

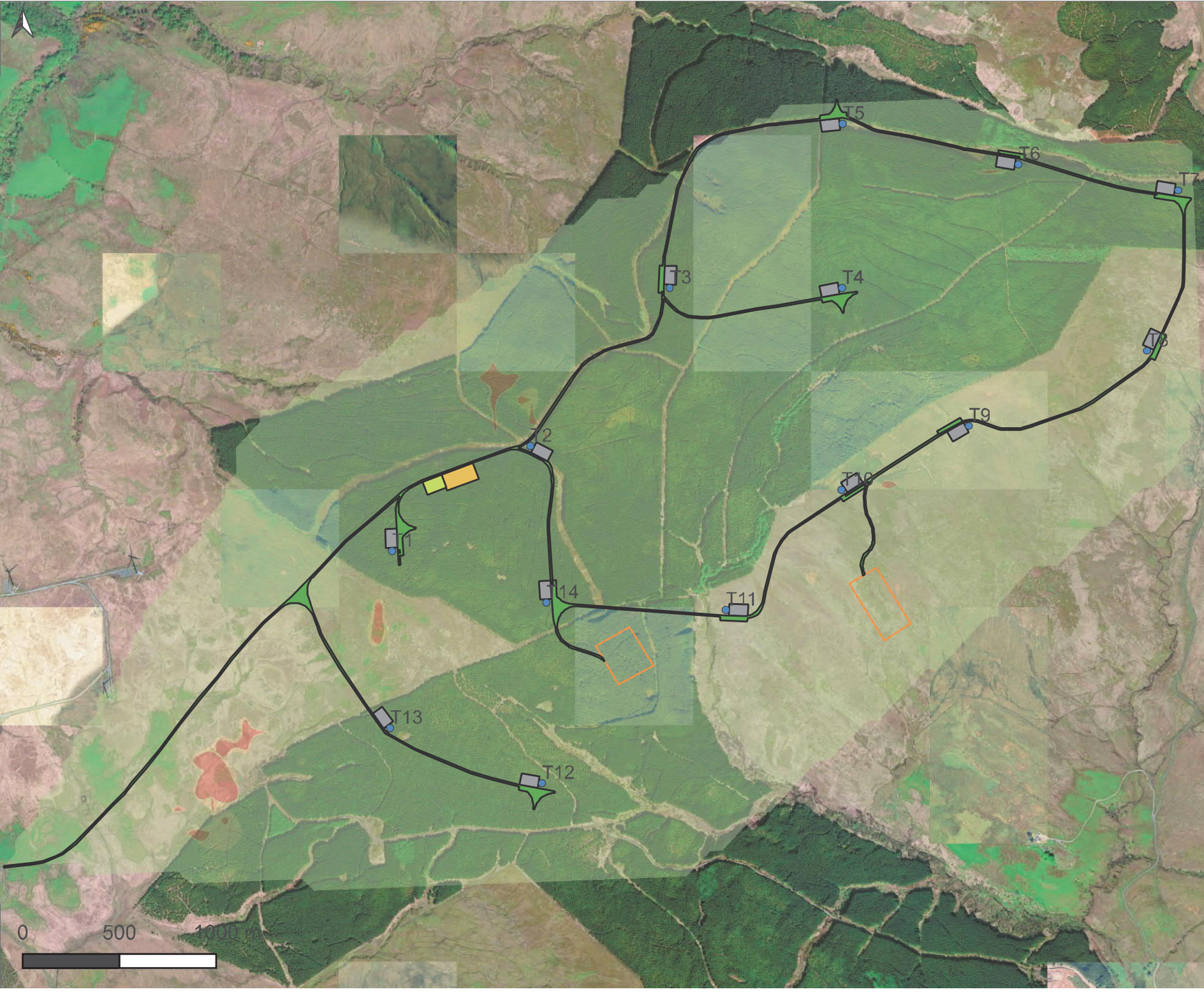
APPENDIX 5 OTHER MATTERS

Appendix 5.1: Peat Slide Risk Assessment (TA 12.3 of Vol III)

- Factor of Safety Map
- Peat Slide Risk Map
- Peat Depth Map
- Slope Angle Map
- Geomorphological Map
- Aerial Photo Map

Appendix 5.2: Ironside Farrar Peat Landslide Hazard Risk Assessment – Stage 2 Checking Report (September 2021)

Appendix 5.3: Ayrshire Rivers Trust consultation and applicant response



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Map Legend:

- FOS: >1.3
- FOS: 1.0-1.3
- FOS: <1.0
- Access Track
- Crane Pad
- Turbine Foundations
- Substation
- Compound
- Crane Pads
- Borrow Pit Search Area

Notes:

Infinite Slope Analysis:
Translational slide sliding model;
Peak Undrained shear strength - 15kPa;
Surface surcharge 20kPa modelled.

Rev	Description	By/Ch	Date
A	First Issue		19/11/20

Status: **First Issue**

Project: **Craiginmoddie Wind Farm**

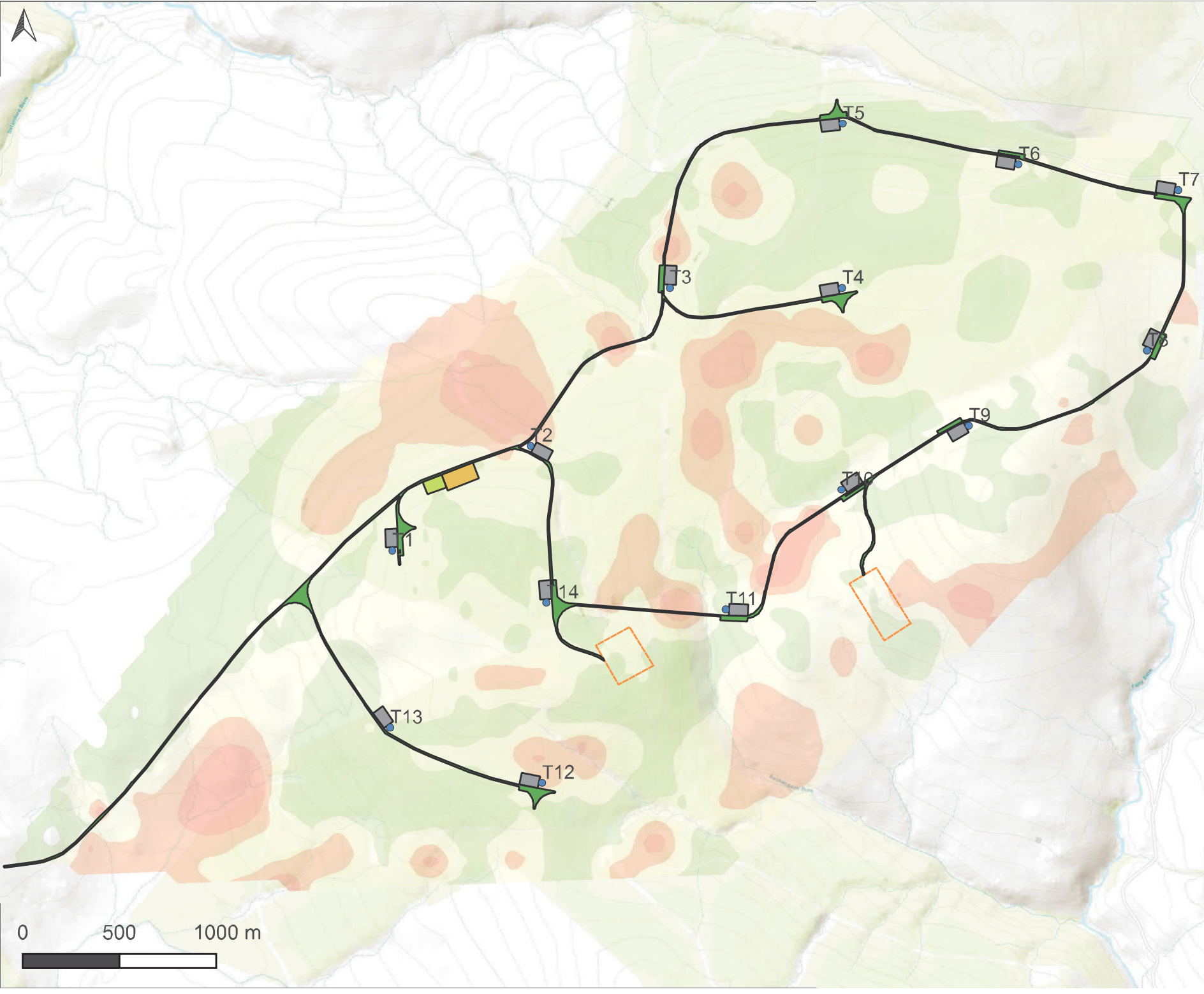
Client: **EnergieKontor**

Drawing Title: **Factor of Safety Map**

Drawn: GG	Checked: CM	Approved: GG
Scale: AS SHOWN @ A3	Date: 19/11/20	

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Drawing No. 14090UKC_PSRA_001	Revision: A
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Map Legend:

High Risk

Medium Risk

Low Risk

Negligible Risk

Notes:

Risk map (pre-mitigation) devised from development survey data:
Peat depth, slope angle and proximity to main watercourse;
Detailed risk assessment for each infrastructure location including infrastructure impact and necessary control measures included in Report: 1238941.

A	First Issue		19/11/20
Rev	Description	By/Ch	Date

Status: **First Issue**

Project: **Craiginmoddie Wind Farm**

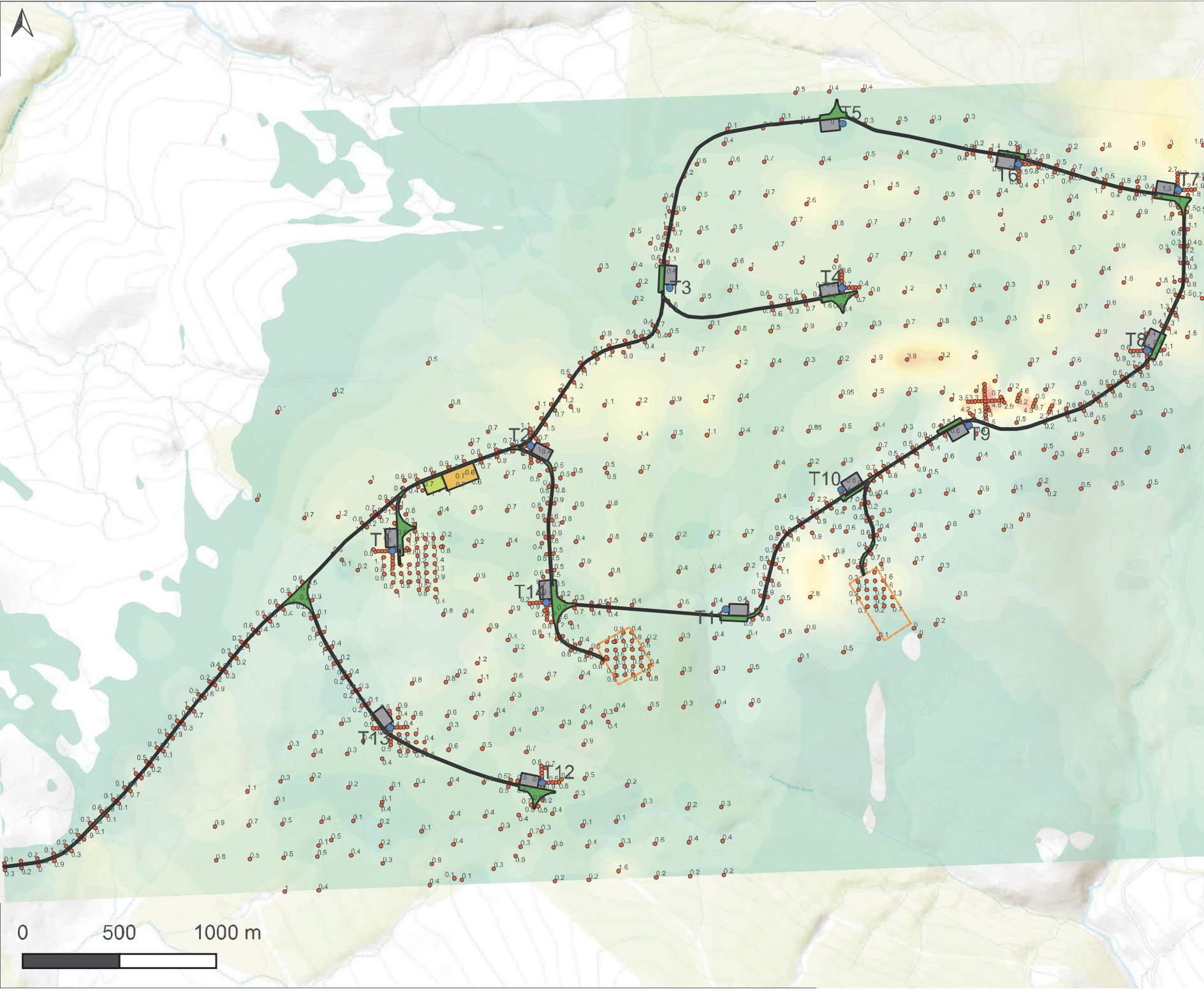
Client: **EnergieKontor**

Drawing Title: **Peat Slide Risk Map**

Drawn: GG	Checked: CM	Approved: GG
Scale: AS SHOWN @ A3	Date: 19/11/20	

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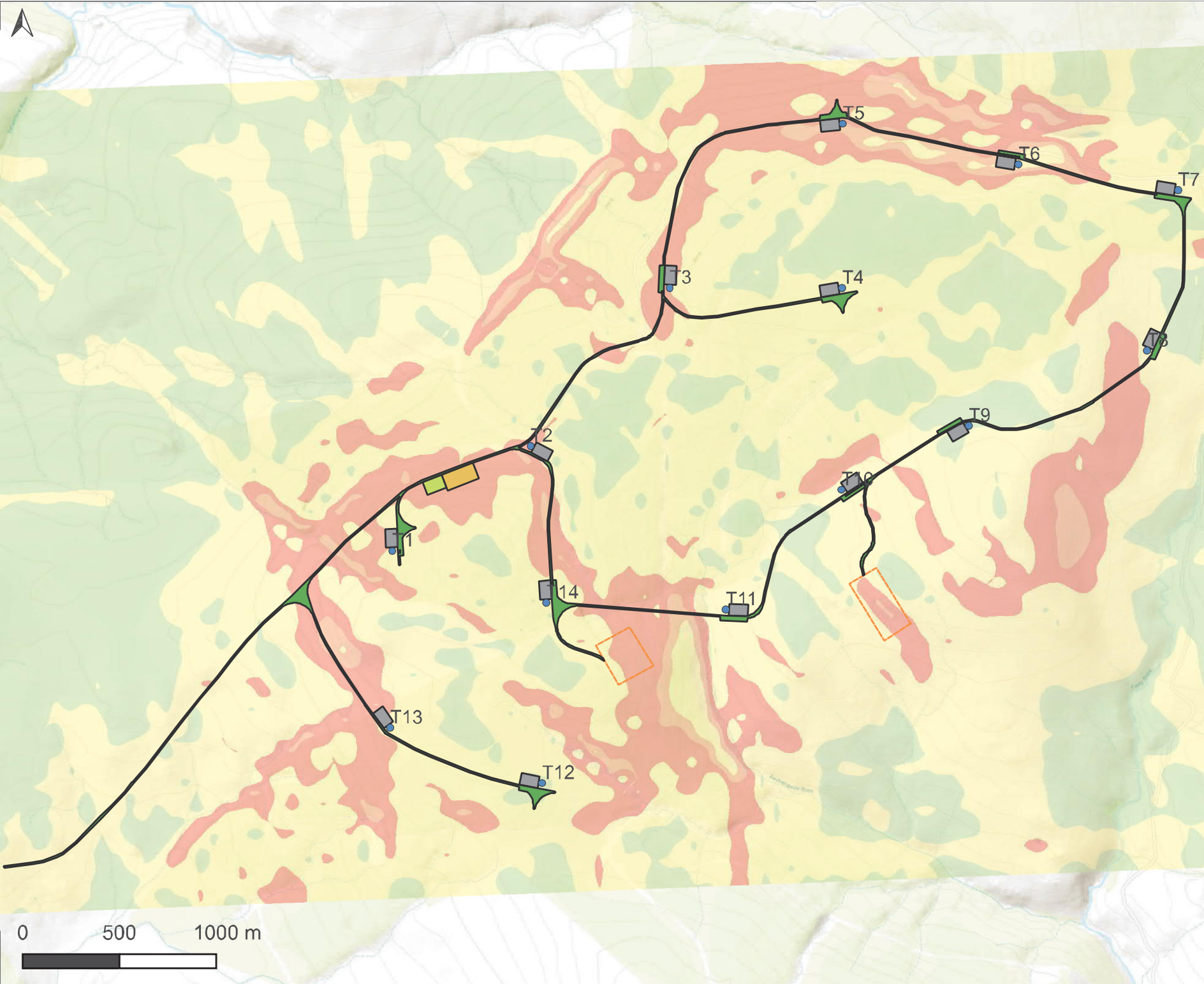
Map Legend:

4.5
4.25
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0

Notes:
Peat Depth Interpolation calculated with kriging method in Surfer version 17.

A	First Issue		19/11/20
Rev	Description	By/Ch	Date
Status: First Issue			
Project: Craiginmoddie Wind Farm			
Client: EnergieKontor			
Drawing Title: Peat Depth Map			
Drawn: GG	Checked: CM	Approved: GG	
Scale: AS SHOWN @ A3		Date: 19/11/20	
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Drawing No. 14090UKC_PSRA_003			Revision: A





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Map Legend:

29deg
28deg
27deg
26deg
25deg
24deg
23deg
22deg
21deg
20deg
19deg
18deg
17deg
16deg
15deg
14deg
13deg
12deg
11deg
10deg
9deg
8deg
7deg
6deg
5deg
4deg
3deg
2deg
1deg
0deg

Notes:
Slope Angle calculations based on aerial photo derived 2m resolution DSM.

A	First Issue		19/11/20
Rev	Description	By/Ch	Date

Status: **First Issue**

Project: **Craiginmoddie Wind Farm**

Client: **EnergieKontor**

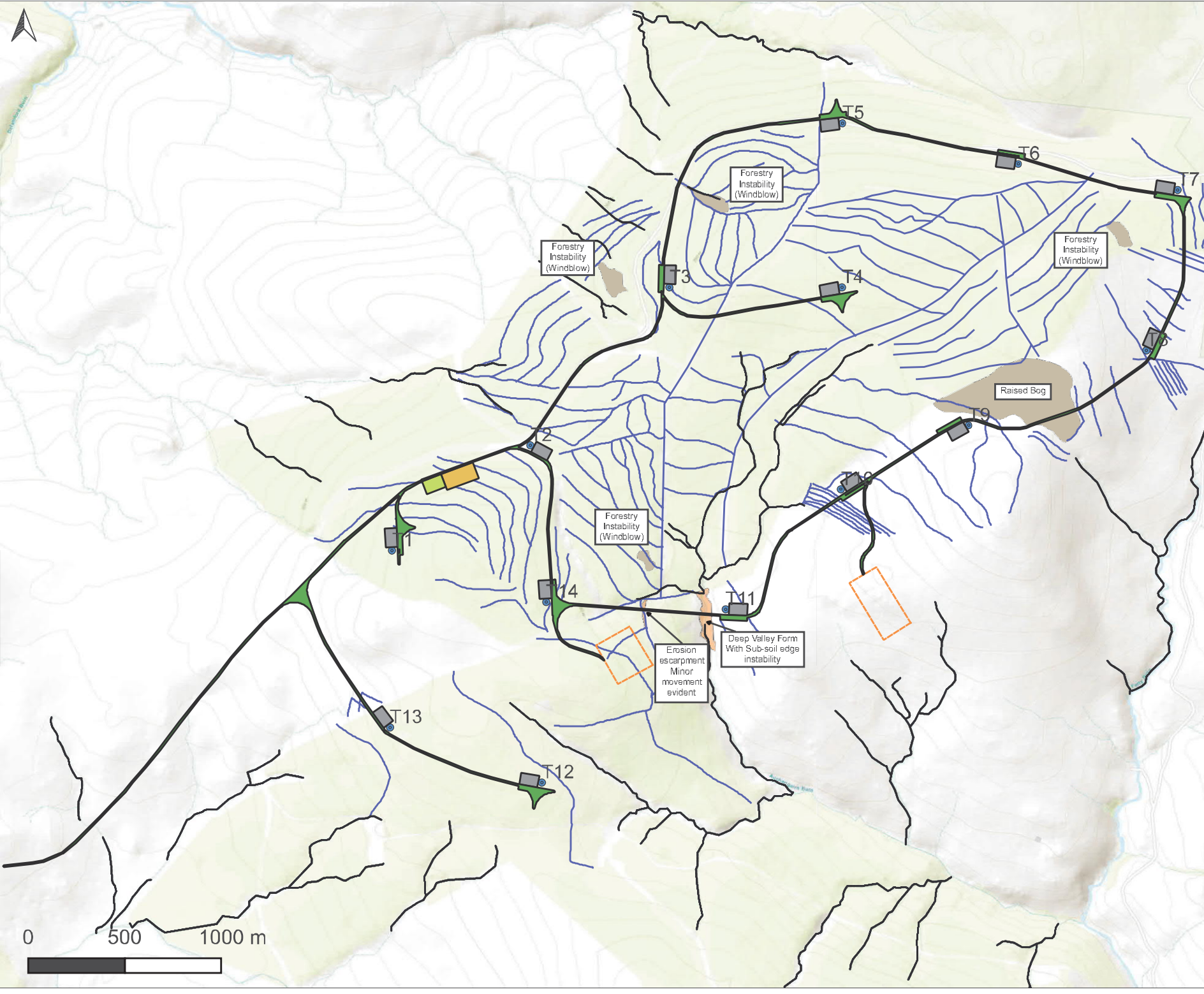
Drawing Title: **Slope Angle Map**

Drawn: GG	Checked: CM	Approved: GG
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Scale: **AS SHOWN @ A3** Date: 19/11/20

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Map Legend:

- Artificial Drainage
- Main Watercourse
- Access Track
- Crane Pad
- Turbine Foundations
- Substation
- Compound
- Crane Pads
- Borrow Pit Search Area

Notes:

Rev	Description	By/Ch	Date
A	First Issue		19/11/20

Status: **First Issue**

Project: **Craiginmoddie Wind Farm**

Client: **EnergieKontor**

Drawing Title: **Geomorphological Map**

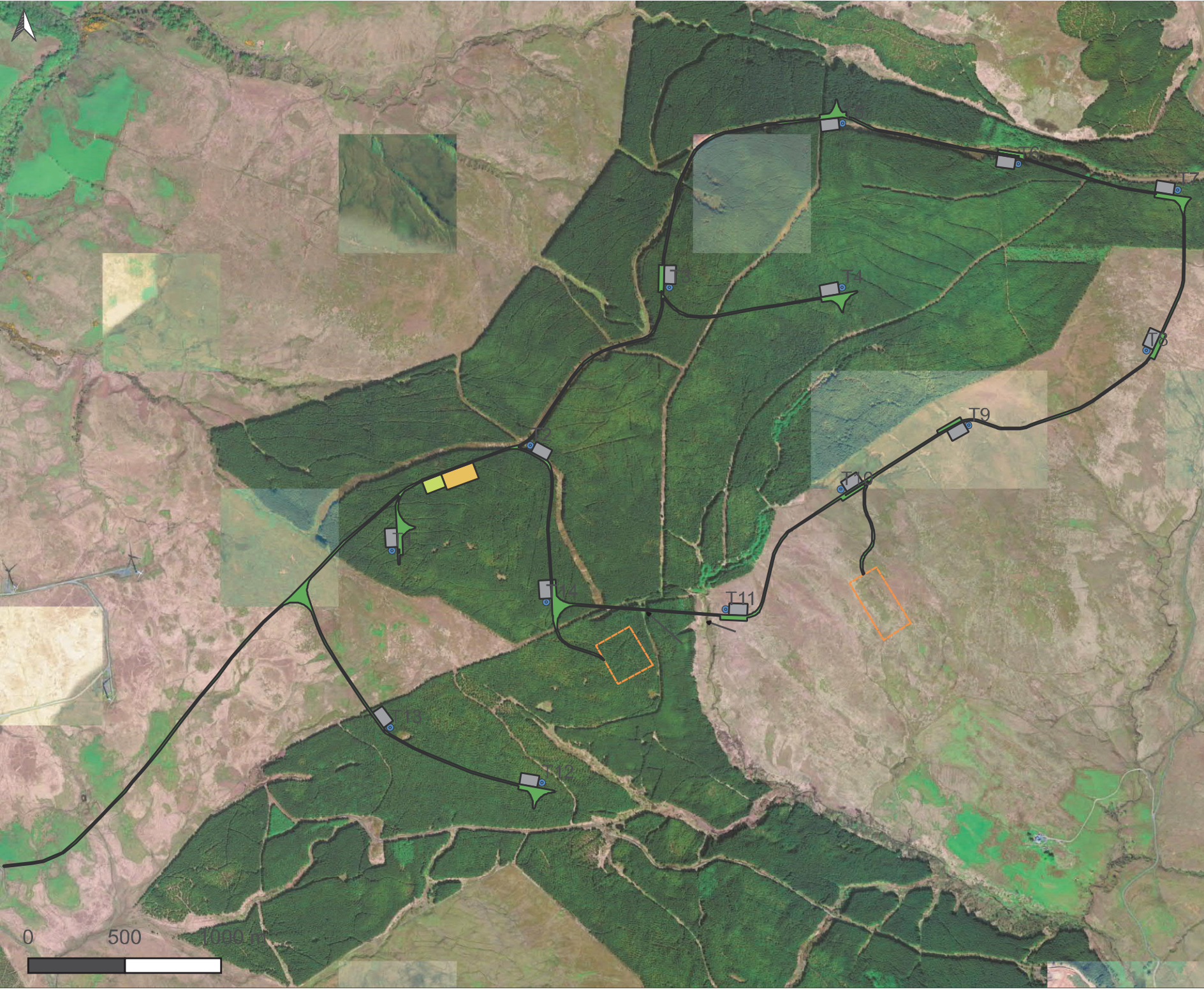
Drawn: GG	Checked: CM	Approved: GG
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Scale: **AS SHOWN @ A3** Date: 19/11/20

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Map Legend:

- Access Track
- Crane Pad
- Turbine Foundations
- Substation
- Compound
- Crane Pads
- Borrow Pit Search Area

Notes:

A	First Issue		19/11/20
Rev	Description	By/Ch	Date

Status: First Issue

Project: Craiginmoddie Wind Farm

Client: EnergieKontor

Drawing Title: Aerial Photo Map

Drawn: GG Checked: CM Approved: GG

Scale: AS SHOWN @ A3 Date: 19/11/20

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Drawing No. 14090UKC_PSRA_006 Revision: A

Appendix 5.2: Ironside Farrar Peat Landslide Hazard Risk Assessment – Stage 2
Checking Report (September 2021)

PEAT LANDSLIDE HAZARD RISK ASSESSMENT

Craiginmoddie WF

STAGE 2 CHECKING REPORT



Scottish Government
Riaghaltas na h-Alba
gov.scot

ENERGY CONSENTS UNIT

IronsideFarrar
Environmental Consultants

50787 | September 2021

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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

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 2 Checking Report will consider whether or not responses received from Developers to Stage 1 Check 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

2.0 STAGE 2 CHECKING REPORT

The following table comprises the Stage 2 Checking Report:

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
1	The geomorphological mapping should be reviewed to confirm it is in line with ECUBPG, eg. does it include major slope breaks, and updated if not."	The geomorphological map was completed to ensure all visible salient features were highlighted and considered by the risk assessment. Natural Power consider it to be in line with the relevant guidance. Generally, break in slopes although present in the few pronounced incised valley forms were determined not to be key to the risk outcomes in this case. Aerial photography information was reviewed as part of the PLHRA which provided a robust background to the assessment relative to peat landslide risks. This was supported by multiple site reconnaissance surveys undertaken by geotechnical engineers and hydrologists. It is highlighted that widespread commercial forestry plantation obscures a large proportion of the terrain, the focus of the risk assessment was on identification of salient features: watercourses, topography, instability (included on the existing mapping) to inform the risk assessment. In addition, the geomorphological map highlights the key features within the site which may contribute to or signify potential future instability. Natural Power considers the geomorphological information to be adequate for the purposes of the peat slide risk assessment in this case.	Noted aerial photography review and multiple site visits fed into the assessment and forest cover obscures much of the terrain but that the Consultant is satisfied the geomorphological information is adequate for the purposes of the peat slide risk assessment.	No further action.
2	ECUBPG requires probing on a 100m grid across the whole site or a detailed justification provided why it was not. Justification is requested on the phase 1 layout	Phase 1: 100m grid probing was undertaken within the confines of the development boundaries and where peat deposits were present and accessible. Natural Power considers the 100m grid probing at Craiginmoddie to provide good coverage given the access (dense forestry) constraints and is confident the coverage is suitable to inform a robust peat slide	The Peatland Survey Guidance Table 1 – Preliminary Assessment of Peatland Extent and Conditions notes that the peat depth survey resolution should be <i>Low resolution - Usually 100 m X 100 m on a regular grid pattern across the whole area proposed for development. Greater intensity surveys will not be required for areas that are unlikely to be developed.</i>	Phase 1 probing focused in the vicinity of infrastructure can be justified, however in instances when sensitive receptors

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
	with specific reference to potential areas of receptors."	risk assessment. The principal goal of the 100m grid probing was on scheme layout design and minimisation of the impacts on areas of deep peat. The risk assessment process whilst drawing on this Phase I data; examines in detail the final infrastructure positions in context of the surrounding peat data. Across the development and surrounding infrastructure there is wide coverage of peat data to support interpolation and risk assessment at each infrastructure location. Natural Power concludes that any further 100m grid probing carried out at this stage would have a negligible impact the risk assessment or conclusions.	Therefore the focus of Phase 1 probing is to understand the wider context of the site, not focus on potential areas of peat or infrastructure. Section 4.4.2 of ECUBPG notes Scottish Government Guidance suggests a site-wide density of approximately one probe per 100m (or one probe per hectare). Section 4.4.3 of ECUBPG notes <i>In order that the model be considered reliable, sufficient coverage of data points should be available in areas covered by the model, hence infrastructure targeted probing (with limited coverage elsewhere) may be inadequate to produce a site wide peat model.</i> As noted in ECUBPG, unsafe/difficult access is a reasonable justification for probing to be omitted in locations. The dwelling at Doughty is the closest receptor, at over 600m away, but noted that at the closest infrastructure (borrow pit) the peat probing south recorded peat depths <0.5m. The road east of the site has been demonstrated to be at the opposite side of a valley. In this instance, as sensitive receptors such as dwellings and public infrastructure are a significant distance from the proposed infrastructure and noted issues with dense forestry, the Phase 1 probing undertaken for this site is considered acceptable in this instance. However, this does not remove the requirement for robust Phase I peat probing for future PLHRAs.	are located downslope of infrastructure it is expected that assessment is conducted to ensure that upslope works would not destabilise downslope peat which could then impact on receptors, with risk to human life / health most important. In this instance it is accepted that the Phase 1 probing is sufficient. Please note that it would be expected that all future PLHRAs would follow the guidance on Phase I (and detailed) probing.
3	"The Guidance notes the Phase 1 grid should be supplemented with significant additional probing at infrastructure	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	The Peatland Survey Guidance Table 2 – Further Assessment of Peatland Extent and Conditions then confirms that: <i>Targeted sampling regime tailored to potential development areas within the proposal boundary. Sampling should focus on areas of greatest</i>	As per ECUBPG significant additional probing over and above the Phase 1 grid is required at

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
	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."	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.	<i>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.</i> ECUBPG notes <i>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.</i> 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.	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.
4	"Justification on why probing for track offsets were 25m rather than 10m."	Natural Power can clarify that peat probe track offsets distances range from 10-20m when rechecked/measured within GIS software. The variation principally attributed to geo-location precision whilst often working under dense or obscured by nearby forestry canopy. Natural Power considers the coverage provides a suitable representation of peat depth across the proposed track infrastructure and for inclusion within the peat slide risk assessment.	Issues regarding forest cover and device accuracy noted. Every effort should be made to ensure accurate readings are made where possible.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
5	"The lowest recorded HSV result was 13kPa however 15kPa has been used as a conservative value, confirmation is requested on why and whether sensitivity analysis was conducted to confirm this value."	The report provides the following statistical values in relation to the peak undrained shear strength of the peat. Min = 13kPa Max = 60kPa Mean = 34kPa A cautious estimated value of 15kPa was selected for input to the site wide factor of safety calculations based on the statistical analysis of undrained shear strength results. Natural Power considers this a suitable representative value based on the range of strength values measured across the development. Note this is lower than the average re-moulded shear strength which should signify further that it is a very conservative value. Further described in the report: the shear vane apparatus has a small surface area compared to the scale of the soil structure within the peat. This scale factor is highlighted as the main limitation of this in-situ test method. The scale effect can lead to an underestimation of peat strength. The hand shear vane therefore only provides a preliminary and conservative estimate of un-drained shear strength. For this reason, it was not considered representative to use the absolute minimum value for the site wide analysis. Natural Power can confirm that applying 13kPa to the Factor of Safety calculations by way of sensitivity analysis does not alter to the outcome of the risk assessment.	Noted issues regarding achieving accurate results for shear strength in peat and statistical assessment behind selecting the 15kPa value. Also noted that a check on the 13kPa value has confirmed there is no change in the outcome.	No further action.
6	"Comment on the user inputs and limitations of the interpolation should be included."	Section 2.9 of the report confirms: to prepare the interpolated peat depth mapping; a spatial interpolation method termed 'Ordinary Kriging' was applied. This is a statistical interpolation function which examines point data (and weights the surrounding measured values) to derive a prediction for unmeasured locations. Ordinary Kriging is considered generally acceptable for geological / soil science applications. Limitations of the Kriging method are widely accepted to be: Confidence in the output related to number and density of points within the input dataset. Search window needs to be set to	Noted limitations on interpolation method and Natural Power commitment that the interpolation parameters and peat depth data set are suitable. Parameters could be noted in future reporting for clarity.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
		limit influence of distant data points. On both points Natural Power commits that both the interpolation parameters and peat depth data set are suitable for informing the peat slide risk assessment.		
7	"Table 4.4 suggests checks for cracking were carried out during the detailed survey and cover the same extent, suggesting this was not carried out at infrastructure locations which were not subject to additional probing, confirmation is requested and justification if this is the case."	Natural Power confirms that the Stage 2 site reconnaissance visit incorporated checks for 'cracking' and other salient evidence for ground instability or contributory factors to instability. The site reconnaissance covered all principal areas of the proposed wind farm infrastructure.	Noted.	No further action.
8	"Justification is requested on the scoring of hydrology across infrastructure locations when artificial drainage is widespread."	Artificial drainage features as represented on the geomorphological mapping and evident on the aerial imagery is principally associated with the historic establishment of the commercial forestry plantations. In relation to these aspects Natural Power confirm the following points: Artificial drains/grips are associated with the forestry land management which is scored separately for relevant infrastructure locations. It was the qualitative determination of the risk assessor that scoring these aspects twice would unrealistically skew the assessment towards medium/high risk. Therefore, the elevated scoring for Land Management were applied only at these locations. Across the proposed development and in line assessment of contributory factors there were determined to be no surface hydrology features actively contributing to peat instability. (Table 4.4: Risk Factors). Natural Power feels these aspects	Noted justification regarding double scoring of artificial drainage and no evidence of surface hydrology impacting stability and this therefore falls under qualitative engineering judgement.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
		were explained within the report and the assessment of these factors falls under again the qualitative engineering judgement rather than quantitative aspects of the assessment.		
9	"Justification is requested on the scoring of land management with much of the area subject to commercial forestry and requiring felling"	See Table 4.4 within the report: For Craiginmoddie Wind Farm a land management scale of '2' has been chosen where significant tree felling is required as this has potential to disturb the peat deposits. This assessment should be updated following the site investigation and felling." Natural Power's justification being that the engineering surveys and site reconnaissance did not encounter any instance of peat instability associated with the existing forestry. It is however still important to raise this issue and recommend suitable controls including additional assessment during the post felling phase of development. Natural Power considers at this stage there to be no further benefit to the peat slide risk assessment to adjust scoring with respect to the Forestry environment.	Noted justification for the scoring of "2" is based on the fact that site reconnaissance did not encounter any instance of peat instability associated with the existing forestry. The wording of the "Criteria" in Table 4.4 could be clearer.	No further action.
10	"Confirmation is requested on whether the likelihood scoring was also applied to the access tracks or whether a different method was used, and if so this should be explained."	Proposed access track locations were subject to the site reconnaissance surveys, peat probing and geomorphological assessments set out in Section 1.4 of the report: Surveys were conducted by a principal geotechnical engineer and geotechnical engineer, covering all key aspects and locations across the Proposed Development (November 2020); During this phase the risk factors (Table 4.4) and likelihood scoring were considered and contributed to the qualitative outcomes of the assessment. A secondary tool for screening the access track sections was the use of GIS based risk mapping which is set out in the reporting and principally draws upon the peat depth, slope angle and proximity to sensitive environmental receptors. Natural Power therefore considers that the access tracks have undergone a robust 'two-	Explanation for method of scoring accepted. Frequency of probing at tracks in order to ensure robust assessment is covered by point 3.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
		pronged' assessment of peat slide risk. This process as successful in highlighting sections of elevated risk and associated control measures which are set out within the report		
11	"Explanation is required on the distances to watercourses used in the assessment of consequence as the scores provided for each turbine location sometimes appear at odds with those stated in Table 4.5. Distances to watercourses from nonturbine infrastructure should be confirmed. Any changes to the risk ratings should then be confirmed, along with proposed mitigation."	Natural Power confirms that the distance to main watercourses has been used as the primary means of impact/consequence assessment within the risk assessment. If watercourses were ephemeral/transient or minor artificial features they were not included as direct receptors. The distances are based on experience and guidance values provided within MacCulloch, F. (2006). Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads over Peat. The approach advocated by MacCulloch is to divide the survey area into Environmental Impact Zones driven by site specific criteria and survey information. It is noted that defining a definitive distance for impact is extremely challenging due to the complex nature of terrain, peat depth, flow mechanics will all influence the flow path characteristics. At present there exists no defined method to accurately define the flow distances. Therefore Table 4.5 within report provides a framework estimate for the purposes of repeatable and representative semi quantitative risk mapping. Natural Power considers this approach alongside the multitude of site-specific factors which are taken into account during the risk assessment a valid approach. Distances to the main watercourses have been assessed within GIS and input to the risk mapping. The proximity classes are based on Table 4.5 within the report. Natural Power does not consider changing the risk assessment approach in this case or altering the risk rating in line with the reviewers' comments would improve the outcome of the peat slide risk assessment in this case.	Noted that the distance to watercourses is based on main watercourses and not those which were ephemeral/transient or minor artificial features. Although artificial channels could still carry peat flows to a main watercourse it is noted that flows are not always present and it possible these ditches may block in time if the adjacent forestry ceases / disturbed or removed as part of development works.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
12	Clarification is requested that no scoring has been assigned to wind farm infrastructure damage and that this will not influence the Developer's decisions."	Natural Power has determined within the risk assessment that: Watercourses are the primary sensitive receptor to a peat failure event. Risk assignments for turbine infrastructure are assigned on this basis. Where relevant (e.g. T12) existing infrastructure is discussed in addition as potential impacts to offsite infrastructure. Natural Power's clear advice to the developer is: through geotechnical risk management, strict construction management and implementation of the relevant control measures, the risk of peat failure across the development can be reduced to residual low levels. Application of this advice will therefore negate wind farm infrastructure damage. Natural Power considers that were the risk assessment to introduce wind farm infrastructure damage scoring at this stage, the overall conclusions and control measures would remain unchanged. The protection of watercourses as both receptors and pathways for peat instability provides the necessary characterization of risk across the development and enables targeting of control measures.	Noted Natural Power advice to developers is that with geotechnical risk management, strict construction management and implementation of the relevant control measures, the risk of peat failure across the development can be reduced to residual low levels, with application of this advice negating wind farm damage. It is accepted this is the decision of Natural Power and the Developer.	No further action.
13	"Impact scales have been adjusted at T05 and T11, justification is requested on why deviation from the methodology was necessary."	Natural Power would like to reiterate the following points: T05 – There is no peat recorded at the location. Proximity to main watercourse is within 100m. Therefore, in this case using the quantitative assessment alone would result in an unrealistic medium risk (14). The impact scale was therefore modified to ensure a representative risk assessment at T05 with no peat and only organic topsoils recorded. For the same reasoning; the shallow peat at T11: The impact rating was reduced to ensure a representative risk classification. Notwithstanding these points T11 carried requirements for control including: • Following further intrusive site investigation post-consent, the risk ranking should be reevaluated. The risk should remain low using low	Noted that due to the lack of peat/shallow peat the risk ranking would be overly conservative and therefore the amendment is justified. It is noted that peat at the threshold depth of 0.5m is recorded in the probes NW and SE of T5 approx. 150m-200m away. Similarly peat at 0.8m depth is located less than 100m east of T11. Additional probing as per point 3 would confirm the validity of the assumption.	No further action provided shallow peat is confirmed at locations as per point 3.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
		impact construction techniques and best practice methods for construction over peatland. • There should be no temporary stockpiling of peat materials down slope from the infrastructure towards the main water-crossing. • Installation of watercourse protection measures as a precaution against entrainment of material and suspended sediment entering the main watercourse would ensure the negligible residual risk.		
14	It is not clear whether the public road located downslope of T7 and T8 and the connecting track was included in the scoring or whether it was assessed and discounted, clarification is requested."	The infrastructure in question is on a separate terrain unit from the adjacent public road. See extract of 3D elevation model below: [image included in PDF received] There is an interceding valley form and topographic low beyond which the public road is isolated and elevated. Natural Power therefore discounted this from its assessment of peat slide run-out for this zone of the development. Further information is provided at Section 4.46-4.48 of the report.	Noted.	No further action.
15	"Clarification is requested that due to distance, impact on dwellings and SSSIs was discounted."	Natural Power can confirm as per the report (4.48): The risk of run out and significant damage to the wider hydrological environmental is deemed low, providing the relevant control measures outlined in his report are implemented. This includes SSSIs and dwellings.	Noted assessment included SSSIs and dwellings.	No further action.
16	"Non designated assets are recorded in close proximity to T8 and T13, confirmation is requested these were considered by the assessment."	Natural Power confirms all onsite assets were reviewed as part of the Peat Slide Risk Assessment.	Noted assessment included non-designated assets.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
17	Confirmation that potential impacts on PWS were considered in the assessment, also that the Scottish Water abstraction location was considered."	Natural Power confirms that the location of PWS and abstraction points was reviewed. The location of these receptors does not alter the risk assessment or main conclusions of the peat slide risk assessment. Figure 12.2 of the Hydrology/Geology Chapter shows the PWS locations with respect to the development.	Noted assessment included PWS and abstraction points.	No further action.
18	"GWDTEs are located in the vicinity of the access road into the site and T3, confirmation is required that risks to these were assessed."	Natural Power confirms that the location of the GWDTEs were noted during the peat slide risk assessment and further details are provided at 12.114 within the Hydrology/Geology Chapter. All instances are near watercourses and thus the environmental impact zonation approach used by the peat slide risk assessment is considered suitable at capturing potential impact to the GWDTEs.	Noted assessment included GWDTEs.	No further action.
19	"The track assessment appears different to the other infrastructure assessment, it appears that Table 4.8 assesses only track areas highlighted as Medium/High risk by the peat slide risk map which considers peat depth, slope angle and proximity to watercourse. Confirmation is requested."	As per response point 10: Proposed access track locations were subject to the site reconnaissance surveys, peat probing and geomorphological assessments set out in Section 1.4 of the report: Surveys were conducted by a principal geotechnical engineer and geotechnical engineer, covering all key aspects and locations across the Proposed Development (November 2020); During this survey phase the risk factors and likelihood scoring were considered and contributed to the qualitative outcomes of the assessment. A secondary tool for screening the access track sections was the use of GIS based risk mapping which is set out in the reporting (Table 4.8) and principally draws upon the peat depth, slope angle and proximity to sensitive environmental receptors. Natural Power therefore considers that the access tracks have undergone a robust assessment of peat slide risk.	Noted that the risk mapping was used to screen the access tracks for higher risk areas. Additional probing will confirm the validity of this assessment as per point 3.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
20	"The assessment of T12 notes the existing track is a potential receptor however catch fencing is not included in the mitigation, confirmation is requested on whether this was not deemed necessary."	Natural Power can confirm that it does not deem catch fencing necessary at the location in question. Interceding peat depths are generally shallow toward the south of the turbine position T12. Furthermore, the track in question is a spur of 'low' infrastructure value which terminates approximately 400m west of the turbine position. It is not integral to the connectivity of the forestry track network nor will it form an integral section of the wind farm infrastructure. Notwithstanding these points Natural Power considers there to be a low residual risk to this existing infrastructure where recommended controls are implemented.	Noted interceding peat depth <0.5m and assessed low value of the track, with low residual risk where recommended controls are implemented.	No further action.
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.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
22	"The PLHRA does not contain a plan of proposed felling, nor a comment confirming the discussions with landowners which can indicate preparatory factors or evidence of pre-failure indicators respectively and would be useful."	A detailed felling plan would be devised during the pre-construction phase of development. Landowners were unable to provide any comment or advice on peat stability failure indicators	Noted detailed felling plan will follow and landowners could provide no comment or advice on peat stability failure indicators.	No further action.
23	The 2016 SNH Carbon and Peatland Map, which is a good source of information, does not appear to have been referenced in the PLHRA. It is noted it is included elsewhere in the EIA."	The 2016 Carbon and Peatland Map is not considered appropriate for inclusion in a detailed peat slide risk assessment report: - SNH/NatureScot advise its use is as a high-level planning tool by planning authorities. It is typically used during site selection but should not be used during the detailed assessment at the EIA stage. Incorporation or referencing of this map in the PLHRA is not required or would it add any benefit to the geotechnical assessment.	The Carbon and Peatland Map indicates the likely presence of carbon-rich soils, deep peat and priority peatland habitat for each individually-mapped area, at a coarse scale. Noted it is not suitable for individual site assessment but as a high-level tool it allows assessors to see what is anticipated on site and whether probing reflects this. The information derived from the mapping also serves to underpin a robust desk study assessment of all available data sets.	No further action.
24	"As well as the above geological maps could have been included for the wider area within the PLHRA as well to provide a better context and reasoning as to why the exclusion of the offsite access track was reasonable."	Geological mapping is provided at Figures 3.1 & 3.2 for the main site. Discussion of the offsite access track is included at Section 1.16. No peat was recorded across this area following review of British Geological Survey soils maps and with additional site reconnaissance undertaken. The proposed offsite track alignment does not cross very steep terrain however further investigation would be undertaken during the pre-construction phase once detailed alignment is established. The important geotechnical issue (un-related to peat slide risk assessment) is of deep-seated mass movement and landslide potential of the adjacent valley forms. This is identified and highlighted for further investigation which can be	Noted Fig 3.1 and 3.2 provide geological mapping, however this comment is regarding the wider area, specifically the offsite access track. This mapping is included elsewhere in the EIA but as noted it could have been included for context within the main body of the PLHRA. Noted further investigation planned for non peat related risks.	No further action.

No.	Stage 1 Checking Report Comment	Developer Response	Stage 2 Checking Report Comment	Recommendations
		secured by condition imposed on a planning consent. Following detailed investigation, the full scope of provision and mitigation to control geotechnical risk would be provided.		
25	"Photos of instability witnessed could be included for context."	Minor movement potential was observed and recorded on the geomorphological map. Signs were subtle to observe however a photo is provided below of the relevant feature for context: [Image Included] Photo of erosion/escarpment/minor movement [BNG: 231336,598414] This feature related to the slope system along proposed track section T11-T14 which there has been proposed a series of robust control measures to manage the geotechnical risk.	Noted.	No further action.
26	A hydrological walkover was noted in Chapter 12, this could be commented on in the PLHRA to add further weight to the reporting, particularly if this was carried out by a team member with different specialism to those authoring this report."	Acknowledged. Natural Power confirms that it routinely undertakes site reconnaissance surveys with both geotechnical and hydrological expertise. This can be reinforced in future reporting, however at this stage don't feel it has any direct impact to the outcome of the peat slide risk reporting.	Noted.	No further action.
27	Incorrect scale to be amended on the probing drawing in the Appendix."	Acknowledged.	Noted.	No further action.

3.0 SUMMARY AND RECOMMENDATIONS

3.1 Summary Outcome of Checking Report

The following comprises the summary outcome of the Stage 2 checking report:

The Developer's response generally addresses the queries raised in the Stage 1 Checking Report although two points require resubmission.

3.2 Recommendations

The following recommendations are made:

Recommendations requiring response from Developer:

- Response to point 3) relating to peat probing at infrastructure locations to be resubmitted with additional probing in line with ECU Guidance. Detailed probing is still omitted from a number of turbine locations and sections of access tracks.
- Response to point 21) include main access track within Table 4.9

Recommendations made for information only – no response required:

- Consideration of queries above to streamline future reporting and responses.

Appendix 5.3: Ayrshire Rivers Trust consultation and applicant response



Ayrshire Rivers Trust

working to improve Ayrshire's rivers and lochs

Ayrshire Rivers Trust
Braeside, Burnbrae Lodge
Mauchline, KA5 5HE

Debbie Flaherty
Energy Consents
Scottish Government
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow G28LU

15th March 2021

Dear Debbie,

Craiginmoddie EIA Report PLANNING REF: ECU00002196

On behalf of the Ayrshire Rivers Trust (ART), The River Stinchar District Salmon Fishery Board (RSDSB) and The River Girvan District Salmon Fishery Board (RGDSFB) we would like to make the following comments on the above EIA Report. Our comments relate only to impacts on the water environment and riparian habitat and take no account of other potential impacts. The proposed wind farm development has the potential to impact on the water environment due to its close proximity to important tributaries of the River Stinchar and River Girvan.

- We note the development will require 20 new or existing water crossings for construction of the access tracks. Having reviewed the proposed recommendations set out in Technical Appendix 12.1: Watercourse Crossing Assessment we are satisfied the appropriate crossing type has been selected for each watercourse with the exception of WC19 and WC20 which were not surveyed. We therefore request these two water crossing proposals are presented to us at earliest opportunity for review. We should stress that continuous fish passage and continuous flow is provided at each water crossing ensuring no hanging culverts and that resident fish are removed from the site **PRIOR** to **ANY** instream works being undertaken. The monitoring programme to assess the impacts of construction works should include provision to monitor these water crossings as previous experience at similar developments have shown that this type of work can release substantial quantities of silt into the water environment.
- *9.65 Fish and FWPM assessments were not undertaken, however, given the connectivity of smaller watercourse to larger rivers with known salmonid and FWPM populations, there is still a risk of impact to these down-stream populations as a result of the Proposed Development.* We are pleased to see a monitoring programme proposed for a site-specific CEMP but there is no detail on which we can comment on. The monitoring programme must include a fish monitoring programme and a full audit of the species present in order to fully assess the impacts of fish populations onsite and downstream. Surveys should be undertaken to Scottish Fisheries Co-Ordination Centre (SFCC) standards, designed in accordance with Marine Scotland Science guidance and undertaken pre, during and post construction (<https://www.gov.scot/binaries/content/documents/govscot/publications/research-and->

[analysis/2020/11/onshore-renewables-interactions/documents/generic-monitoring-programme-for-monitoring-watercourses-in-relation-to-onshore-wind-farm-developments/generic-monitoring-programme-for-monitoring-watercourses-in-relation-to-onshore-wind-farm-developments/govscot%3Adocument/Generic%2BMonitoring%2BProgramme%2Bfor%2BMonitoring%2BWatercourses%2Bin%2BRelation%2Bto%2BOnshore%2BWind%2BFarm%2BDevelopments.pdf](#)). Water quality monitoring should be supplemented by macroinvertebrate surveys to be undertaken within the receptor watercourses. ART would welcome the opportunity to comment on the fish monitoring programme and methodologies. The baseline should be collected prior to any onsite construction and forestry felling activities.

- There is a lack of detail on mitigation for forestry felling close to watercourses with the report highlighting *Several of the proposed crossings were also found to be within 'densely shaded conifer plantations with pole-stage trees planted right up to the bankside'*. We would welcome more detail on how harvesting will minimise sediment runoff, elevated phosphates and nitrates within watercourses. This is important as The River Stinchar has suffered from a deterioration in water quality in certain areas in recent years, notably an increase in concentrations of suspended sediments (dark peaty water). This is believed to be from plantation forestry such as Sitka spruce planting on peatlands where forestry drainage and felling may have contributed to water quality decline in sub-catchments of the River Stinchar.
- Compensatory planting should consider the planting of broadleaf native trees along watercourses within the site in order to enhance freshwater habitats and protect freshwater fish and invertebrates. ART would welcome the opportunity to discuss this with the relevant stakeholders.

Finally, we refer you to Fisheries Management Scotland advice on terrestrial windfarms issued to District Salmon Fishery Boards and Fishery Trusts and request you fully consider the guidelines in relation to this development. <http://fms.scot/wp-content/uploads/2017/04/170412-Guidance-Terrestrial-windfarms.pdf>

We hope these comments are helpful. Should you require further information or clarification of any points, please don't hesitate to contact the undersigned.

Yours sincerely

REDACTED

Gillian McIntyre
Biologist and Project Manager

Watercourse Crossings (1st bullet point)

The first bullet point refers to the omission of survey information for WC19 and WC20. The fieldwork for the watercourse crossing survey was carried out based on the off-site access layout at the time (survey carried out on 2 and 10 Nov 2020). The track alignment was adjusted following the survey but a further visit wasn't considered necessary as the information already obtained, in addition to an updated desk-based assessment was considered sufficient and these details (survey sheets) are provided at pages 27 and 28 of Technical Appendix 12.1.

Specifically, WC19 was taken as representative of WC11. WC11 is located 180 m downstream of WC19 on the same watercourse. There are no other joining tributaries which would significantly change surveyed crossing conditions between the two locations.



WC20 was taken as representative of WC10. WC10 is located 225 m upstream of WC20 on the same watercourse. There are no other joining tributaries which would significantly change surveyed crossing conditions between the two locations.



Mitigation for forestry felling close to watercourses (3rd bullet point)

The layout has been designed with appropriate turbine buffers but there are a few locations where the keyholing is close to watercourses. Notwithstanding, the impacts of the development does consider the effects of forestry felling on hydrological receptors and the mitigation presented is based on mitigating these impacts although we do accept that this could be more specific.

Table 12.16 of the EIAR sets out mitigation measures covering onsite and downstream water quality as well as effects to on-site and downstream fisheries. This includes appropriate drainage design that incorporates sediment management.

A suite of best practise measures would be outlined in a CEMP. The preparation of the CEMP will include Method Statements for pollution prevention, site drainage, water monitoring and sensitive habitat protection and would include the provision of a Drainage Management Plan as well as a Water Quality monitoring programme. The water monitoring programme would outline surface water sampling methodologies (which will include parameters such as phosphates and nitrates) and a baseline dataset (prior to felling) would be collected as part of the programme to monitor that no elevations were detected.

In consultation with ART (and others) we would be happy to agree the provision and details of broadleaf planting along watercourses, a water quality monitoring plan, fish monitoring plan and a habitat management plan as part of the CEMP prior to the commencement of development.

We are also happy to commit to detailed design and ground truthing of mitigation prior to felling of trees bankside as well as the provision of an Ecological/Environmental Clerk of Works.

I trust that this is helpful and we would be happy to discuss any of these issues with Ironside Farrah or ART, but do please let me know if you require anything else from us at this stage.

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