PEAT LANDSLIDE HAZARD RISK ASSESSMENT

Craiginmoddie WF

STAGE 3 CHECKING REPORT

Scottish Government
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ENERGY CONSENTS UNIT

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Contents

History/ Stage

This document has been prepared to audit Peat Landslide and Hazard Risk Assessments on behalf of the Scottish Government Energy Consents Units.

The Stage of the Checking Point and history of the document is as follows:

Stage	Date	Description	Author	Checked/ Approved
1	May 2021	Checking report for Developer's PLHRA	Anna Wright, MEng (Hons), GMICE	Mark Chapman, BSc, MSc, CEng, MICE
2	September 2021	Stage 2 Audit of Developer's Response	Anna Wright, MEng (Hons), GMICE	Nick Matheson, BSc, FGS, CGeol, Principal
3	February 2022	Stage 3 Audit of Developer's Response	Anna Wright, MEng (Hons), GMICE	Nick Matheson, BSc, FGS, CGeol, Principal

1.0 INTRODUCTION

1.1 Context to Report

The Scottish Government Energy Consents Unit is responsible for processing applications under sections 36 and 37 of the Electricity Act 1989 to develop electricity generation projects and overhead electric lines. In addition, under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Scottish Ministers are required to consider the environmental impacts of the proposal. EIA Development applications are therefore required to be supported by EIA Reports, which include site-specific information and survey details in respect of the risk of peat landslide events for elements of the proposal and its infrastructure (i.e. construction of roads, access, tracks, wind turbine foundations etc).

The Energy Consents Unit commissioned Ironside Farrar Ltd to technically assess the Peat Landslide Hazard and Risk Assessment(s) (PLHRAs) submitted by developers.

This Stage 3 Checking Report will consider whether or not responses received from Developers to Stage 2 Checking Report Recommendations adequately address the issues raised.

The checking report will provide a summary of findings and recommendations and the Energy Consents Unit will issue a copy to the development in accordance with the requirements of the Best Practice Guide (Scottish Government, 2017).

1.2 Audit Methodology

This audit primarily reviews the information submitted by the developer against the guidance provided in:

- Peat Landslide Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, Energy Consents Unit Scottish Government, Second Edition, April 2017.

1.3 Documents Reviews

The documents reviewed as part of this audit were:

Stage 1 Audit:

- Craiginmoddie Wind Farm, Environmental Impact Assessment Report, Technical Appendix 12.3 Peat Stability Risk Assessment, Natural Power Dec 2020
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report, Technical Appendix 12.2 Peat Management Plan, Natural Power, Dec 2020 Ref 1239594
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Chapter 3 Project Description and Construction Methods, EnergieKontor UK Ltd, Dec 2020
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Chapter 7 Cultural Heritage and Archaeology, Wood, Dec 2020
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Chapter 12 Hydrology, Hydrogeology and Geology, Natural Power Dec 2020
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Technical Appendix 9.1: Phase 1, NVC & GWDTE, Gavia Environmental, Dec 2020
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 1.1 Site Location Plan
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 3.1 Offsite Access Track

- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 6.3 Topography
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 7.1 Designated Assets
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 7.2 Non Designated Assets
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 9.1 – 9.7 Ecology
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figures 12.1 – 12.8
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 13.1 Area to be Felled
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 13.2 Indicated Wider Area to be Felled (Wind Blow)
- Craiginmoddie Wind Farm, Environmental Impact Assessment Report Figure 14.2 Potential Recreational Access Opportunities
- Scoping Responses
- Google Earth was reviewed for general context.

Stage 2 Audit:

- Natural Power Memorandum, Craiginmoddie Wind Farm, Developer Response to Peat Slide Risk Assessment Stage 1 Checking Report, May 2021, Ref 1251682

Stage 3 Audit:

- Additional Information – Main Report, Craiginmoddie Wind Farm, EnergieKontor UK Ltd, October 2021
- Additional Information – Appendix 5 Other Matters, Craiginmoddie Wind Farm, EnergieKontor UK Ltd, August 2021

2.0 STAGE 2 CHECKING REPORT

The following table comprises an abridged version of the Stage 2 Checking Report, with the items which required a response from the Developer:

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
3	"The Guidance notes the Phase 1 grid should be supplemented with significant additional probing at infrastructure and along tracks. Additional probing has only been carried out at targeted turbine and access track locations. Probing as per SNH guidance should be undertaken at infrastructure locations or, if not possible for any reason, detailed clarification provided together with implications for the risk assessment and proposals to obtain the information."	The peat survey phase followed the principles of the Peatland Survey Guidance, SNH, SEPA (2017). The central guidance being to target the peat surveys across areas of greatest potential impact. In line with the PHLRA Guidance: "Mapping of peat geomorphology (including landslides and erosion), hydrology (natural drainage features), land-use (forestry, artificial drainage) and any other pertinent factors can be undertaken in GIS in order to inform subsequent site visits and the scope of detailed peat probing work." This process was followed therefore made to predefine the peat probing survey to account for safe access provision and presence of peat soils. Natural Power considers the frequency and density of peat probe data sufficient to inform a robust peat stability assessment.	The Peatland Survey Guidance Table 2 – Further Assessment of Peatland Extent and Conditions then confirms that: *Targeted sampling regime tailored to potential development areas within the proposal boundary. Sampling should focus on areas of greatest potential impact from development including: full targeted probing along all tracks, at all turbines/hard standings, turning points and passing places, site compounds, substation, borrow pits and met mast locations.* Appropriate resolutions are then provided. ECUBPG notes *The Scottish Government (Scottish Government et al., 2014) provide information on the level of detail expected for site investigations on peatlands, which suggests both a site-wide density of approximately one probe per 100m (or one probe per hectare) supplemented with significant additional probing at infrastructure and along tracks.* ECUBPG notes "In general terms, sufficient sampling locations should have been investigated to produce an outline map of variability in peat depth across the development site (to inform layout iterations)." It is noted that in particular peat >0.5m is recorded within 100m of Turbines 3, 5, 9, 10, 11 and associated crane pads and the borrow pit near Turbine 10. It is also not clear what additional probing was carried out at the proposed construction compound and substation. Also along the access tracks between Site Entrance-T1, vicinity of T3, T3-T5, T5-T6, east of T9, T11-T14 and T12-T13.	As per ECUBPG significant additional probing over and above the Phase 1 grid is required at infrastructure locations. Peatland Survey Guidance provides appropriate probing density backed by the clear requirements of the ECUBPG. Additional probing is required in line with guidance.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
21	"The main on-site access track passes through an area of Medium risk and should be included in Table 4.9 or justification for its exclusion provided."	The main entrance track traverses generally peaty soils or shallow peat. The section in question is associated with a watercourse crossing. The zone of elevated risk is confined to a small area around a watercourse crossing point. Natural Power would therefore justify its absence from Table 4.9 with the fact that this scenario is attributed the following control measures at Section 4.34: Detailed engineering design incorporating watercourse protection measures, slope stabilisation and micro-siting of the routes. Designs to be fully defined as part of the construction environmental management plan and detailed civil infrastructure design. The peat slide risk assessment report should be reviewed as part of the pre-construction design phase. The larger (more significant) areas of increased risk were thus elevated to Table 4.9 for further discussion and attribution of more targeted control measures. Natural Power considers there be suitable risk assessment of the main access track within the existing report.	Comparison of the peat depth map and the peat slide risk map suggests this zone of higher risk corresponds with peat probes recording 1.9m, 1.6 and 0.8m of peat and therefore it is not accepted that this section of the track traverses generally peaty soils and shallow peat and should be assessed specifically to ensure it is appropriately picked up in subsequent reporting and planning.	Include the Section of access track within Table 4.9.

3.0 STAGE 3 CHECKING REPORT

The following table comprises a review of the Developer's response.

Infrastructure Areas Identified for Additional Probing	Justification / Comments on Probe Coverage	Stage 3 Checking Report Comment	Recommendations
T3	*Dense forestry stands prevented wider probing coverage. Suggest additional Investigation is included as part of planning condition post felling.*	Note dense forestry is present however this has not prevented detailed probing at other turbine locations. It is noted that if deeper peat was encountered this has the potential to increase the risk ranking to Medium. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECBPG – options for additional probing to be reviewed.
T5	*Infrastructure location is not sited on peat / peatland as demonstrated via 100m probes, visual reconnaissance and this is already confirmed within the peat slide risk assessment report.*	Agree most probes within nearby grid are <0.5m, but probes measuring 0.5-0.7m are also in the vicinity. Turbine 5 located within Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. If standard Environmental & Infrastructure impact score used (ie 1, not 0.5) then, if encountered, deeper peat (1-2m) could increase risk ranking to Medium. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
T9	*Detailed probing undertaken at original location with evidence of deep peat prompting micro-siting. Microsite location is on area of level ground. Therefore he addition of peat depth information would not alter the risk category further in in this instance.*	Original PLHRA notes slope is 4 degrees at this location. ECUBPG notes in section 2.1 that bog bursts tend to occur in deeper peat (greater than 1.5m) on shallow slopes (2 to 10 degrees). A probe depth of 1.5 is located immediately adjacent to the infrastructure associated with T9 and peat >1.5m deep is found at the original T9 location, in close proximity. Noted if found, deeper peat would not affect the risk ranking, however ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
T10	*Site reconnaissance, phase 1 grid probing and carbon soils mapping*	Probing within 100m of T10 includes probes of 0.7m and 0.9m.	Not in line with ECUBPB – further probing required.

Infrastructure Areas Identified for Additional Probing	Justification / Comments on Probe Coverage	Stage 3 Checking Report Comment	Recommendations
	Indicated thin peat soils or absent peat.	Noted if found, deeper peat would not affect the risk ranking, however ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	
T11	*Site reconnaissance, phase 1 grid probing and carbon soils mapping indicated thin peat soils or absent peat Further investigations detailed in report included probes and peat cores at this location due to proximity to slope system.*	Probing within 100m of T10 associated infrastructure includes probes of 0.6 and 0.8m. If standard Environmental & Infrastructure impact score used (ie 1, not 0.5) then, if encountered, deeper peat (1-2m) could increase risk ranking to Medium. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
Borrow Pit Near T10	*Detailed probing not extended across an areas which from visual reconnaissance confirmed absent peat and bedrock at or near surface.*	Probes to south of borrow pit suggest this is the case, however Borrow Pit is located within Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. Noted if found, deeper peat would not affect the risk ranking, however ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
Compound	*Area is not located on peat / peatland as demonstrated by 100m probes, visual reconnaissance and confirmed within reporting.*	Probes on / immediately adjacent to compound show peat at 0.6m to 0.9m depth. Compound is located within Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. If deeper peat encountered (>1m) then risk ranking would increase to Medium. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.

Infrastructure Areas Identified for Additional Probing	Justification / Comments on Probe Coverage	Stage 3 Checking Report Comment	Recommendations
Substation	*Dense forestry presented wider proving coverage. Additional detailed probing was gathered commensurate with the practical limits on access into the forestry.*	Probes on / immediately adjacent to substation show peat at 0.6m to 0.8m depth. Access for detailed probing of track, immediately adjacent, appears possible probe mapping results and justification not applied to compound, immediately adjacent. If deeper peat encountered (>1m) then risk ranking would increase to Medium. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk-based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
Track: Site Entrance – T1	*50% of section length is within dense forestry. Open ground section did not require probing as visual reconnaissance was for shallow or absent peat and shallow slope system.*	Slope mapping shows this area to be in yellow/orange/red zones of slope mapping suggesting this is not a shallow slope area. Noted dense forestry issues however this did not prevent probing closer to T1, including detailed probing of the turbine location. Part of this track length traverses Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. Due to assessment style it is not clear how increased peat depth would affect risk ranking. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required or further justification of access/H&S concerns.
Track: Vicinity of T3	*where 100m grid indicated <0.5m probing was curtailed as forestry is dense and terrain steep in this area limiting practical access.*	Noted area is forested however this did not prevent detailed probing elsewhere with aerial photos showing dense forestry across the majority of the site. Also note areas of steep slope, these do not appear to cover the complete footprint of absent probing based on slope mapping. Due to assessment style it is not clear how increased peat depth would affect risk ranking. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required or further justification of access/H&S concerns.

Infrastructure Areas Identified for Additional Probing	Justification / Comments on Probe Coverage	Stage 3 Checking Report Comment	Recommendations
Track: T3 – T5	*Track alignment requisitely follows existing track which through 100m grid probing and visual reconnaissance found not to be on peat / peatland hence detailed probing curtailed.*	Agree track approximately follows existing, making probing access easier. Although generally <0.5m, 100m grid probing records peat probe of 0.6m in proximity. Due to assessment style it is not clear how increased peat depth would affect risk ranking. Part of this track length traverses Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
Track: T5 – T6	*Track alignment requisitely follows existing track which through 100m grid probing and visual reconnaissance found not to be on peat / peatland hence detailed probing curtailed.*	Agree track approximately follows existing, making probing access easier. Although generally <0.5m, 100m grid probing records peat probes of 0.5m in proximity. Part of this track length traverses Class 5 Peatland, in these locations soil information takes precedence over vegetation data as no peatland habitat recorded, therefore visual reconnaissance alone insufficient. Due to assessment style it is not clear how increased peat depth would affect risk ranking. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required.
Track: East of T9	*Detailed probing has been undertaken although data points not visible on PDF map. Confirmation that probes undertaken and incorporated into risk assessment.*	All data should be displayed on mapping to allow thorough understanding and avoid areas of risk being forgotten/missed in future.	No further action.

Infrastructure Areas Identified for Additional Probing	Justification / Comments on Probe Coverage	Stage 3 Checking Report Comment	Recommendations
Track: T11 – T14	*Generally a very challenging access track section in terms of survey access (very steep slopes and dense forestry as explained in reporting). The risk category for this section remains at the highest level as also Is explained in reporting. Additional probing is not practical or beneficial to the assessment at this stage.*	Noted areas of steep slope and forestry across majority of the track. Peat probes record peat 0.6m and 1.5m deep in some locations. Due to assessment style it is not clear how increased peat depth would affect risk ranking. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required or further justification of access/H&S concerns.
Track: T12 – T13	*Dense forestry / access in practical. Suggest additional investigation is included as part of planning condition post felling.*	Noted dense forestry, however detailed probing was possible in vicinity of T12 and T13. Due to assessment style it is not clear how increased peat depth would affect risk ranking. ECBPG is clear that infrastructure locations require significant additional probing, this cannot be optimised/reduced by desk based review – see Section 4.4.2.1.	Not in line with ECUBPB – further probing required or further justification of access/H&S concerns.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Summary Outcome of Checking Report

The following comprises the summary outcome of the Stage 3 checking report:

The Developer's response does not address the queries raised in the Stage 2 Checking Report.

Point 21, regarding inclusion of the main access track, has not been addressed within this response. The Developer was asked to include this within Table 4.9 of the PLHRA or provide justification for its exclusion.

4.2 Recommendations

The infrastructure probing is not in line with ECUBPG, with section 4.4.2.1 noting:

4.4.2.1 Scoping ground investigation

A competent person should be responsible for identifying and justifying the numbers, locations and types of sample collected, and this will depend upon the size and variability of the development site. Grids, transects, random or targeted sampling strategies may be appropriate. In relation to infrastructure, sampling or probing locations should be considered for:

- *All proposed turbine locations, possibly using a gridded sampling approach within the extent of the micro-siting allowance;*
- *Access tracks, with sampling along the centrelines and more widely within the area covered by the micro-siting allowance.*
- *Major areas of hardstandings (e.g. site compounds); and*
- *Borrow pit*

Lack of probing around the turbines is the key concern given these represent the most significant infrastructure requiring peat disturbance.

In some areas dense forestry has been noted as the reason for reduced probing. From aerial photos it is difficult to discern that the forested areas which were subject to successful detailed probing were any less dense than those areas, sometimes adjacent, which were too dense for probing. Additional evidence such as photos would be useful to confirm the inaccessibility / H&S concerns.

Other justification suggests that the Phase 1 Grid and site reconnaissance is sufficient, but this is not in line with clear ECUBPG as above. Additional probing is therefore required.