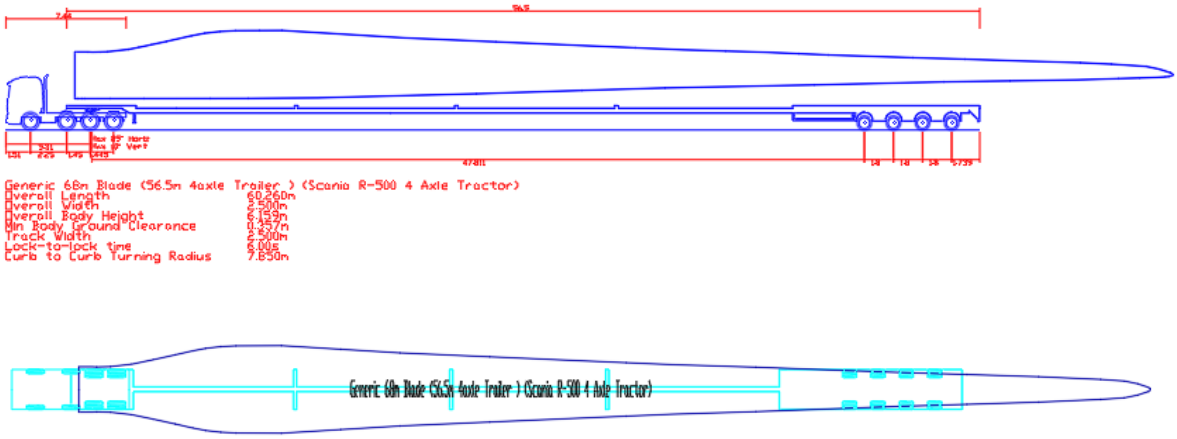


Figure 1-2 AutoTrack Delivery Vehicle Configuration for a 68m Blade

An AutoTrack model was developed for a 68m long blade with a 12m overhang on a bogie trailer in accessing the route from Foynes to Shronowen. The type of trailer proposed for blade transportation is commonly available from turbine transport companies.

An automatic steering principle within the software was used where possible but otherwise a manual override system is used with a conservative maximum steering angle of 30° to help alter the path of the bogie past constraints at pinch points.

The Swept Path Analysis output is illustrated in the drawings included in Table 1-1. This shows the extents of the wheel swept path, vehicle body swept path and blade swept path as the delivery truck manoeuvres around each pinch point. This information highlights areas that require widening or clearance along the route. See Table 1-1 for an overview of works required to public roads along the turbine delivery route.

Minor works will be required along the route. These will entail hardening of soft verge with compacted granular material. Existing drains to be piped. The extents of the works are minor and localised.

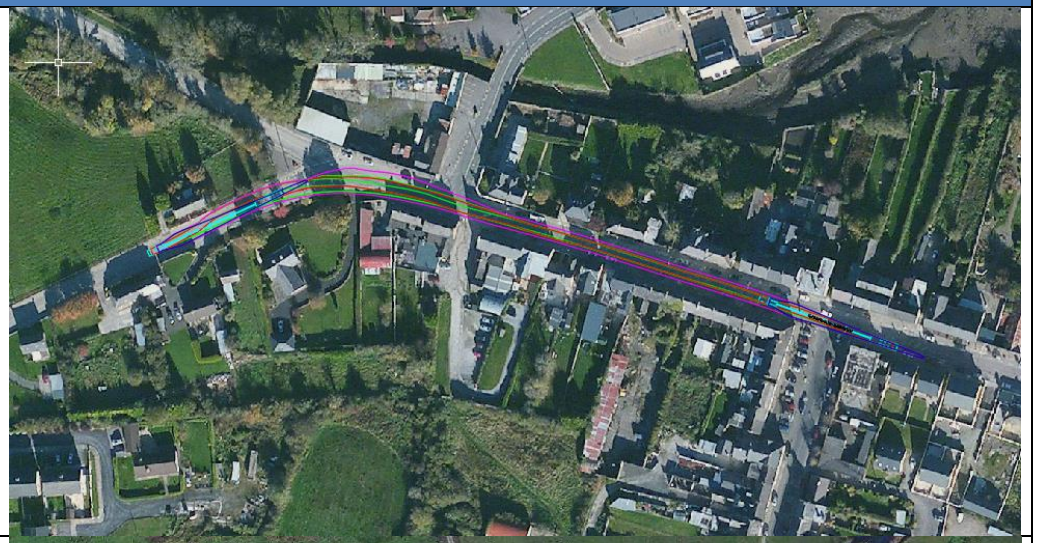
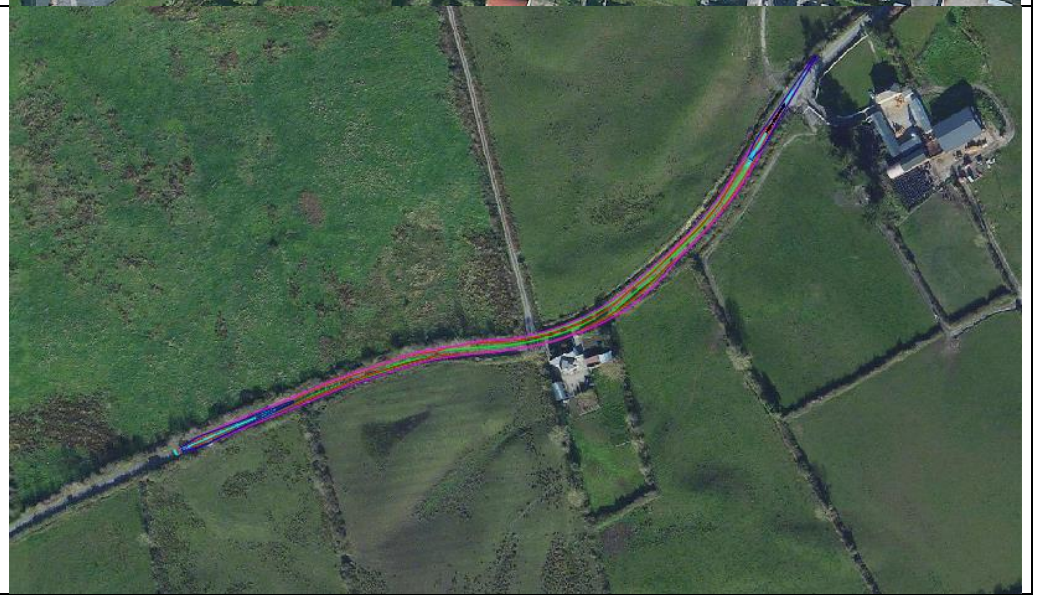
Table 1-1 Overview of Works along Turbine Delivery Route

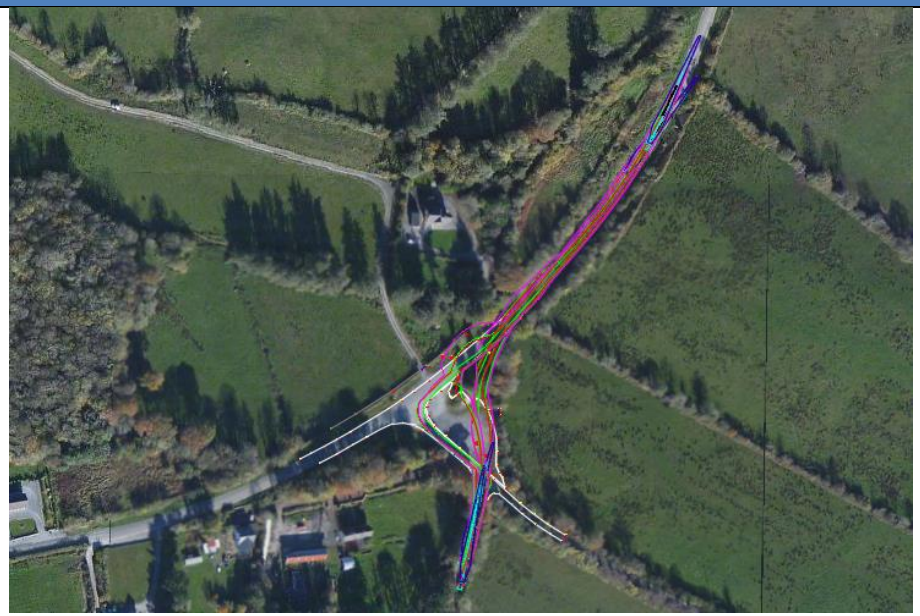
NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
1	Exit from Foynes Port	Temporary widening along existing grass verge. Temporary removal of fences, lighting poles, telecoms poles, signs and other street furniture	
2	Junction between Foynes Port Access Road and N69	Temporary widening along existing grass verge Temporary removal of fences, lighting poles, telecoms poles, signs and other street furniture	

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
3	Main street through Foynes	Temporary removal of fences, lighting poles, telecoms poles and other street furniture.	
4	N69 between Foynes and Log Hill	Temporary removal of fences, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	

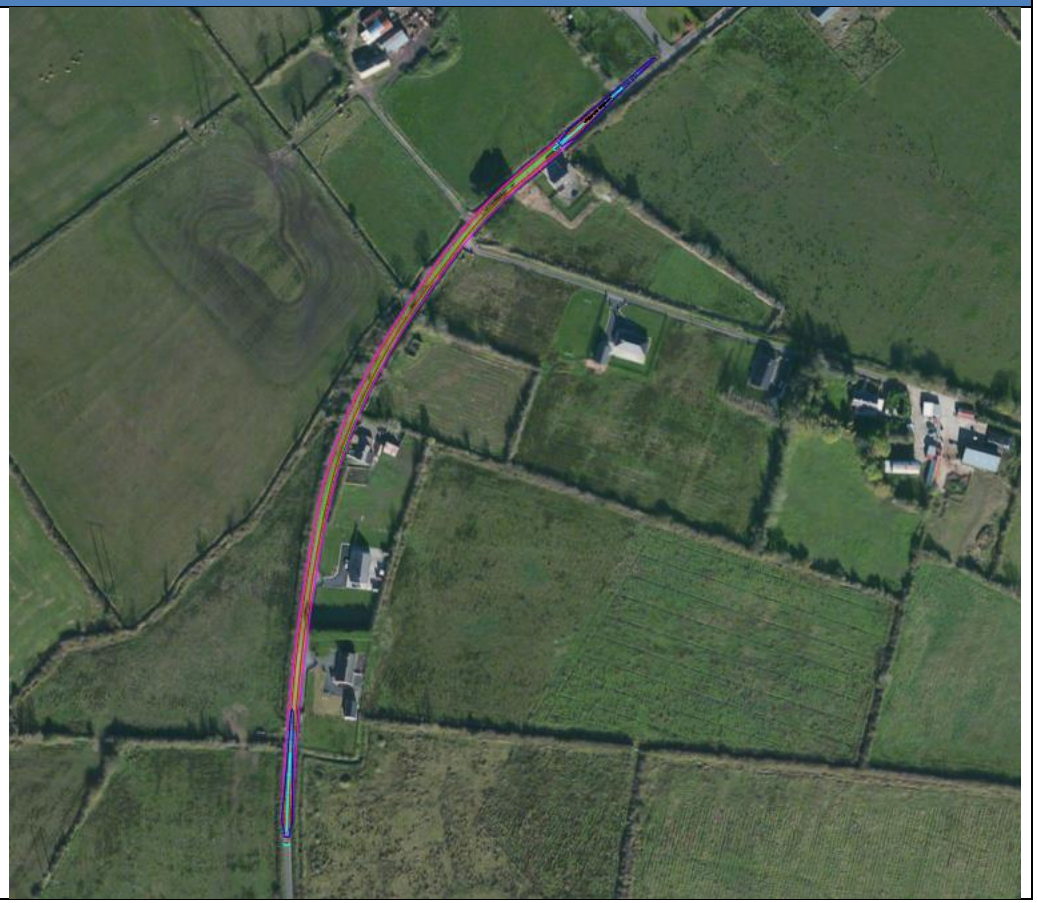
NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
5	N69 through Log Hill	Temporary removal of lighting poles, telecoms poles, signs and other street furniture. Temporary removal of bridge parapets may be required if they are too high to facilitate over sail.	
6	N69 west of Glin	Temporary removal of fences, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
7	N69 between Glin and Tarbert	Temporary removal of fences, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	
8	N69 between Glin and Tarbert	Temporary removal of fences, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
9	N69 through Tarbert (Diverting onto the R551 Regional Road towards Ballylongford)	Temporary removal of lighting poles, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	
10	R551 west of Tarbert	Temporary removal of fences, telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance. Extents of road surface to be confirmed. Temporary hardening of existing grass verges.	

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
11	R551 to L-6021 (*Cross of the Wood)* junction	This junction was previously widened as shown for deliveries to Leanamore Wind Farm which is located on the L-6021 Local Road. Land take to the north would be required but a straighter alignment would ensure blade over sail does not become an issue while turning would be easier and quicker with this option for deliveries. This option also corresponds to the original alignment of the junction as shown on 25" mapping prior to its realignment. Clearance of existing vegetation and hardening of existing soft verges would be required.	 

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
12	L-6021 to Proposed Site Entrance	The L-6021 has been previously used for transporting turbine components to the nearby Leanamore Wind Farm and as such has a minimum 4m drivable width to its site entrance. Minor hardening of existing grass verges will be required to bring the road width up to the minimum of 4.5m required by Vestas. Past the Leanamore Wind Farm entrance the L-6021 road decreases to a minimum width of 3m which will necessitate widening to 4.5m. The road is also bordered on both sides by bog for certain lengths and it is likely that some of these sections of road will be of the floated variety.	

NODE REF NO	LOCATION	BRIEF DESCRIPTION OF WORKS	IMAGE
13	L-6021 to Proposed Site Entrance	Past the Leanamore Wind Farm entrance the L-6021 road decreases to a minimum width of 3m which will necessitate widening to 4.5m. The road is also bordered on both sides by bog for certain lengths and it is likely that some of these sections of road will be of the floated variety. Some existing boundary walls are close to the edge of the road. Surveys of wall position and heights will be needed to check for clearance. Temporary removal of telecoms poles, signs and other street furniture. Height of boundary walls to be confirmed for over sail clearance.	

2 Conclusions

A conservative swept path analysis has been carried out on all the identified potential pinch points on the route from Foynes Port to the site of the proposed development.

The delivery of a 68m blade to the site is feasible with some modifications to existing boundaries and temporary widenings. Temporary works including widening by placing hardcore or other suitable material over existing grass verges is required at a number of locations along the proposed route and is included as part of the proposed development as set out in Table 1-1 above.

3 Recommendations

It is recommended that the following is carried out as early as possible post-consent:

- A schedule of street furniture alterations required will be compiled and formally agreed with Kerry County Council, Limerick City & County Council and Transport Infrastructure Ireland (TII).
- Approval should be obtained from Shannon Foynes Port Company for the temporary measures required at the entrance to the port.
- Carry out a topographical survey of all pinch points to confirm exact extent of widening requirements, location of street furniture, location of edge of roadway, and location of utility poles.
- Consultation with all relevant authorities and stakeholders such as KCC, LCCC and An Garda Síochana regarding possible traffic restrictions when transporting components.
- Consultation with landowners along the route regarding temporary widening and temporary removal of any fences, boundary walls etc.
- A utility survey should be completed to confirm the predictions in this EIAR regarding clearance requirements for turbine components along the transport route which should include public streetlight, telephone poles and overhead lines. Consultation should be made with Eir and ESB Networks about temporary removal of their services during delivery if necessary.