

Abnormal Load Route Survey Supplementary Report

Gordonbush Extension Wind Farm

SSE Renewables Developments (UK) Ltd

June 2015

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Document history

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SSE Renewables Development (UK) Ltd

This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
001	05.03.15	For Inclusion as Appendix in ES	Alan Kerr/Bryan Tighe	Richard Bourne	Jonathan Plant
002	05.06.15	Incorporating minor changes to comments received following legal and client review	Alan Kerr	-	-

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1 Introduction

1.1 Background

Following the production of the Abnormal Load Route Survey Report (Appendix 12.1), CH2M HILL have been commissioned by SSE Renewables Development (UK) Ltd (hereinafter referred to as SSE) to undertake supplementary swept path assessments to take account of changes to the nominated turbines originally considered.

As agreed by SSE, revised swept path assessments have been undertaken at a number of points identified in Appendix 12.1: Abnormal Load Route Survey Report as 'higher risk' areas of the proposed delivery route. The Points of Interest (POI) selected are detailed below and illustrated on Figure 3-1 and Figure 3-2 of Appendix 12.1:

- POI 6 signalised junction in Invergordon;
- POI 9 at junction (right-turn) exiting Invergordon;
- POI 45 right hand bend, low risk in Route Survey Report but close to edge of road boundary;
- POI 62 right hand bend in Golspie, low risk in Route Survey Report but close to boundary wall;
- POI 63 left hand bend in Golspie, low risk in Route Survey Report but close to adjacent buildings;
- POI 66 left hand bend in Golspie, low risk in Route Survey Report but close to boundary wall;
- POI 89 left hand bend in Brora, low risk in Route Survey Report but near bridge and war memorial;
- POI 90 junction from A9 (T) to Clynelish Road;
- POI 156 Oldtown Bridge (will include assessment of adjacent POI's); and
- POI 184 junction leading to site access to confirm still within road boundary.

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This route assessment is an initial source of guidance only. The report identifies the key points and issues associated with the horizontal alignment of the selected POI's along the proposed route to accommodate the predicted loads. The designs of these remedial works are, however, beyond the agreed scope of works. This assessment identifies necessary further work required to ensure that the access route from the POE to the site access is fit for purpose and that appropriate consideration for all road users has been made in accordance with the relevant health and safety legislation and ruling transport requirements.

1.2 Proposed Candidate Turbine

SSE originally requested that the impacts of transporting the REpower 3.4M104 turbine, with a rotor diameter of 104m and a standard hub height of 80m were assessed.

It has subsequently requested by SSE that a horizontal tracking assessment is to be undertaken using the dimensions of the new nominated turbines as summarised in Table 1-1.

Turbines	Model	Hub Height (m)	Rotor Diameter (m)	Tip Height (m)
Turbine 1 – 13	Vestas V105-3.3	77.5	105	130
Turbine 14 - 16	Siemens 93	68.5	93	115

Table 1-1: Nominated Turbine Dimensions

Based on the information available and agreed with SSE, the Vestas V105-3.3 blade, which is 51.5m in length is assessed in this supplementary report, an increase of 0.7m from REpower 3.4M104 assessed in Appendix 12.1: Abnormal Load Route Survey Report. It should be noted that no information has been made available by SSE on the dimensions of the tower components, although those assessed in Appendix 12.1 assessment provide a robust assessment to determine the suitability of the proposed abnormal load transport route. Nevertheless, the blade is the longest component and typically provides the worst case in assessing the horizontal impacts of transporting wind turbine components.

2 Selected Point of Interest Review

2.1 Introduction

As agreed by SSE, revised swept path assessments have been undertaken at a number of points identified from Appendix 12.1: Abnormal Load Route Survey Report as 'higher risk' areas of the proposed delivery route. It was agreed with SSE that, due to a lack of detail currently available from the turbine manufacturer, it was appropriate to use the existing blade/vehicle model (used for the REpower 3.4M104) and extend the dimensions of the load to suit the blade length of the Vestas V105-3.3.

2.2 Swept Path Assessment Results

This supplementary report considers horizontal tracking assessments to determine the additional impact of transporting the revised nominated turbine blade. Summaries of the assessment results are provided in Table 2-1 and the illustrated outputs are provided in Appendix A for review. It should be noted that manual rear wheel steer has been used at certain locations to minimise over-run i.e. widening to accommodate vehicle movements, and to avoid impacting on third-party land and this is highlighted on the Drawings in Appendix A. Where mitigation works are required, these are illustrated on the swept path drawings. The following risk index has been used to quantify the significance of any required improvements and land take at the POI listed in Table 2-1:

- 0: Minimal risk;
- 1 3: Low risk, some road land take with limited modifications to street furniture;
- 4 6: Medium risk with some limited third party land and further investigation required on bridges and other structures;
- 7 9: High risk with extensive third party land, single track roads or major investigation required on structures; and
- 10: Route not feasible.

It should be noted that both sides of the carriageway on the public road network would be required along a significant proportion of the proposed delivery route due to the load and vehicle dimensions and the configuration of the loads on the vehicles. This would be particularly true at bends in the road. Therefore, appropriate traffic management would be required.

The drawings in Appendix A illustrate the results of the swept path assessment of the revised model compared against the assessment included in Appendix 12.1: Abnormal Load Route Survey Report. The drawings are for information only and should not be scaled from. The colours provided on the swept paths are as follows:

- green: body swept path (vehicle/trailer outline);
- red: wheel swept path; and
- magenta: load swept path.

2.3 Swept Path Comments

It is important to note that the swept path assessments undertaken have been based on the data currently available i.e.:

- Ordnance Survey Mastermap data; and
- Topographical data plans, provided by SSE that include the widening areas associated with the existing Gordonbush Wind Farm, for the part of the route from the A9 (T) to the site entrance access.

This information has been used as the basis of the swept path assessment undertaken for this study. It has been noted whilst undertaking the assessment that widening that was evident during the site visit does not always match with the widening illustrated on the plans provided. Therefore, the further assessment of the route should aim to confirm what widening has already been undertaken either by providing as-built drawings or undertaking further topographical surveys. Also, any areas of the original widening that this assessment uses will need to be assessed for strengthening and/or reconstruction prior to the delivery of the assessed loads.

It should also be noted that as a haulier has not been chosen to deliver the proposed abnormal loads, any alterations to the load or vehicle details considered as part of this assessment will invalidate the assessment results. The swept path assessments are based on a computer model of the likely vehicles and configurations that may be used, which also build in a degree of safety margin that tends to provide a conservative estimate of the required area. Engineering judgement has been used to determine the best path for the vehicles to take and the model has replicated this. However, what may have been achieved on the desktop review may not necessarily be replicated precisely in reality. Consequently, it is recommended that a trial run must be undertaken before the delivery of actual components to confirm the findings of this and any future model based study.

Reference should be made to Appendix 12.1: Abnormal Load Route Survey Report regarding: Future Works; Height Restrictions; tasks to complete prior to delivery of turbine components; the site entrance location and details; recommendations on traffic management measures; and recommendations on further work.

CH2MHILL.

Table 2-1: POI Summary



Doc No 1 Rev: Date: June 2015







OSGR: 285270,908764

Left-hand Bend/Oldtown Bridge

Similar area of widening and over-sail areas required when compared with the original assessment from the initial assessment.

The widening will be additional to accommodate estimated over-run and over-sail beyond that already undertaken for the original Gordonbush development. Considerable excavation will be required.

Note, manual rear-wheel steering has been modelled.

Risk = 6, Medium Risk

See Drawing 652994/AA.00.01 - 86

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3 Summary

3.1 Background

Following the production of Appendix 12.1: Abnormal Load Route Survey Report, supplementary swept path assessments were required to take account of changes to the nominated turbines. As instructed by SSE, revised swept path assessments have been undertaken at a number of points identified as 'higher risk' areas of the proposed delivery route as outlined in Appendix 12.1.

3.2 Route Review

The assessment undertaken at the agreed selected locations estimates that careful manoeuvring will be required with some mitigation necessary to accommodate the anticipated blade load movements at a number of locations. The additional length of the revised blade has not revealed issues that may cause the transportation of the turbines to become unviable, when compared with the assessment undertaken in Appendix 12.1: Abnormal Load Route Survey Report. It should be noted that this is a desk based assessment. It should be noted that no details on the tower components was available and has not been assessed. However, the blade is the longest component and typically provides the worst case in assessing the horizontal impacts of transporting wind turbine components.

The extent of the required improvement works, based on horizontal tracking assessments, have been identified and these are provided for guidance for the client group's civil engineers and quantity surveyors to review for engineering feasibility and cost review.

It is the responsibility of the wind farm Applicant to ensure that the access route from the POE to the site is fit for purpose and that appropriate consideration for all road users has been made in accordance with the relevant health and safety legislation and ruling transport requirements.

Appendix A – Swept Path Assessment Drawings

Appendix A – Swept Path Assessment Drawings







Existing Road
Previous Widening
Load Envelope
Vehicle Body Envelope
Vehicle Wheel Base
Tower Rear Wheel Steering
Blade Rear Wheel Steering
Tower Over-sail Area Highlight
Vehicle Overun Within Highways
Notes:
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Client
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GORDONBUSH EXTENSION
WIND FARM
ROUTE SURVEY
POI 45, 51.5m BLADE
Drawn by: BT Date: 23/02/15
Checked by: AK Date: 23/02/15 Approved by: JP Date: 23/02/15
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