Glenurquhart & Strathglass Wind Energy Project

Section 6D

Carbon Balance Calculations

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Carbon Balance Calculation

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1 Introduction

1.1 A wind energy project is proposed for a moorland plateau between Cannich and Drumnadrochit near Inverness. The project consists of five wind turbines, an upgraded access track and a switchgear building, all to be owned by local companies.

1.2 As part of the planning process, a carbon balance calculation has been completed, relating to the possible release of carbon from the construction of the roads and foundations, compared with the carbon benefits of a renewable energy project.

1.3 The site and route of the access track have been surveyed as part of the project ecological assessment, with any necessary changes noted and mapped. The project layout has evolved over the assessment period, and as the project has been designed to have minimum ecological impact, care has been taken to avoid areas of sensitive habitats.

1.4 The project has evolved to take into account ground conditions. A walkover survey was completed, identifying any significant peat deposits, with particular care taken to avoid areas of peat or blanket bog, with the project infrastructure positioned in an area away from deep peat or bog; Figures 1 and 2.

2 Carbon impact of access tracks

2.1 The maximum volume of peat and topsoil that could be disturbed is approximately 5000 m^3, consisting of area taken up by the new access track and the hard standing areas. The carbon content of peaty soils has been discussed by Chapman et al, and for the Glenurquhart & Strathglass assessment a figure of 0.069 tonnes of carbon per cubic metre of peat has been used; the carbon content of this volume of peat is estimated to be 345 tonnes.

2.2 The **carbon emission** factor of grid electricity is 0.117 T/MWh, and five 2MW wind turbines in this area provides 25,000 MWh per annum; 68 MWh per day. This is a positive carbon balance of 8 T per day, assuming a mixture of conventional generation is displaced Carbon Trust; a maximum of 44 days of generation at average levels are required to compensate for the potential carbon released from the soil.

2.3 The construction process will retain the integrity of the soil systems to avoid release of carbon, and it is intended that all excavated peat will be reused in other parts of the site, backfilling the borrowpits to create peatbog; actual carbon loss is predicted to be minimal.

3 Carbon impact of foundations

3.1 The foundation manufacturing process will require approximately 1,100 m^3 of concrete, or 140 mixer loads. It is recognised that the production of concrete is responsible for the emission of CO_2, from both the energy required and from the calcining of limestone when producing cement; 1,100 m^3 of concrete requires 500 T of cement, and assuming 1.25T of CO_2 per tonne, IPCC Working Group II, p661, 625 T of CO_2 would be emitted.

3.2 Using a **CO_2 avoidance** factor of 0.43T CO_2/MWh, five 2MW wind turbines produce 25,000 MWh per annum, providing a positive CO_2 balance of 10,750 T each year, or 29 T per day, assuming a mixture of conventional generation is displaced; 21 days of wind-powered electricity generation at average levels are required to compensate for the carbon emissions from the concrete in the foundations.

References

The Carbon Trust. *Guidelines on measuring carbon and CO_2 emissions from electricity.* http://www.thecarbontrust.co.uk/carbontrust/low_carbon_tech/dlct2_1_6.html

Chapman, S.J., Towers, W., Williams, B.L., Coull, M.C., Paterson, E. (2001) *Review of the Contribution to Climate Change of Organic Soils Under Different Land Uses.* Scottish Government Central Research Unit.

Figure 1; Site Peat Depths

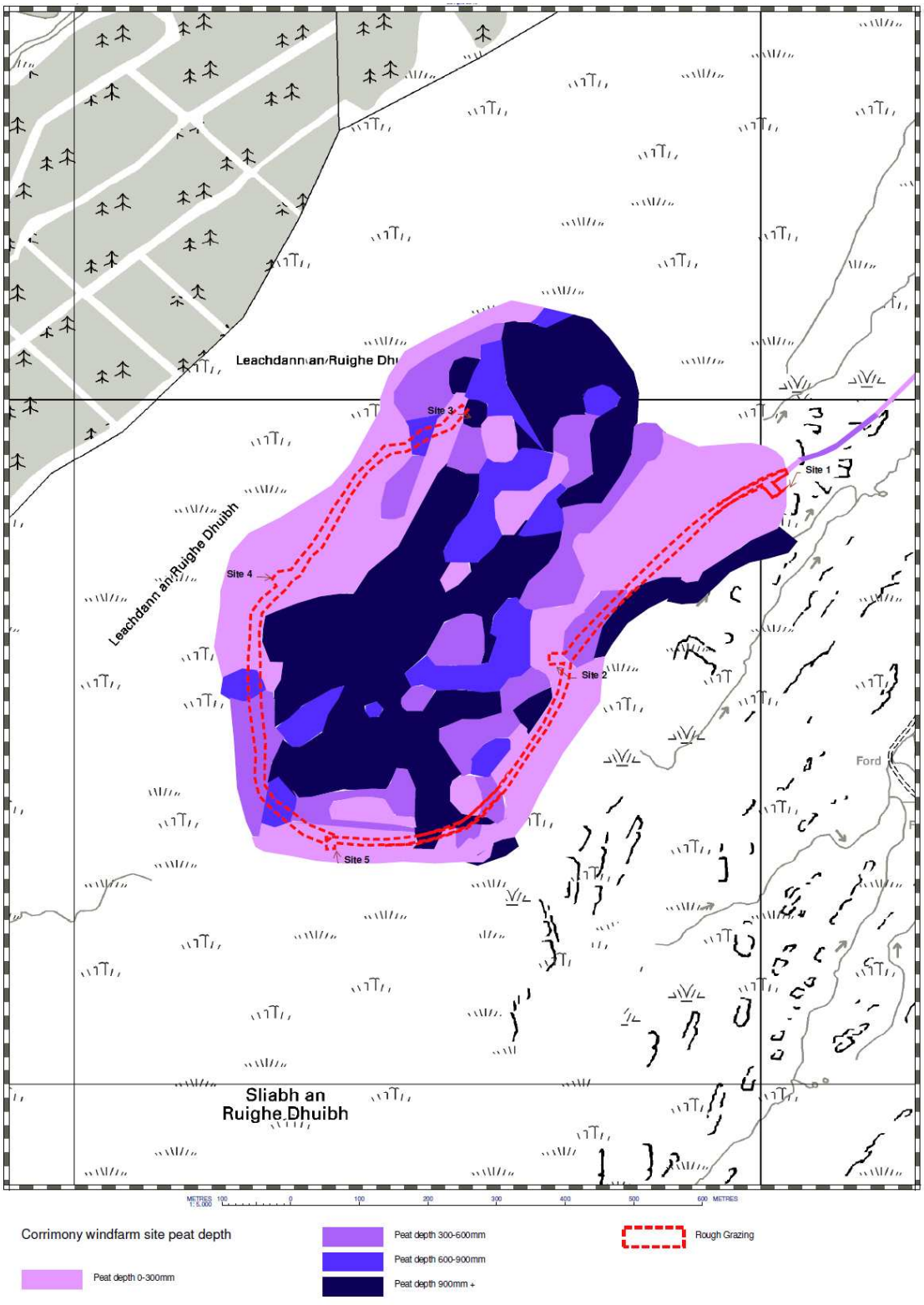

Figure 2; Track Peat Depths