

2010

Erosion of blanket bog within the site proposed for the Viking Windfarm: Field Visit Report



Dr Richard V. Birnie

Macaulay Scientific Consulting Ltd

5/3/2010

Erosion of blanket bog within the site proposed for the Viking Windfarm

Field Visit Report

Purpose

This report provides observations relating to the condition of the blanket bog within the proposed Viking Windfarm site. These are related to the present condition of the blanket bog, particularly the extent of active erosional features, and the implications of this to the revised calculation of the carbon payback periods associated with the windfarm development.

There are 14 observations in total.

The first 8 of these are specific to the technical remit of this consultancy. There are two main concerns raised: 1) about how the Viking Windfarm site is defined for the purposes of the carbon payback calculations and 2) how the areas of bare peat are measured and incorporated into the payback calculations.

Another 6 observations are made which, although not specific to the technical brief, may be of some value to the Viking Energy team as they consider the site works and particularly how the peat surfaces will be managed, and also to how the team develops and disseminates the addendum documentation.

Context

Viking Energy's application for consent for the Viking Windfarm, under Section 36 of the Electricity Act, was submitted in May 2009.

Since then a number of representations, including objections, have been received from various statutory and non-statutory bodies (e.g. SNH, RSPB and SEPA). Viking Energy decided that, in order to address these issues adequately, a process of engagement with consultees should be undertaken with a view to dealing with as many of them as possible. The addendum document will reflect this process of engagement by submitting its results as additional information into the planning process.

Shetland Islands Council's Planning Officers have delayed the Council's planning consideration of the project so that the Council, as a principal statutory consultee, can take cognisance of its outcomes in making a recommendation to Scottish Ministers.

The primary issues which are being addressed by the addendum process include birds, landscape and visual impact, peat habitat (including handling and storage of

excavated peat) and the project's carbon payback calculations. The process will include a number of recalculations to key figures, possible turbine deletions or movements, and an extension of the compensatory habitat management plan to extend to the whole geographical area of Shetland, rather than being restricted to the wider windfarm development site as contained in the original proposals.

Brief

For the purposes of this consultancy Viking Energy has asked Macaulay Scientific Consulting Ltd for:

1. A peer review of the relevant sections of the addendum documentation once these are to hand. The full extent and detail of that work is not yet known, as it is still work in progress, but it is expected to be significantly less than the volume of work contained in the already submitted ES documentation.
2. Engagement with their lead ecologist and their consultant tasked with recalculating the windfarm project's carbon payback calculations to ensure that the final figures are as robust as possible.

This field visit report relates to Task 2.

Field Visit

Dr Richard Birnie (Macaulay Scientific Consulting Ltd) and Dr Peter Cosgrove (Principal Ecologist, Alba Ecology Ltd), lead ecologist to Viking Energy, visited sites within the area of the proposed Viking Windfarm together over Friday 30th April and Saturday 1st May 2010. Dr Birnie also visited the Mid Kame part of the site on Sunday 2nd May. The main purposes for these visits were for:

- Dr Cosgrove to brief Dr Birnie on the general environmental context of the Viking Windfarm site.
- Dr Cosgrove to brief Dr Birnie on both the avian and non-avian aspects of the proposed Habitat Management Plan for the Nesting quadrant.
- Dr Birnie to re-familiarise himself with blanket bog sites around Petta Dale, which he had studied previously, and to generally familiarise himself with the other areas of blanket bog within the site that he had not previously visited.
- Dr Birnie to brief Dr Cosgrove on the processes associated with, and the extent of, blanket peat erosion in these areas.

(See Appendix 1 for the field visit itinerary)

Observations Relating to Technical Remit

1. Previous research has shown that the vegetation over much of the blanket bog in Shetland has been modified, primarily through the long-term effects of sheep grazing (Birnie and Hulme, 1990; Hulme, 1985; Hulme and Birnie, 1997). This research included the area of the proposed Viking Windfarm.
2. Peat erosion is widespread, with extensive areas of bare peat surfaces especially in the Nesting quadrant.
3. Because the vegetation community of the blanket bog has been modified, typically showing declines in key species like heather (*Calluna vulgaris*), and

there is extensive erosion, it would not be considered to be in favourable condition. It would therefore be inappropriate to describe the blanket bog within the Viking Windfarm site as being entirely “pristine”.

4. Losses of peat from bare peat surfaces have been directly measured at a site on Mid Kame to the west of Petta Water. The annual losses were found to be in the range 10-40 mm (Birnie, 1993). This range of values is similar to the annual losses measured at other UK peatland erosion sites (see Table 3.1, Evans and Warburton, 2007).
5. There is little evidence of vegetation re-colonising actively eroding bare peat surfaces where there continues to be sheep grazing at relatively high stocking densities. Therefore these surfaces tend to be persistent features once they have developed in the blanket bog system. As a guide, the annual erosion rate figures suggest that for a site with 2m of peat it will take between 50-200 years for the full depth of the peat to be eroded.
6. Approximately 50% of the organic matter in peat is carbon. Therefore peat erosion is potentially a significant negative contribution to the site’s carbon budget.
7. Because active peat erosion is present over much of the proposed Viking Windfarm site, it is essential that eroding peat is accounted for in any revision of the carbon payback calculations.
8. There are two particular concerns in relation to the extent of eroding peat surfaces within the Viking Windfarm site and any revisions of the carbon payback calculations:
 - **DEFINITION OF THE WINDFARM SITE:** if the Viking Windfarm site is narrowly defined as comprising only that area immediately impacted by the turbines and their associated tracks (possibly of the order of 200-300ha), then including the eroding peat within this footprint is likely to reduce the estimated carbon payback period. However, such a narrow definition of the site denies the fact that the windfarm will be located within a wider area that is actively losing carbon through continued peat erosion. Alternatively, if the Viking Windfarm site is considered to comprise the whole environmental study area (i.e. that area within the red line planning boundary of approximately 90km²), then this area is already a significant source of carbon simply because of the extent of active peat erosion. This negative baseline situation could be considerably improved if the building of the Viking Windfarm is achieved through disciplined and/or strictly conditioned development procedures, accompanied by well defined and long term management prescriptions applying to the wider site. The latter could be aimed at reducing existing carbon losses on existing eroding peat areas and increasing carbon capture on intact blanket bog areas, with the Colla Firth quadrant possibly being a candidate for this. In either case, these

would involve negotiating reductions in grazing pressure through lowering effective sheep stocking densities across the site and/or changing seasonal grazing patterns. The grazing and other impacts of wild, non-native herbivore populations, especially those of rabbits and mountain hares, will also need to be considered.

- **MEASUREMENT OF THE AREA OF BARE PEAT:** if the site is narrowly defined then it is my understanding that there are data available from Highland Ecology on peat condition along all the track corridors (note that these data will be affected by revisions in layout). If the site is more widely defined, then there is a need to provide a measure of the extent of bare peat across the entire site. Because there are aerial photographs available covering the whole site (as far as we understand this), then this is a relatively straightforward task using digital images and image classification software like Definiens. Even if the site is narrowly defined, it is recommended that the carbon payback calculations are done for both definitions of the site. This is of potential value both in terms of providing robust calculations and for providing a baseline against which future changes might be monitored.

General Observations relating to site works

9. There is an existing literature on peatland restoration techniques (see for example Brooks and Stoneman, 1997) and more recent experience in the Pennines and in the Flow Country of Caithness at Forsinard. Whilst this experience is not associated with windfarm sites it does relate to the restoration of degraded blanket bogs and is therefore likely to be of some relevance to the Viking Windfarm site. The site team and contractors should be aware of this experience and how it might be applied in the Shetland context.
10. Whilst some of these restoration techniques are concerned with stabilisation of bare peat surfaces using, for example geo-textiles and mulches, others are concerned with re-establishing the peat hydrology including blocking drainage ditches to encourage growth of sphagnum moss. Whilst such micro-site management would be impractical over extensive areas, it could be possible around the turbine sites and along the tracks, particularly where small machines are available. There is good evidence from the central section of the Mid Kame site that even on such exposed ridges there is potential for sphagnum growth where ponds are created.
11. Peatland is a living system and a healthy vegetation cover is the key to its stability. Where peat has to be removed, there will be opportunities to

transplant the vegetated peat turf into adjacent eroded peat systems. This will have to be done in a sensitive way, avoiding prolonged storage and/or the turf drying out, and strategically placing it so as to create dams that will hold up and/or slow down surface runoff. If this is done well then the track works could have some positive impacts on the surrounding peatland hydrology. The Viking Windfarm site could become a demonstration site for such techniques.

General Observations relating to public perception

12. MANAGING PUBLIC PERCEPTIONS. One of the concerns relayed to me was that the Viking Windfarm site was generally perceived to be “pristine blanket bog”. Clearly this is not the case especially in the Nesting quadrant although there are areas of intact blanket bog especially in the Colla Firth quadrant. One possible way of dealing with this misconception is to arrange for a public site visit which could also be an opportunity to introduce some of the positive initiatives in the Habitat Management Plan.

13. PRESENTING THE ADDENDUM. From my perspective, the changes from between the original plan and the one that will be presented, clearly demonstrate that Viking Energy has been both sensitive to objections and responsive to them. It is essential that this is highlighted in the narrative that accompanies the new plans by a) stating the changes in turbine locations and tracks (quadrant by quadrant) and b) providing brief explanations of why they have been made (e.g. because of potential impacts on peat habitat, birds, aircraft etc.). This is a very positive feature and deserves to be well recognised by all the members of the Viking Energy team, the objectors and the wider public. If this narrative is written before the addendum is drafted then the authors of the individual sections can link their text to it. This will give a much more “joined-up” feel to the addendum, something that appears to be missing from the original ES.

References

- Birnie, R.V. (1993). Erosion rates on bare peat surfaces in Shetland. *Scottish Geographical Magazine*, **108**: 12-17.
- Birnie, R.V. and Hulme, P.D. (1990). Overgrazing of peatland vegetation in Shetland. *Scottish Geographical Magazine*, **106**: 28-36.
- Brooks S. and Stoneman, R. (1997). *Conserving bogs: the management handbook*. The Stationery Office Ltd, Edinburgh.
- Evans, M. and Warburton, J. (2007). *Geomorphology of upland peat: erosion, form and landscape change*. Blackwell Publishing Ltd
- Hulme, P.D. (1985). The peatland vegetation of the Isle of Lewis and Harris and the Shetland Islands. *Aquilo Seria Botanico*, **21**: 81-85
- Hulme, P.D. and Birnie, R.V. (1997). Grazing induced degradation of blanket mire: its measurement and management. In: proceedings of conference on "Blanket mire degradation: causes, consequences and challenges" (ed. by J.H. Tallis, R. Meade, and P.D. Hulme), University of Manchester, 9-11 April. Mires Research Group, British Ecological Society, 163-173.

Appendix 1: Field visit itinerary

Over the three days all four quadrants of the proposed windfarm site were visited as follows:

1) Friday 30th April:

Nesting Quadrant

- (on foot) from Petta Dale eastwards over East Kame, over Moo Field and Hill of Flamister, returning westwards towards and over Hoo Kame back into Petta Dale (western side of Nesting quadrant and area to be covered by proposed Habitat Management Plan).
- (by car) north on A970 to Voe; east on B9701 to Laxo, south on B9075 through North and South Nesting to Catfirth.

2) Saturday 1st May:

Colla Firth Quadrant

- (by car/foot) access track from minor road to Collafirth to former HEB aerogenerator site on Hill of Susetter.

Delting Quadrant

- (by car) A968 to Mossbank, B9076 to Brae.
- (by car/foot) from A970 peat track to Wethersta common grazings.

Kergord Quadrant

- (by foot) from B9071 above Setter onto Marro Field and West Kame and returning along same line.
- (by car) by continuing south along B9071 to Aith and returning along A971 to Weisdale.

3) Sunday 2nd May

Kergord Quadrant

- (on foot) from Petta Dale westwards onto Mid Kame and southwards along ridge.

Note: Drs Cosgrove and Birnie visited all the sites together on the first two days. Dr Birnie visited the Mid Kame site on the third day.