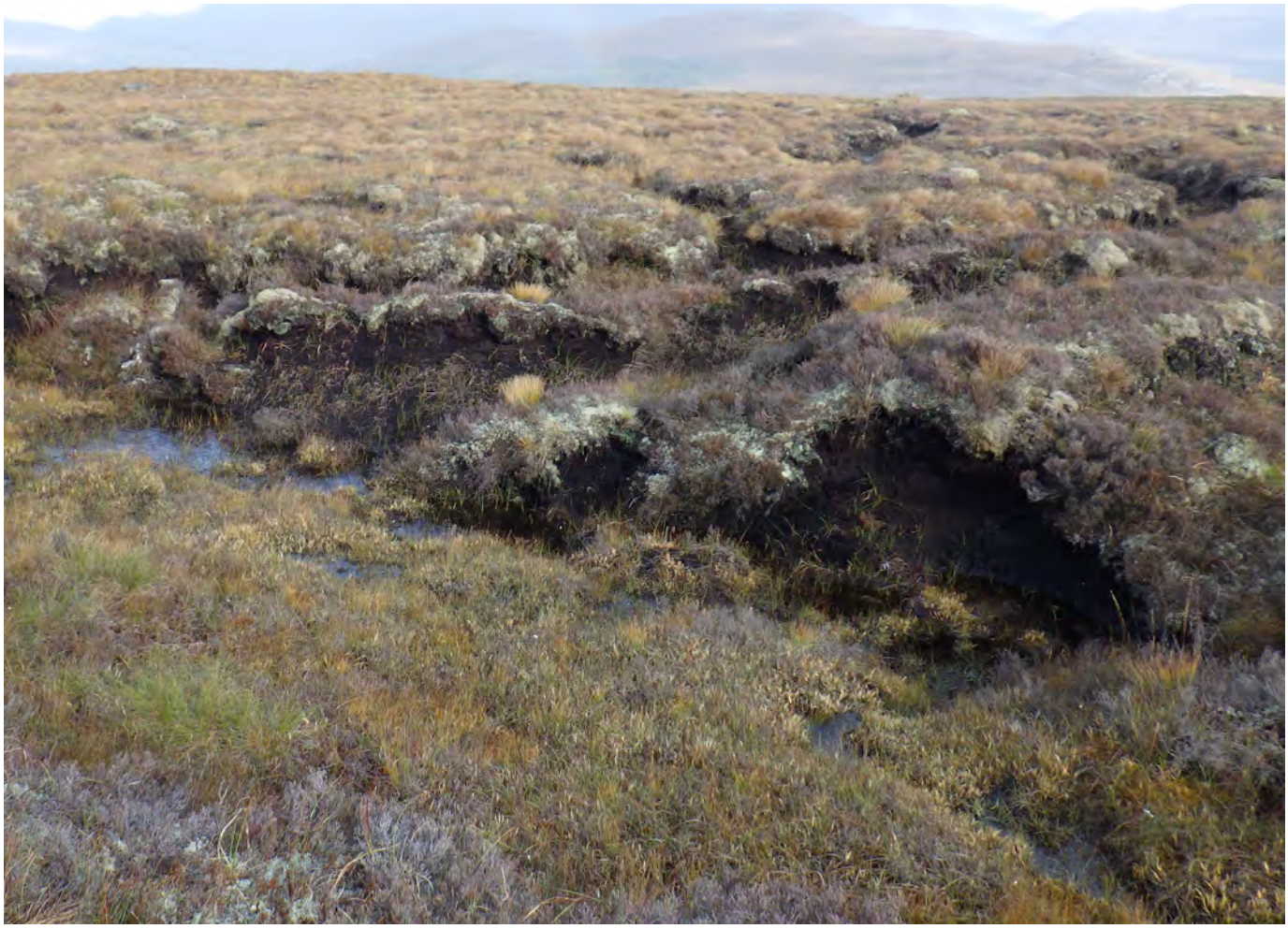

Scottish Power Renewables

Earraghail Renewable Energy Development: Peat Slide Risk Assessment

Technical Appendix 10.1

FEBRUARY 2022

RSK GENERAL NOTES

Title: Earraghail Renewable Energy Development: Peat Slide Risk Assessment, Technical Appendix 10.1

Client: ScottishPower Renewables

Date: 12th January 2022

Status: Final

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Date:	12/01/2022		

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1 INTRODUCTION

1.1 This report provides a Peat Slide Risk Assessment (PSRA) for ScottishPower Renewables' Earraghail Renewable Energy Development ('the proposed Development') and associated infrastructure.

1.2 The report forms a Technical Appendix to the Environmental Impact Assessment (EIA) Report for the proposed Development and should be read in conjunction with this document. It has been produced in response to concerns over development in areas of peatland relating specifically to the risk of induced instability within peat caused by proposed development.

1.3 This report describes the existing peatland conditions at the Site and identifies and assesses the potential impacts that may be caused by the proposed development. This includes potential risks from induced peat instability. Design and mitigation methods to avoid or minimise these risks are set out, along with a number of good construction practices that would be employed during all proposed Development works.

Location

1.4 The Site is located between the village of Tarbert, to the north east, and the village of Skipness, to the south, situated within the northern part of Kintyre Peninsula in Argyll & Bute council and administrative area – centred on National Grid Reference (NGR) NR 88732 63637. The Site is owned by Forestry and Land Scotland (FLS). The Site lies primarily lies within the Corranbuie and Skipness coniferous woodland plantations and is located within an area of carbon-rich soils. The Site area is 1,455 hectares (ha) in total and the current land use is classified as primarily forestry with some moorland.

1.5 The topography of the Site is variable and undulating and is dictated by seven small hills within the forested areas. Between the hills, the land is generally less than 14 % slope, with the exception of some land in the north Corranbuie forest area and throughout the south west of the Skipness forest area.

Development proposals

1.6 The proposed Development includes the following key elements:

- 13 wind turbines, up to 180 m to blade tip, including foundations and aviation lighting;
- ground mounted solar arrays;
- BESS units;
- crane hardstandings for wind turbine installation;
- transformer/switchgear housings located adjacent to turbines & solar arrays;
- new (10.4 km) and upgraded (12.9 km) access tracks including watercourse crossings where necessary, passing places and turning heads;
- underground electrical cabling;
- compound containing substation, control building and BESS;

- one main site construction and maintenance compound and a security compound;
- a permanent lattice construction meteorological mast, up to 105 m high;
- health & safety and other directional site signage;
- search areas for three new borrow pit areas; and
- additional development components to improve the overall ecological, environmental and social benefits accruing from the proposed Development, as follows:
    - ecological and environmental: peatland restoration; habitat improvement; native woodland planting
    - social: proposed new walking bothy on the Kintyre Way; circular walking route and viewpoint near Tarbert.

1.7 Full details of the project design are provided in **Chapter 3** of the EIA Report.

Aims

1.8 This report aims to undertake a review of available relevant Site information, including all peat depth and peat condition records, in order to provide an assessment of the risk of peat instability within the Site. Recommendations will be made for mitigation measures and specific construction methods that should be implemented in order to minimise the risk of inducing instability in the peat during construction works.

Assessment method

1.9 The assessment has involved the following stages:

- Desk study;
- Site reconnaissance;
- Peat condition assessment;
- Hazard and risk assessment;
- Detailed assessment;
- Mitigation.

2 DESK STUDY

Information sources

2.1 The desk study involved a review of available relevant information sources on the ground conditions at the proposed Development study area. Information sources included:

- Ordnance Survey mapping at 1:50,000, 1:25,000 and VectorMap Local raster mapping, Terrain 5 digital terrain model grid and contours, and OpenData mapping;
- Online satellite and orthorectified aerial imagery;
- British Geological Survey online and digital geological mapping, 1:50,000 scale;
- Scotland's Soils digital soil mapping, 1:250,000 scale;
- Data provided by the landowner including forestry details;
- Peat depth data collected by RSK;
- Archive and extensive Site data held by RSK Group.

Historical information

2.2 There are no available records that indicate any historical peat slides in and around the study area.

2.3 A detailed inspection of available current and historical satellite and aerial photography has been undertaken to identify any signs of recent or former peat or slope instabilities within the Site and its surroundings. No indication of peat or slope instabilities was identified and no signs of any instability was observed during field surveys at the Site.

Climate

2.4 The proposed Development is located on the Kintyre peninsula on the west coast of Scotland, within the UK Meteorological (Met.) Office's Western Scotland regional climatic area (Met. Office, 2021). Much of Western Scotland is exposed to the rain-bearing westerly winds, particularly areas along the west coast. Although in the more western part of the region, Earraghail RED lies to the east of the islands of Islay and Jura, affording it some ground-level protection from the rain-bearing westerly winds.

2.5 Average annual rainfall for the study area catchments varies between 1,707 mm and 2,015 mm (CEH, 2021), reflecting the elevation and slope aspect of the catchments. Average annual rainfall for the climate monitoring station at Campbelown Airport, Machrihanish, is 1,226.2 mm, and for the monitoring station at Rothesay, Isle of Bute, is 1,455.2 mm.

2.6 The Western Scotland climatic area includes part of the West Highlands, in the northern part of the region. This is one of the wettest areas in Scotland, with annual rainfall over 3,500 mm in the areas of higher ground. In contrast, the upper Clyde valley and the coastal sections of Ayrshire and Dumfries and Galloway receive annual rainfall of less than 1,000 mm.

Topography and Geomorphology

2.7 The Site is located across a dissected plateau surrounded by sloping ground to lower areas and the coast. The main plateau area is characterised by a series of notable hills with summits between 237 and 377 m AOD, and a large number of smaller rocky hills, with a distinctive north-east to south-west lineation visible in aerial imagery.

2.8 The north eastern margin of the plateau area falls off steeply to the coastline. The slope is relatively smooth with numerous small watercourses providing drainage to this section. Slopes in the north western and southern margins are also comparatively steep. This principally reflects the larger watercourses in these areas and their main drainage channels.

2.9 The south western margin of the Site is less clearly defined, as the plateau area continues beyond this area. Part of the south western margin, in the southern part of the Site, contains steep slopes in the section around the Skipness River valley.

2.10 Slope and geomorphology mapping are provided in **Figures 10.1.1** and **10.1.2**.

Geology

2.10.1 Geological information is derived from the BGS GeoIndex online geological mapping (BGS, 2021) and BGS map sheets Sound of Gigha (Sheet 20 and part of 21W) and Kilfinan (Sheet 29W and part of 21W) (BGS, 1996; 2000). Geology mapping is provided in **Figure 10.1.3**.

Bedrock geology

2.10.2 The Site is underlain by bedrock from the Beinn Bheula Schist Formation, part of the Southern Highland Group of the Dalradian Supergroup, of Pre-Cambrian age. This formation is described as ‘psammite, quartzose to micaceous, locally gritty, with phyllitic semipelite’.

2.11 Two sets of dykes are mapped within the study area. The oldest trends approximately east-west through the central part of the study area and consists of quartz microgabbro of the Central Scotland Late Carboniferous Theoleiitic Dyke Swarm. The younger dykes are shown to be olivine microgabbro of the Mull Dyke Swarm, part of the North Britain Palaeogene Dyke Suite. These dykes follow either a north-west to south-east or north-east to south-west orientation and are generally limited in extent.

2.12 The study area forms part of the Cowal Antiform, a regional up-fold structure with the axis crossing the area in a north east to south west orientation. No major faulting is shown within the study area, but a number of inferred minor faults are present. These are largely without significant displacement and form two sets oriented either north west to south east or north-east to south-west.

Superficial geology

2.12.1 The study area is largely without significant superficial deposits. The Skipness River valley is indicated to have deposits of diamicton till. This is a highly variable glacial sediment consisting of unsorted material ranging in size from clay to boulders, usually with a matrix of clay to sand.

2.12.2 Some alluvium is indicated along the Skipness River valley. Alluvium is variably formed from mixed clay, silt, sand and gravel.

2.12.3 Some coastal sections are indicated to have raised marine deposits formed from sand and gravel. These are confined to isolated very narrow strips along the eastern coast.

Soils and peat

2.13 The Soil Survey of Scotland digital soils mapping (James Hutton Institute, 1981) shows four soil types within the study area. Details are provided in **Table 2.1** and shown on **Figure 10.1.4a**.

2.14 The Soil Survey mapping does not identify extensive blanket peat within the study area, although almost all the study area is overlain by peaty gleys with peat and peaty podzols as secondary soils. Brown forest soils are present along the eastern coastal section.

Table 10.1.1: Soil types within the application boundary

Soil Assoc.	Parent Material	Component Soils	Landforms	Vegetation	Area %
Strichen	Drifts derived from arenaceous schists & strongly metamorphosed argillaceous schists of the Dalradian Series	Brown forest soils, humus-iron podzols, humic gleys	Hill & valley sides with strong to very steep slopes; slightly & moderately rocky	Bent-fescue grass-land; broadleaved woodland; rush pastures & sedge mires	10.3
		Peaty gleys, peat; some peaty podzols & peaty rankers	Hill sides with gentle & strong slopes; moderately rocky	Bog heather moor & blanket bog; Atlantic & Boreal heather moor; heath-rush – fescue grassland	38.7
		Peaty gleys, peaty rankers, peat; some peaty podzols	Rugged hills with gentle to strong slopes; very rocky	Atlantic, Boreal & bog heather moor; blanket bog; heath-rush – fescue grassland	47.2
Kintyre	Drifts derived from Dalradian schists & red sandstones, often water-modified	Peaty gleys; some peat	Undulating foothills with gentle slopes; slightly rocky	Flying bent grassland & bog; heath-grass – white bent grassland; rush pastures	3.8

2.15 Within the Site, the peatland has been significantly modified for commercial forestry with extensive drainage systems present in many areas.

2.16 The Carbon and Peatland 2016 map has been consulted to understand the carbon-rich soils, deep peat and priority peatland habitat within the study area (Scotland's Soils, 2016). The peatland classes present within the study area are outlined in **Table 10.1.2** and shown on **Figure 10.1.4b**.

2.17 The majority of the study area is underlain by Class 5 soils; these represent areas of commercial forestry plantation on peat soils and have a lack of peatland vegetation. The middle of the study area is underlain by Classes 1 and 2, which are considered to be nationally important carbon-rich soils, deep peat and priority peatland habitat. These areas are deemed likely to be of high conservation value. A portion of the southern-most study area is underlain by Class 3, indicating that occasional peatland habitats can be found here. Mineral soils have been identified along the eastern edge of the study area.

Table 10.1.2: Carbon and Peatland Map 2016 classes present within the Site

Peatland Class	Description	Area %
Class 0	Mineral soils; peatland habitats are not typically found on such soils	5.19
Class 1	All vegetation cover is priority peatland habitat; all soils are carbon-rich soils and deep peat	0.23
Class 2	Vegetation cover is priority peatland habitat or areas with high potential to be restored; soils are carbon-rich soils, deep peat or peaty soils	2.18
Class 3	Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type; occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat	4.40
Class 5	Peat soil; soil information takes precedence over vegetation data; no peatland habitat recorded; may also show bare soil; all soils are carbon-rich and deep peat (defined within the document as 0.5 m or deeper)	88.00

2.18 Peat depth surveys were undertaken in March and May 2020 across the application boundary area and in August 2020, April 2021 and January 2022 for areas of proposed infrastructure. The peat depth and reconnaissance surveys both confirm that peat is present in the area but is patchy and irregular in its distribution across the Site.

2.19 Much of the recorded peat is relatively shallow (<1.0 m), although some areas of deep peat (>2.0 m) are present. Areas of deep peat are patchy in distribution across the Site and usually form small basins between hill crests, around the headwater areas of some watercourses. Two main areas of deep peat were found north of Turbine 9 and west of Loch na Machrach Mòire. There are also small areas of deep peat north of Turbine 7, west of Turbine 1, north-east of Turbine 13 and south of Turbine 5. Areas of very deep peat (>3.0 m) were infrequent within the study area; a notable area of very deep peat was located north-east of Turbine 9.

Hydrogeology

2.20 The Site is underlain by bedrock classed as a 2C low productivity aquifer, comprising Dalradian schists, psammites and semi-pelites (Scottish Government, 2021; BGS, 2021). This means that natural groundwater flow within the Site bedrock is limited, with flow virtually all through fractures and other discontinuities. Groundwater flow is concentrated principally within the near-surface weathered zone, which typically extends to around 1-2 m below ground surface. Groundwater storage and flow at deeper levels requires the

presence of a network of fractures within the bedrock, which are infrequent and often isolated in these strata.

2.21 Regional groundwater flow will tend to mimic the natural topography, flowing north and east in the northern part of the Site and south and east in the southern part.

Hydrology

2.22 The Site is located across the catchment areas for three main watercourses, plus approximately 20 smaller watercourses which provide drainage along the eastern side of the study area. The three main Site watercourses are the Skipness River, the Bardaravine River and the Allt Achachoish. Most of the Site is located within the Skipness River catchment, flowing broadly south-south-west into Kilbrannan Sound at Skipness; this catchment has a total area of 14.7 km^2.

2.23 The Catchment Wetness Index, PROPWET, for the study area catchments is 0.660 for all the catchments, indicating the Site is wet for 66 % of the time. The area has a relatively low Baseflow Index, indicating that groundwater contribution is of limited importance to Site watercourses. The Standard Percentage Runoff is relatively high, indicating that 50-54 % of Site rainfall is converted into surface runoff from rainfall events. Catchment statistics are derived from the Flood Estimation Handbook Web Service (CEH, 2021).

Aerial photography

2.24 High-resolution orthorectified colour aerial photography for the Site and its surroundings was used for this assessment, through ArcGIS World Imagery, Google satellite imagery and Bing aerial imagery.

2.25 The Site is largely characterised by a mosaic of green and brown areas, with some small areas of pale grey and black/dark blue.

2.26 The brown and green mosaic relates to vegetation and natural topographical changes and surface drainage patterns.

2.27 The dark green areas represent commercial forestry. Some clear-felled commercial forestry appears pale green or greyish-green in aerial imagery. The characteristic striped nature of these areas marks these areas as active or felled commercial forestry, where the striped effect identifies the planting in rows. Some pale green areas with irregular patterns within clearings may indicate Sphagnum mosses.

2.28 Brown areas generally denote peatland and peat moorland areas. The brown areas are divided into moderate brown and tan. Moderate brown sections generally indicate areas of heather-rich vegetation, with the tan sections indicating areas of sedge- and grass-rich vegetation. Some clear-felled commercial forestry areas also appear tan in aerial imagery; these areas have the characteristic striped texture indicating planting in rows.

2.29 Black/dark blue areas depict lochans, located in the northern part of the main development area and within the open central part of the Site. Sinuous black lines show the main watercourses.

2.30 The strip of pale grey winding through the Site identifies the existing access track. Grey bulges along this route indicate borrow pits or layby areas. Small patches of mid- to pale grey across the Site characterise bedrock exposure at the surface. These are more

dominant in the northern part of the Site, within areas that lack commercial forestry. These tend to blend with the brown vegetation and are only visible on close inspection.

Vegetation

2.31 The majority of the Site is under coniferous forestry plantation with some areas of recently felled woodland present within both Skipness and Corranbuie forests. Smaller areas of semi-natural broadleaved woodland are present, mostly within Corranbuie forest particularly around the access track.

2.32 Open areas and rides within the plantation areas are predominantly a mosaic of wet modified bog, wet dwarf shrub heath and dry dwarf shrub heath.

2.33 National vegetation classification (NVC) survey mapping of the remaining areas indicates that there are four main communities present:

- H12 – *Calluna vulgaris* – *Vaccinium myrtillus* heath;
- M19 – *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire;
- M23 – *Juncus effusus/acutiflorus* – *Galium palustre* rush pasture;
- M25 – *Molinia caerulea* – *Potentilla erecta* mire

2.34 The open central area between Skipness and Corranbuie forests is predominantly covered by H12 and M19 habitats, with smaller areas of M25 widespread, and three small areas of M23 associated with the upper reaches of the Allt Chapull-cloiche watercourse.

2.35 NVC survey mapping within the Development area identified M19 and smaller areas of M23, generally associated with watercourses.

3 SITE RECONNAISSANCE

3.1 Walkover surveys of the Site were undertaken by RSK, accompanied by a member of the design team, on 19th February 2020 and 11th March 2021. The scope of the surveys included a reconnaissance survey of the Site and its immediate surroundings, plus mapping of the geomorphology and local-scale hydrology of the Site. The survey covered the entire Site, with a particular focus on the proposed Development area where infrastructure is planned and potential access routes into and across the Site. In February 2020, the weather was cloudy and overcast with showers, becoming misty later in the day leading to very poor visibility at times. In March 2021, the weather was overcast with showers and generally good visibility.

3.2 The areas described below provide good coverage of the Site, detailing the range of landforms, vegetation and erosion patterns encountered. As the area is largely forested, it is not possible to give a realistic indication of proposed infrastructure.

3.3 Reference is made to peat hagging, a form of erosion specific to peat. The peat develops channels which form breaks in the surface vegetation, exposing bare peat surfaces which are then more susceptible to erosion. Over time, this can lead to the development of a network of complex and sinuous channels through the peat and can lead to the formation of isolated peat 'islands'. In extreme situations, the peat body can be completely removed to leave bare mineral soil. Peat hagging is a natural process but can be exacerbated by poor land management practices including overgrazing and trampling from deer, sheep and cattle, extensive muirburn from grouse moor management, and uncontrolled off-road vehicle activity.

3.4 There is relatively limited peat hagging at the Site. Small hagged areas were identified in the open moorland area between the Corranbuie and Skipness forest areas and in the open area at the southern margin of Skipness forest. Within the forestry, areas of exposed peat are largely a result of existing access tracks or forestry works within the Site.

(A) View of access corridor looking north, NGR NR 8794 6452.

View shows the open area between the two forest blocks, the southern edge of Corranbuie forest, and the access route through the Site.

In much of this area peat is <1.0 m although isolated pockets of deeper peat are present in some areas, mainly to the west of the access track.

	**(B) View across open area looking south-east, NGR NR 8787 6400.** View shows a lochan near the summit of Cruach Doire Lèithe within the open section of the Site. Peat is of variable thickness across this area but is generally <1.0 m. The grey areas behind the lochan are areas of exposed bedrock, where peat is absent.
	**(C) View across open area looking west from access road, NGR NR 8777 6393.** View shows central open area with the headwaters of the Allt Chapull-cloiche initially flowing west, then north to the right of the photo. Peat is variable in this area, mainly <1.0 m. An area of deeper peat (>2.0 m) is present to the south, just out of shot.
	**(D) View of existing access track looking south, NGR NR 8776 6389.** View shows the drainage ditch along the edge of the access road with a peat layer exposed at the top of the slope. Peat is of variable thickness across this area but is generally <1.0 m apart from occasional pockets of deeper peat. In this photograph, peat soils are <0.5 m thick.

	**(E) View across Site looking south, NGR NR 8980 6270.** View south between Càrn Chaluim and Guallan Mhòr showing forested area to RHS, and recently harvested area to LHS. A tributary to the Skipness River is present within the small valley. Peat is generally <1.0 m, with an area of deeper peat within the forestry to the RHS.
	**(F) View of Site looking north-east, NGR NR 8829 6180.** View shows example of Skipness forest with a tributary to the Garbh Allt flowing through the fire break. This area is representative of the open breaks within mature forestry. Peat is variable, with some areas >2.0 m interspersed with shallower peat.
	**(G) View across Site looking north, NGR NR 9070 6190.** View shows a recently harvested area of Skipness forest with remaining stumps, brash and disturbed shallow soils. Peat is recorded either as absent (<0.5 m) or shallow (<1.0 m) throughout most of the harvested areas; however, soils are extensively disturbed from the harvesting activity with fragments of shallow bedrock brought to the surface.

	**(H) View north-west from NGR NR 8800 6210 along forestry drain.** Forestry drain within Skipness Forest showing significant Sphagnum growth within the ditch. Peat is variable within the forestry, with pockets of deep peat (>2.0 m) in between areas of shallow (<1.0 m) or no peat (<0.5 m). Areas of peat development are mainly in areas with flat or gentle slopes.
	**(I) View of Site looking west, NGR NR 8740 6280.** Remnants of former small quarry within north-eastern part of Skipness forest showing thin layer of peat above shallow bedrock. Peat depths in the area are variable with shallow/no peat common in areas like this with significant ground slopes.
	**(J) View across Site looking north-west along drainage ditch, NGR NR 8980 6200.** View shows recently harvested area including disturbed shallow soils with mixed loose bedrock. Peat is almost exclusively recorded at depths <1 m in the area. Soils and peat in harvested areas like this have been significantly disrupted by harvesting activity, resulting in mixing of soil layers and incorporation of broken fragments of bedrock within the soil layers.

	**(K) View south from NGR NR 8775 6300 along watercourse** View shows a fire break with a tributary to the Garbh Allt from near the northern edge of Skipness forest looking south towards T07. Peat in this area is 0.6-1.2 m deep around the watercourse, with much deeper peat (>2.0 m) to either side within the forestry blocks.

4 MAPPING

Peat depth survey

4.1 Initial peat depth surveying was undertaken by RSK between 23rd and 27th March 2020, with a supplementary survey between 4th and 8th May 2020. This Phase 1 survey consisted of a 100 m grid across the development area in order to develop a picture of the overall pattern of peat development across the study area. The survey results were used to inform the infrastructure design, in order to minimise incursion into areas of deeper peat. Some areas were not accessible as a result of ongoing harvesting activity, ecological restrictions and areas that were unsafe for access on foot.

4.2 A subsequent phase of peat depth surveying was undertaken by RSK between 3rd and 8th August 2020, with a supplementary survey between 9th and 14th April 2021 and on 6th January 2022. For this Phase 2 survey, peat depths were recorded at 50 m intervals along proposed tracks, crosshair probing at turbine base locations and in grids across hardstanding areas, site compounds and buildings, the solar area and borrow pit areas. Offset records were made alongside existing tracks that would require widening as part of the Development.

4.3 Peat probing point locations were recorded using a handheld GPS with typical accuracy of ±5 m and peat depths were measured to an accuracy of ±0.05 m. All measurements were recorded to full depth/point of refusal.

4.4 The survey results are summarised in **Table 10.1.3**.

4.5 The peat depth survey indicates that approximately two-fifths of the study area has no peat, with 40.3 % of the measured locations having topsoil or peaty soil cover up to 0.5 m deep. 82.4 % of the area has peat depths of 1.5 m or shallower. The deepest recorded peat was 6.2 m.

Table 10.1.3: Summary of peat depth probing results

Peat depth range (m)	No. of points	Percentage of points
0.00	38	2.0
0.01 – 0.50	717	38.4
0.51 – 1.00	556	29.8
1.01 – 1.50	230	12.3
1.51 – 2.00	129	6.9
2.01 – 2.50	104	5.6
2.51 – 3.00	47	2.5
3.01 – 3.50	18	1.0
3.51 – 4.00	10	0.5
4.01 +	18	1.0
Total:	1,867	100

4.6 The peat depth survey and reconnaissance survey both confirm that peat is present in the area but is patchy and irregular in its distribution across the Site. One main area of deep peat is present to the north of Turbine 9, with smaller areas of deep peat notable

west and north of Turbine 7, south-east of Turbine 10 and south-east of Turbine 5. The probing data indicate that the peat depth can vary very substantially over short distances.

Indicative peat depth mapping

4.7 The combined peat depth survey results were used to produce an extrapolated indicative peat depth map for the study area. The extrapolated peat depth map was produced using a Gravity interpolation across the survey area with a 10 m cell size.

4.8 The advantage of using a digital interpolation is that the process is fully objective and there can be no subjective influence. However, the process is not able to allow for known variation in peat development in varying topographical settings. As a result, there may be over-estimation of peat development in areas of steep or well-drained ground, and potential under-estimation of peat development in flatter or poorly drained areas. Owing to the good resolution of the underlying data, the interpolation appears largely to give a representative indication of peat depth across the study area.

4.9 The indicative peat depth map for the study area is provided in **Figure 10.1.5**.

Peat sampling and analysis

4.10 Peat core samples were taken at four locations and the peat cores were logged using the modified Von Post humification and wetness scale. Core logs and photographs are provided in Annex 1.

4.11 Four peat core samples were sent for analysis by Envirolab. Analysis results are provided in **Table 10.1.4** and sampling locations are shown on **Figure 10.1.5**.

Table 10.1.4: Peat sample analysis results

Client Sample ID	Units	Limit of Detection	Method	C1	C2	C3	C4
Depth to Top				**0.80**	**0.85**	**2.30**	**0.24**
Depth to Bottom				**0.95**	**0.95**	**2.45**	**0.41**
Date Sampled				**07-Aug-20**	**07-Aug-20**	**07-Aug-20**	**07-Aug-20**
Sample Type				**Soil**	**Soil**	**Soil**	**Soil**
% Moisture at <40°C	% w/w	0.1	A-T-044	18.4	1.8	19.9	0.2
% Stones >10mm	% w/w	0.1	A-T-044	<0.1	<0.1	<0.1	<0.1
pH	pH	0.01	A-T-031s	4.45	5.4	4.74	4.38
Total Carbon	% w/w	0.1	A-T-032s	54.7	46.3	54.5	46.3
Wet weight	g			169.2	113.9	166.4	112.1
Dry weight	g			41.2	12.2	36.6	11.9
Bulk density	g cm^{-3}			1.06	1.07	1.04	0.62

5 PEAT CONDITION

Developments on peat

Definition of peat

5.1 Scotland's Soils (2018a) classifies peat as:

> *"An accumulation of partially decomposed organic material, usually formed in waterlogged conditions. Peat soils have an organic layer more than 50 cm deep from the soil surface which has an organic matter content of more than 60%."*

5.2 Organic soils which are less than 50 cm thick can also support peatland vegetation and as a result are also considered within Scotland's broader peatland system in Scotland's National Peatland Plan (NatureScot, 2015). These are often described as 'peaty gleys' or 'peaty podzols', reflecting key aspects of the underlying soil. Peaty soils have a higher plant fibre content and are less decomposed than peat.

5.3 Active peatland typically consists of two layers: the surface layer or *acrotelm* and the deeper layer or *catotelm*. The acrotelm contains the living vegetation and consists of living and partially decayed plant material. It typically has a low but variable hydraulic conductivity and allows some through-flow of water within the plant material. The underlying catotelm is denser, with a very low hydraulic conductivity, and is formed from older decayed plant material. The catotelm varies in structure, in some areas retaining a proportion of fibrous material and in other areas being more humified and amorphous. The degree of humification typically increases with depth.

5.4 Underneath the peat-forming layers, the basal substrate can be a mineral soil, a superficial deposit such as glacial material, or bedrock. There may be a transition zone through a mineral-rich peaty layer at the base of the peat, although this is usually no more than 5 cm in thickness.

Importance of peat

5.5 Peatland forms a key part of the Scottish landscape, covering more than 20 % of the country's land area, and forming a significant carbon store (Scotland's Soils, 2018b). In addition, peatland is an internationally important habitat.

5.6 Active and healthy peatlands develop continuously, removing carbon dioxide from the atmosphere and storing it within the peat soil. Peatland protection and restoration form key parts of the Scottish Government's Climate Change Plan, which targets restoration of 50,000 hectares (ha) of degraded peatland by 2020 and 250,000 ha by 2030 (Scottish Government, 2018).

5.7 It is therefore important that developments in upland areas, where peat is most likely to be encountered, take recognition of the importance of peatland as a habitat and carbon store. Careful planning of developments, and careful infrastructure design, can remove or minimise the disturbance of peat that would be needed to allow the development to proceed.

Peat condition survey

5.8 As part of the peat depth surveys, information was collected concerning the condition of the peat present within the Site. NatureScot recognises five categories of peatland condition: (1) Near-natural; (2) Modified; (3) Drained; (4) Actively eroding; and (5) Forested/Previously Afforested (NatureScot, 2018).

5.9 As the study area is principally within a forestry plantation, the majority of the area falls into category 5.

5.10 Within the forested areas, small areas of Near-natural peat are present (category 1), particularly in the vicinity of natural watercourses which prevented the development of forestry. Deer were observed during the field surveys which are likely to impact some areas in the form of grazing and trampling, although significant impacts were not recorded.

5.11 Throughout the open part of the Site, between the two forestry parcels, peat is mainly in the form of upland blanket peat. The peatland condition is a mixture of Near-natural (category 1) and Modified (category 2), with small areas Actively eroding (category 4). Evidence of small revegetated erosion features and limited impacts from grazing and trampling were recorded. During site surveys both deer and sheep were observed within the central part of the study area.

Peatland restoration

5.12 Within the Site, a number of peatland areas potentially suitable for restoration have been identified within Skipness forest. These include two main areas – in the north west around Turbines 7 and 8, and in the north near Turbine 9. Additional smaller areas are present near Turbines 1 and 15, near Turbine 4 and around Turbines 5 and 10 in the south of the Site.

5.13 Restoration works may include: blocking of natural or artificial drainage channels to encourage re-wetting and regrowth of *Sphagnum* species; reprofiling of gully sides and replacement of vegetation; use of geotextile and/or mulches to prevent erosion and encourage natural regrowth of vegetation; and exclusion of grazers through fencing.

5.14 Peatland restoration proposals for the project are discussed in **Technical Appendices 10.2** and **8.5** (Habitat Management Plan) of the EIA Report.

6 HAZARD AND RISK ASSESSMENT

6.1 For the purposes of this peat slide risk assessment, the following definition of risk has been adopted:

Risk = Probability of a Peat Landslide x Adverse Consequences

6.2 Probability, or likelihood, can be estimated in a number of ways and should take account of both natural factors and man-made or man-imposed factors that could influence slope stability. Man-made or man-imposed factors can include overgrazing from over-stocking, excavation of drainage ditches or grips, or heather burning for land management purposes. Natural factors can include extreme weather events such as very high intensity rainfall, or prolonged dry periods followed by storms.

6.3 The methods of assessment of likelihood and adverse consequences used here are described below.

Assessing likelihood

6.4 As peat slope failures are mainly considered to resemble planar translational slides, the assessment of likelihood of a peat landslide makes use of the Infinite Slope Model (Boylan & Long, 2014) to assess stability of the peat across the slopes in the Site, in line with the Scottish Government guidance (Scottish Government, 2017). The Infinite Slope Model assesses slope stability by calculating the forces resisting failure (shear strength or cohesion) and the forces inducing failure (shear stress) and taking a ratio of these, known as the Factor of Safety. The modified Infinite Slope Model equation is as follows:

$$F = \frac{c'}{\gamma\, z \sin\beta \cos\beta}$$

where
- F = Factor of Safety, the ratio of forces resisting a slide to forces causing a slide
- c' = undrained shear strength of the material; kPa
- γ = specific weight of peat, undrained in situ; kN/m^3
- z = peat depth; m
- β = slope of ground surface, assumed to be parallel to the slope of the failure plane; degrees

6.5 If F > 1, the slope is stable; if F < 1 the slope is unstable; if F = 1 the forces are exactly balanced. It is possible to state with some confidence, therefore, that if F > 1.3 the slope is stable and would have some resistance to change.

6.6 Values assigned to the parameters are provided in **Table 10.1.5**, along with an explanation for their selection.

Table 10.1.5: Parameters for the Infinite Slope Model

Parameter	Value and Derivation
F	Calculated value
c'	5.1 kPa Published shear strength values for peat vary from 4.5 to 60 kPa or more (e.g. Long, 2004). Published values from recent field tests tend to cluster between 10 and 20 kPa with some higher and lower values recorded. The selected value represents the maximum of a back-calculated minimum c' (see explanation below).
γ	10.40 kN/m^3 Derived from density of peat multiplied by acceleration due to gravity (9.81 m/s^2). Density of peat varies depending on degree of decomposition and water content; published values range from 500 to 1,400 kg/m^3. This value is derived from peat core samples collected from the Development, which came to a mean value of 1,060 kg/m^3.
z	Where available, measured peat depths have been used. For grid analysis, the maximum interpolated depth within the grid has been taken to provide a conservative estimate.
β	Slope angles have been derived from the DTM for the Site. Grid cell slopes were all derived from the Site DTM. The DTM used for slope angle generation has a resolution of 5 m. The slope raster map was generated within the GIS software used for the analysis. Average (mean) slope angles were used for each cell.

6.7 The shear strength, c', has been estimated from study area data. This is undertaken by assuming that the slope is just marginally stable at each point where peat depth has been measured, i.e. the slope has F = 1. The Infinite Slope Model equation can be rearranged to derive a value for c', using the other parameters as described in **Table 10.1.5**

6.8 It is important to note that the calculated values of c' for each location represent the *minimum* shear strength needed for the peat to be stable. In fact, the shear strength may be, and in most cases probably is, considerably higher. For example, on very shallow slopes the peat needs only a very low shear strength to remain stable, whereas on steeper slopes a much higher shear strength is required to hold the peat on the slope. For this reason, the higher estimated values of c' are of more relevance as they are more likely to be representative of the actual shear strength of the peat on the study area. For this assessment, the maximum value of the calculated shear strengths has been used in the stability analysis. This gives a value of 5.1 kPa, as stated in **Table 10.1.5**.

6.9 For the proposed Development, 1,841 locations have been probed during the phases of fieldwork. c' values have been calculated for each of these and the distribution is provided in **Figure 10.1.A**.

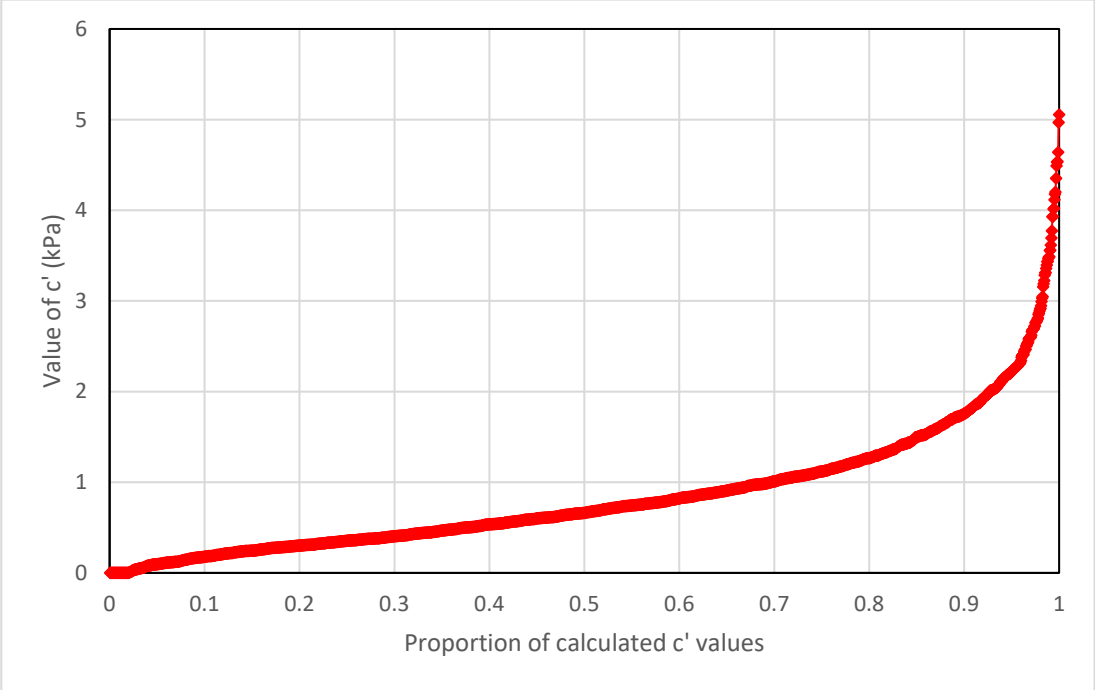


Figure 10.1.A: Estimate of minimum shear strength, c'

6.10 In order to produce a study area-wide dataset for Factor of Safety, a grid of 50 x 50 m cells was overlain across the study area and a Factor of Safety calculated for each cell. It is a standard and widely recognised GIS technique to use a regular grid for terrain analyses of this kind. It allows a systematic process across the landscape and minimises the subjectivity of the analysis. The 50 x 50 m cells are referred to as 'grid cells' throughout the analysis.

6.11 The Factor of Safety, F, has been calculated for each peat probing location within the study area, and for each grid cell within the survey area. Areas clearly unsuitable for development were excluded from surveying and, as a result, some parts of the application boundary area have not been included in the analysis as local peat depth records are not available for these areas. The Factors of Safety have been divided into classes, which have been used to map the likelihood of a peat landslide occurring at each point and for each grid cell across the study area. The results are presented in **Table 10.1.6**.

6.12 The calculated Factor of Safety results have been considered together with field observations and geomorphological assessment to take into account additional risk factors including breaks in slope, or risk reduction factors such as areas of bedrock exposure. These factors have been applied to the calculated Factor of Safety results and the grid cell classes have been changed as appropriate based on the geomorphological mapping. For cells where both additional risk factors and risk reduction factors are both present, no change has been made to the calculated results.

Table 10.1.6: Summary of Infinite Slope Model results

Likelihood	No. of points	% of points	No. of cells	% of cells
Nil	756	40.4	1,938	22.6
Negligible	987	52.9	5,043	58.9
Unlikely	113	6.0	1,269	14.8
Likely	12	0.6	167	2.0
Probable	3	0.2	68	0.8
Almost certain	0	0.0	81	0.9
Totals	**1,871**	**100.0**	**8,566**	**100.0**

6.13 The Likelihood map is provided in **Figure 10.1.6**.

Assessing adverse consequences

6.14 Potential adverse consequences resulting from a peat landslide cover a wide range, from environmental through to economic and, potentially, harm to life. Scottish Government (2017) gives five examples, as follows:

- Potential for harm to life during construction;
- Potential economic costs associated with lost infrastructure or delays in the construction programme;
- Potential for reputational damage associated with the occurrence of a peat landslide in association with construction activities;
- Potential for permanent, irreparable damage to the peat resource, in terms of both carbon store and habitat, through mobilisation and loss of peat in a landslide; and
- Potential for ecological damage to watercourses and waterbodies subject to inundation by peat debris.

6.15 Adverse consequence has been assessed taking account of environmental sensitivity, including potential consequences to water quality from peaty debris and habitat loss by peat removal and by blanketing of sensitive areas with peat debris, and economic significance, including damage to infrastructure and construction delays resulting from a peat landslide, in line with current guidance (Scottish Government, 2017).

6.16 Adverse consequence has been assigned as follows:

- **Very high consequence:** public roads (A83), wind turbine foundations, substation, solar area, private water supply sources;
- **High consequence:** watercourses and waterbodies, areas of sensitive habitat, turbine hardstandings, substation or construction compounds, meteorological mast;
- **Moderate consequence:** areas of moderately sensitive habitat, access tracks, Kintyre Way footpath;
- **Low consequence:** areas of low sensitivity habitat, borrow pits;
- **Very low consequence:** damaged or degraded habitat.

6.17 **Table 10.1.7** below provides a summary of the grid cells in the study area assigned the various consequence ratings. The adverse consequence map is provided in **Figure 10.1.7**.

Table 10.1.7: Summary of adverse consequence ratings

Adverse consequence	No. of cells	% of cells
Very high consequence	89	1.0
High consequence	2,247	26.2
Moderate consequence	534	6.2
Low consequence	5,696	66.5
Very low consequence	0	0.0

Risk assessment

6.18 The Likelihood and Adverse Consequence are combined to produce an estimate of risk for each grid cell within the study area. The risk assessment matrix used to combine these two parameters is provided in **Table 10.1.8** below.

Table 10.1.8: Risk assessment matrix

		Adverse consequence				
		Extremely high	High	Moderate	Low	Very Low
Peat landslide likelihood	Almost certain	High	High	Moderate	Moderate	Low
	Probable	High	Moderate	Moderate	Low	Negligible
	Likely	Moderate	Moderate	Low	Low	Negligible
	Unlikely	Low	Low	Low	Negligible	Negligible
	Negligible	Low	Negligible	Negligible	Negligible	Negligible

6.19 **Table 10.1.9** below provides a summary of the risk ranking for the grid cells across the Site, together with an indication of appropriate mitigation from Scottish Government (2017). The risk ranking map is provided in **Figure 10.1.8**.

Table 10.1.9: Summary of risk ranking and appropriate mitigation

Risk ranking	No. of grid cells	% of grid cells	Appropriate mitigation
High	15	0.2	Avoid project development at these locations
Moderate	94	1.1	Project should not proceed unless risk can be avoided or mitigated at these locations, without significant environmental impact, in order to reduce risk ranking to low or negligible
Low	641	7.5	Project may proceed pending further investigation to refine assessment, and mitigate hazard through relocation or re-design at these locations
Negligible	5,878	68.6	Project should proceed with monitoring and mitigation of peat landslide hazards at these locations as appropriate
No peat	1,938	22.6	No peat landslide hazard

6.20 Most of the Site has been assessed as having a negligible risk of peat landslide, or of having no peat (91.2%). Ninety-three grid cells have been assessed as having a moderate risk of peat landslide and 15 with a high risk.

6.21 Of the 109 grid cells assessed as having moderate or high risk, only six are located near Development infrastructure. These cells and their immediate surroundings have been the subject of further investigation in order to refine the assessment in these areas. This is detailed in Section 7.

6.22 The remaining moderate or high-risk cells have been considered in relation to natural peat slide and the risk this may cause to the proposed Development infrastructure and nearby protected areas. This is also discussed in **Section 7**.

Peat slide risk associated with blasting for aggregate

6.23 As with many renewable energy developments, rock extraction for the proposed Development is proposed to be achieved by blasting. It is recognised that shock waves from blasting have the potential to travel through the bedrock and could, potentially, be associated with triggering instability in peat areas at some distance from the borrow pit sites. All borrow pit sites have been located within areas with minimal or no peat, to restrict the potential for induced peat slide adjacent to the borrow pit areas.

6.24 All blasting will be under the supervision of a qualified and experienced blast engineer. The smallest practicable amount of explosive would be used in order to minimise shock waves resulting from the blast. Additional pre-drilling of the blast face may be appropriate to provide a higher level of control of the blast, particularly if this allowed use of smaller amounts of explosive; this would be undertaken on the advice of the blast engineer on the site.

6.25 Significant excavation works would be restricted when blasting for aggregate is planned at Borrow Pits 2 or 3, with restrictions affecting Turbines 1, 8 and 13 and the substation area for Borrow Pit 2, and Turbines 2, 4 and 11 for Borrow Pit 3. Works would only continue after appropriate inspections have determined that ground instability has not arisen as a result of the blast.

6.26 Visual peat monitoring would be undertaken following periods of blasting, to inspect nearby infrastructure locations for any signs of potential instability. This would include recording any signs of cracking or mounding of peat, which can be the early signs of slippage. It is recommended that infrastructure and peat areas within 500 m of the blasting location are visited, with additional locations if relevant as recommended by the Environmental Clerk of Works (ECoW).

6.27 Blasting may be restricted in periods of significant wet weather, upon the advice of the blast engineer. Wet weather definitions are provided in **Technical Appendix 10.2** of the EIA Report.

6.28 Blasting has been undertaken previously within the Site by FLS in order to extract aggregate for forestry track construction and maintenance. No induced instabilities have been reported as a result of this activity, and no signs of induced ground instability were observed during any of the site surveys.

7 DETAILED ASSESSMENT AND MITIGATION

7.1 Six grid cells within the Site have been identified as having a moderate risk of peat landslide. In addition, four main clusters of cells within or just outwith the application boundary have been identified as having moderate and high risk of peat landslide. The areas identified for detailed assessment are indicated on **Figure 10.1.8**.

7.2 These cells have been considered in greater detail, as eight groups: Areas 1-6 consider the six individual cells within the proposed Development footprint; Areas 7-10 consider the four wider cell clusters that are located some distance from the Development infrastructure. Relevant photographs of the areas are included to provide additional context.

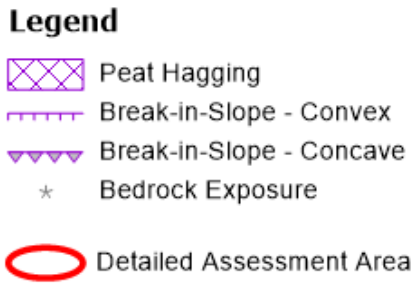
7.3 The inspection for Areas 1-6 includes a detailed inspection of the highlighted cells, the cells immediately around and downslope of them, the measured peat depths and slope angles present, drainage features and the nature of the proposed nearby infrastructure. Mitigation measures are recommended to reduce or control the risk for the areas.

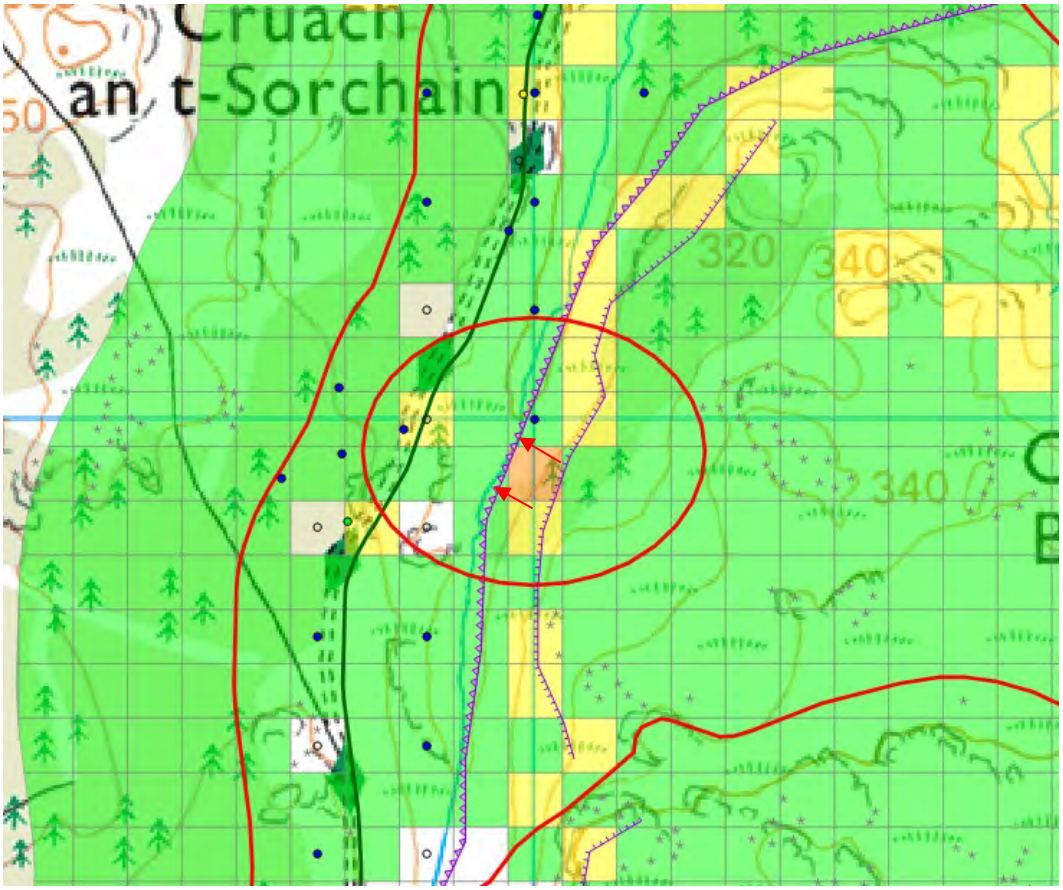
7.4 The inspection for the clusters of cells in Areas 7-10 have been further appraised to determine if there is any risk to downslope receptors including the Tarbert Woods Site of Special Scientific Interest (SSSI) and proposed Development infrastructure.

7.5 Following detailed consideration, the risk ranking has been re-appraised in the light of the presented information and proposed mitigation. Each description is accompanied by a map of the cell and its immediate surroundings. The grid cells in each map are 50 x 50 m, to give an indication of scale. Green cells have negligible risk; yellow cells have low risk; orange cells have moderate risk; red cells have high risk. Blank cells have no peat as defined in the PLHRA Guidelines (Scottish Government, 2017).

7.6 The points on the maps show the calculated Likelihood rating for all locations with directly measured peat depth, where blue is negligible; green is unlikely; yellow is likely; orange is probable; and red is almost certain.

7.7 Other symbols used on the maps are described below:





Area 1:

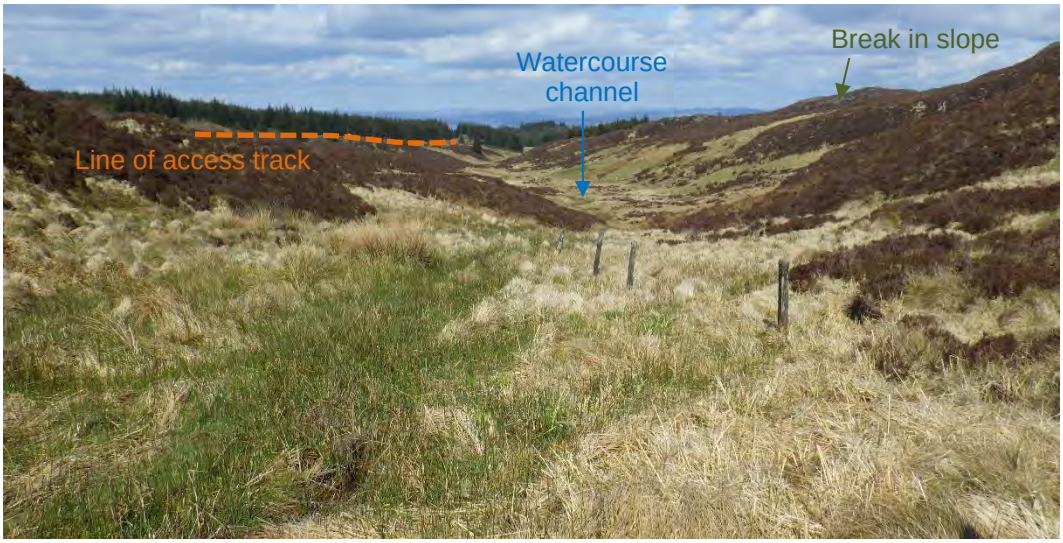
One cell west of the access track, near the southern margin of Corranbuie forest, has been assigned Moderate Risk. The cell is immediately adjacent to a watercourse. The assigned risk level relates to the sensitivity of the receptor, the unnamed watercourse, and its associated High consequence rating. The watercourse channel is within the north-east corner of the cell.

Calculated likelihood for the cell is Likely, reflecting the combination of interpolated peat depth, slope present within the cell and the presence of a convex break-in-slope. There is no infrastructure upslope of the cell and there is no activity planned to take place within the cell. The nearest construction activity is planned to be approximately 86 m away and will involve widening of the existing track.

The interpolated peat depth is 1.10 m, with an average slope angle for the cell of 16.5°.

Potential runout from any failure: Any failure in this or adjacent cells would travel north-west down the slope and terminate in the watercourse channel. A failure could affect the integrity of the channel and may cause temporary damming of the watercourse. Runout paths are indicated by arrows.

The nearest infrastructure, the access track, is at approximately the same elevation as the cell, on the opposite side of a small valley, and would not be affected.



Photograph looking N along watercourse near Area 1

Rocky outcrops are visible along the slope to the east side of the watercourse, making it unlikely that there is much peat development along the slope. Peat depth records from similar slopes in the nearby area are consistently <1.0 m, and often <0.5 m, with a very patchy distribution indicating highly variable peat development. There is likely to be peat within the watercourse channel, where the slope angle is very low.

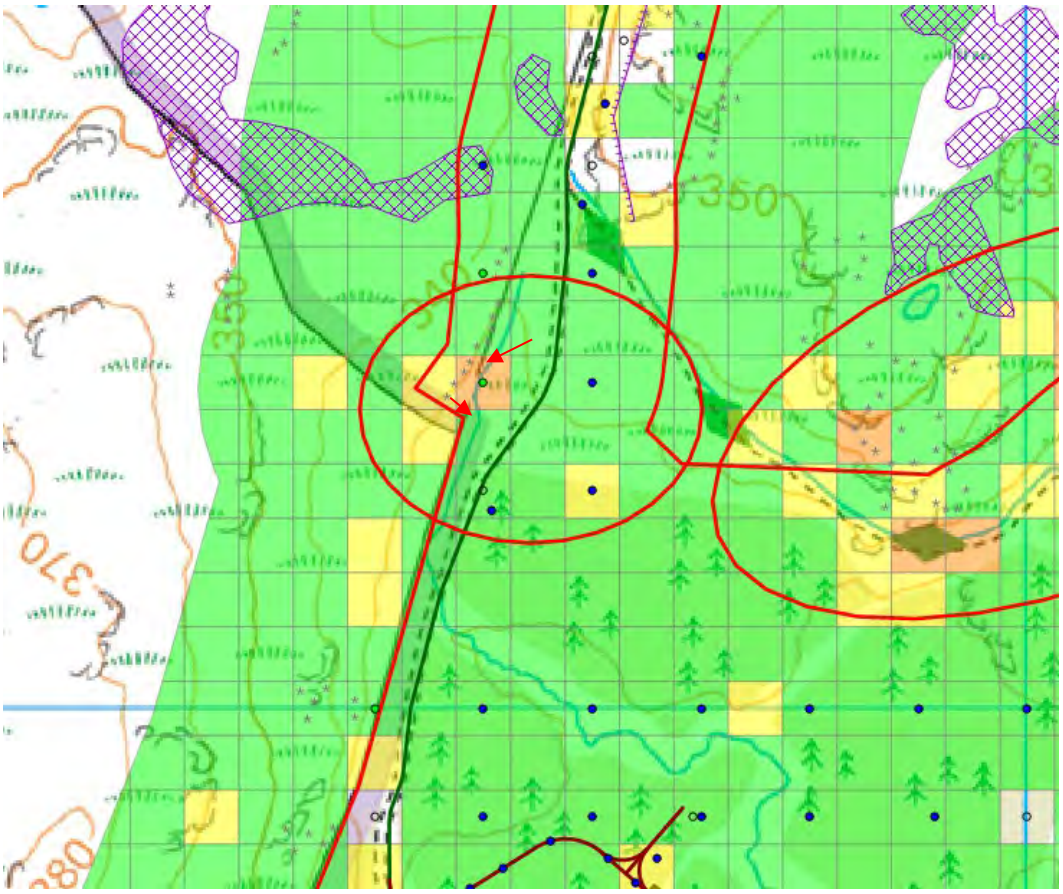
Calculated likelihood for the measured peat depth points are shown on the figure above. It can be observed that all but one of the peat depth records have a calculated likelihood no greater than Negligible, with one record at Low, based on the actual slope present at that peat depth record.

Mitigation

Closer inspection of the highlighted cell indicates that the interpolated peat depth is likely to over-estimate the actual depth within the cell. In addition, the areas with steepest slopes and the areas with deepest peat are not coincident – the steeper slopes are in the south-east part of the cell and the deepest peat would be expected around the watercourse channel in the north-west part (see photograph above). The elevated Risk ranking is considered to be an artefact of the grid-based assessment.

Work in the area is confined to upgrades to the existing access track and would be under supervision of the Environmental Clerk of Works at all times. Widening of the track is proposed on the west side of the existing track, to maintain separation from the watercourse and associated sensitive habitats.

Revised risk ranking:
Negligible



Area 2:

One cell east of the access track, near the northern margin of Skipness forest, has been assigned Moderate Risk. A watercourse crosses the central part of the cell. The assigned risk level relates to the sensitivity of the receptor, the unnamed watercourse, and its associated High consequence rating.

Calculated likelihood for the cell is Likely, reflecting the combination of deep peat by the watercourse and a comparatively steep slope present within the cell. The presence of bedrock outcrops has reduced the likelihood by one class. The nearest construction activity is planned to be adjacent to the cell and will involve widening of the existing track.

The recorded peat depth is 2.8 m, with an average slope angle for the cell of 9.52°.

Potential runout from any failure: Any failure in this area is restricted by the potential length of the slope and would be less than 30 m. Any slide would terminate in the watercourse channel. A failure could affect the integrity of the channel and may cause temporary damming of the watercourse. Runout paths are indicated by arrows.

Photograph looking S along watercourse from the peat sampling location in Area 2.

Inspection of the photograph indicates that the slope to the west of the valley is steep but rocky, indicating that peat must be largely absent from this section. A peat depth of 2.8 m was recorded adjacent to the watercourse channel, within the flat boggy area within the valley floor where slope angles are very low.

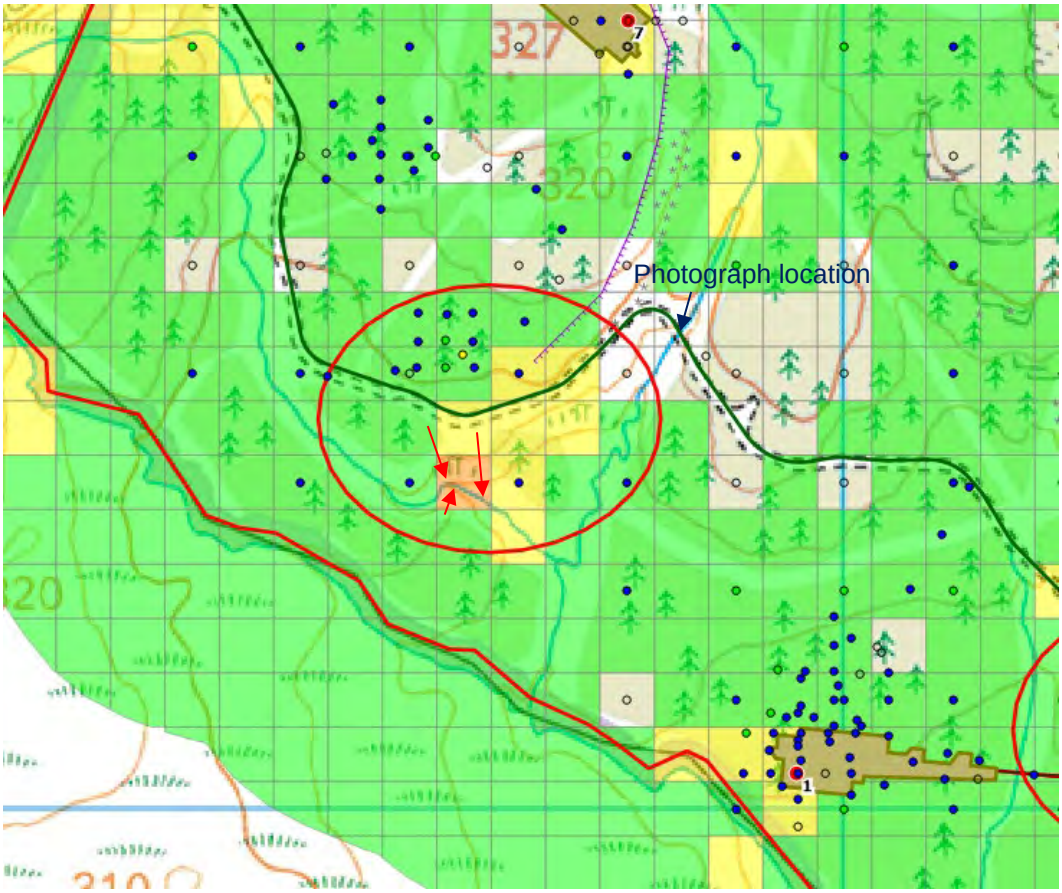
Calculated likelihood for the peat depth record within the cell is Low, despite the deep peat at this location, as the slope is relatively low. Other nearby calculated likelihood values for peat depth records are low or ngeligible, with some areas where no peat was recorded.

Mitigation

Closer inspection of the highlighted cell indicates that the area of deep peat is not coincident with the steeper slopes, and that the steeper slopes are present in areas characterised by rocky outcrops. The elevated risk ranking is considered to be an artefact of the grid-based assessment and does not accurately reflect the risk status at this location.

Work in the area is confined to upgrades to the existing access track and would be under supervision of the Environmental Clerk of Works at all times. Widening of the track is proposed on the east side of the existing track, to maintain separation from the watercourse and associated sensitive habitats.

Revised risk ranking:
Low



Area 3:

A single cell with Moderate Risk ranking is located south of the access track in the area between Turbines 1 and 7. A watercourse crosses the centre of the cell. The assigned risk level relates to the sensitivity of the receptor, a tributary to the Garbh Allt, and the comparatively steep slopes present in this area.

Calculated likelihood for the cell is Likely, reflecting the combination of a comparatively deep interpolated peat depth and steep slope angles within the cell. There are no associated risk or risk reduction factors for this cell. The nearest construction activity is planned to be approximately 35 m north of the cell and will involve widening of the existing track.

The interpolated peat depth is 1.2 m, with an average slope angle for the cell of 18.9°.

Potential runout from any failure: Any failure in this area would terminate in the watercourse channel, with longer potential slides from the north side (approx. 60 m) than from the south (26 m). A failure could affect the integrity of the channel and may cause temporary damming of the watercourse. A failure on the north side has the potential to affect the integrity of the access track in this area. Runout paths are indicated by arrows.

Photographs from nearby areas show the slope is comparatively steep and has the form of a river terrace (see photograph above). Depth records on the slope are all <0.5 m indicating that there is little or no peat on the slope. One peat depth record upstream of the highlighted cell has peat at 0.8 m above the main slope; a second record down-stream, in a wide flat area, has peat at 1.35 m.

Calculated likelihood for both nearby peat records is Negligible. The nearest record directly on the slope, but further round from Area 3, has no peat.

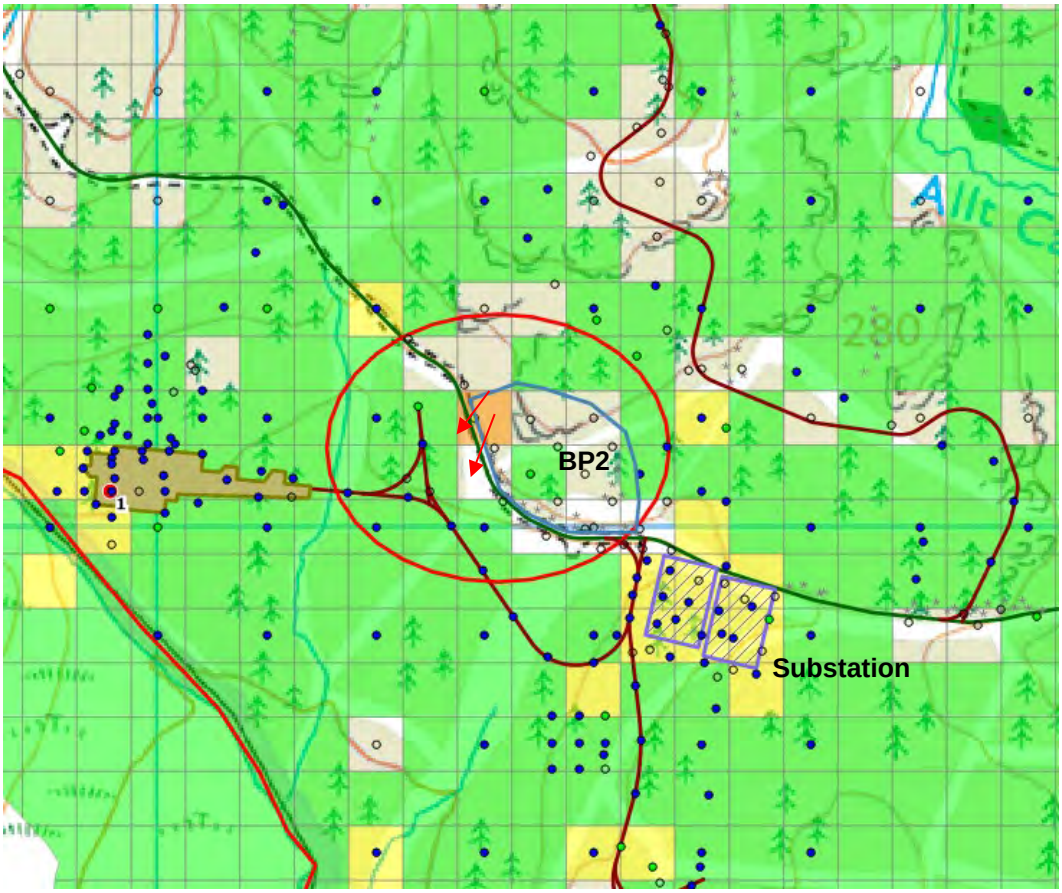
At the north-eastern part of the highlighted area, FLS borrow pit 2 includes an area built out over the slope using aggregate material derived from the quarry. Despite significant loading of the slope, no signs of instability either in the area of made ground or around the slope were observed during any of the site visits.

Mitigation

Close inspection of the highlighted cell indicates that the interpolated peat depth within the cell is most likely to reflect the lowest area at the south-east corner, where the watercourse channel flattens out. The nearest depth record to this point (30 m E) is 1.35 m. Evidence from the immediate area indicates that the steep slope areas are most likely to have no peat. The elevated risk ranking is considered to be an artefact of the grid-based assessment, with interpolated deep peat and a steep slope present in different parts of the cell but not coincident. It does not, therefore, accurately reflect the risk status at this location.

Work in the area is confined to upgrades to the existing access track, and would be under supervision of the Environmental Clerk of Works at all times. Widening of the track is proposed on the north side of the existing track, to avoid the steeper slopes and to maintain separation from the watercourse. Should FLS BP2 require use for aggregate, monitoring will be undertaken in the area including along the steeper slopes and within the highlighted cell to check for any induced instability along the slopes.

Revised risk ranking:
Low



Area 4:

A single cell with Moderate Risk ranking is located on the access track at the north-east corner of BP2. The assigned risk level relates to the measured peat depth within this cell and to the comparatively steep slope present in this area.

Calculated likelihood for the cell is Almost Certain, reflecting the combination of a deep peat depth measurement and steep slope angles within the cell. There are no associated risk or risk reduction factors for this cell. The nearest construction activity would be within the cell, involving widening of the existing track and excavation of the borrow pit area.

The measured peat depth is 2.6 m, with an average slope angle for the cell of 13.3°.

Potential runout from any failure: Any failure in this area would be very likely to affect the access track. A failure from above the access track would either terminate against it, or cross the track to the flatter ground below. A failure below the access track may affect the integrity of the track, although any failure in this area would be limited in size by the length of slope (<5 m) below the track. Runout paths are indicated by arrows.

Photograph SE from Area 4 showing steeper slopes to NE side of track and gentle slopes to SW side

Photograph of glacial till exposure in trackside bank in Area 4. Peat soils are visible but thin (around 0.3 m).

Photographs from the area show that peat to the north-east of the track is largely absent, with peaty soils around 0.3 m overlying glacial till (see above). Further south east, bedrock is exposed in the trackside bank. The recorded peat depth of 2.6 m was measured on the south-west side of the track, opposite the identified borrow pit, in an area with almost flat slope and impeded drainage. No signs of instability were observed in the area during site visits.

Mitigation

Close inspection of the highlighted cell and survey records indicate that the deep peat and steep slopes are not coincident. The elevated risk ranking is considered to be an artefact of the grid-based assessment, with a deep peat record and steep slope present in different parts of the cell. It does not, therefore, accurately reflect the risk status at this location.

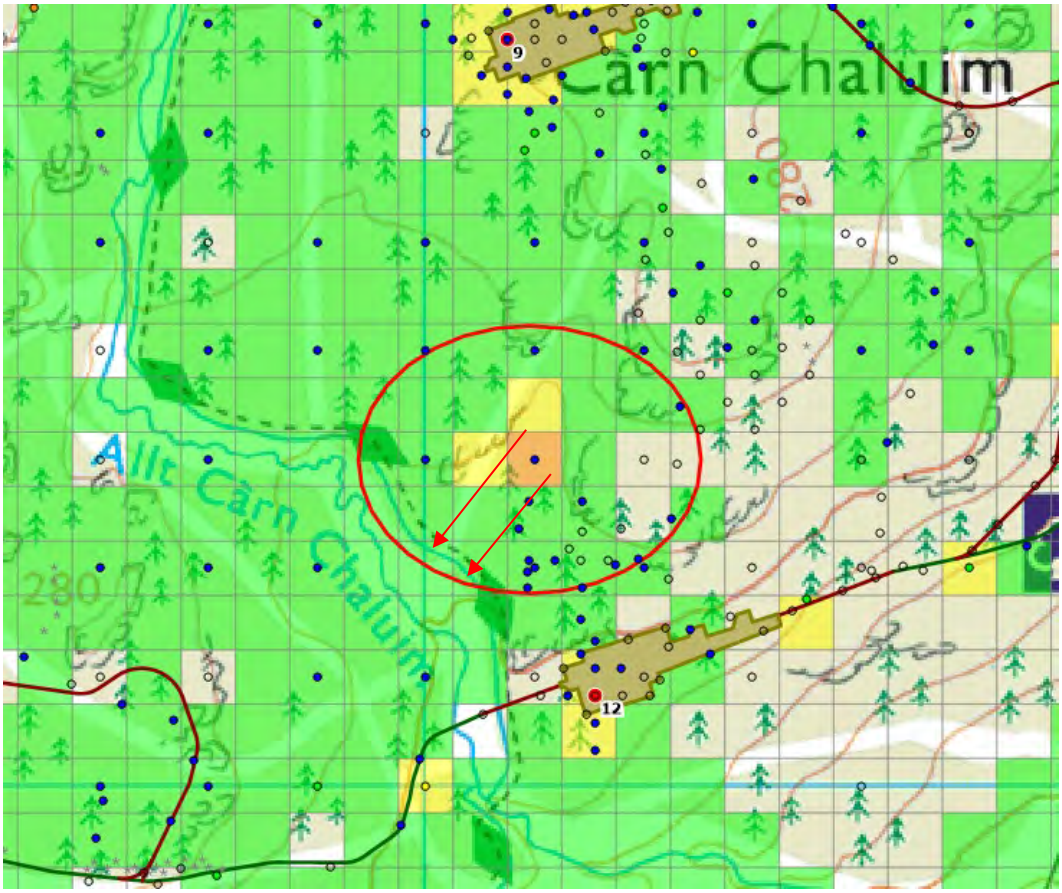
Work in the area would involve upgrades to the existing access track, rock extraction from BP2 and construction of the new substation, substation compound and sections of new access track. It is anticipated that the access track would be widened to the north-east, to avoid the area of deep peat and to facilitate access to the borrow pit area.

Plant and vehicle movements would be restricted to the immediate working area and would not be permitted in the identified areas of deep peat west of the track.

Blasting would be undertaken under the supervision of a qualified and experienced blast engineer, in line with the guidance provided in **Section 6** above. Monitoring would be undertaken after every blast to check for any indications of induced instability in the highlighted area and nearby construction areas. All works would be under the supervision of the Environmental Clerk of Works at all times.

Revised risk ranking:

Low



Area 5:

A single cell with Moderate Risk ranking is located on the slope between Turbine 9, to the north, and Turbine 12, to the south. The assigned risk level relates to the measured peat depth within this cell and to the comparatively steep slope present in the area.

Calculated likelihood for the cell is Probable, reflecting the combination of a deep peat depth measurement and steep slope angles within the cell. There are no associated risk or risk reduction factors for this cell, although rocky outcrops are present nearby. The nearest construction activity would be for Turbine 12, 160 m to the south.

The measured peat depth is 2.6 m, with an average slope angle for the cell of 10.1°.

Potential runout from any failure: Any failure in this area would be directed south-west towards the two channels of the Allt Càrn Chaluim and the Kintyre Way footpath, a distance of around 150 m. The mapped rocky areas suggest that the failure source area would be restricted in size. It is unlikely that any failure would directly impact any Development infrastructure directly, although effects on the crossing of the Allt C Càrn Chaluim would be possible. Runout paths are indicated by arrows.

Photograph looking S along Kintyre Way across potential runout area from Area 5

Photographs from the area show that the ground is undulating with mainly gentle slopes. Peat depths are variable but generally <1 m. The short sections of steeper slope, as apparent in the photograph above are formed from shallow bedrock ridges, leading to small waterfalls in the nearby Allt Càrn Chaluim channel.

Calculated likelihood for all the nearby peat records are Low or Negligible. Calculated likelihood for the peat depth record within the highlighted cell is Negligible.

No signs of instability were observed in the area during site visits.

Mitigation

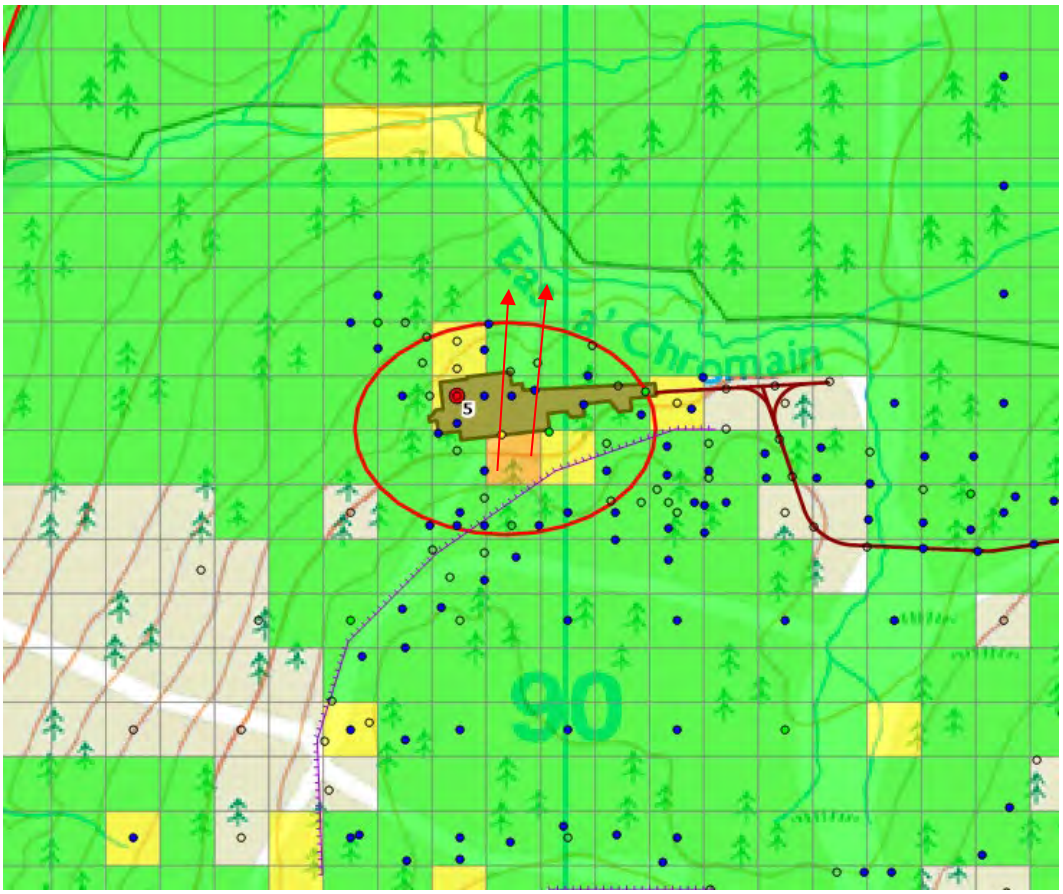
Close inspection of the highlighted cell and survey records indicate that the recorded deep peat depth and areas of steeper slopes are not coincident, as the cell lies across a small valley with steep sides and a relatively flat base. Site records from nearby areas confirm that there is considerable bedrock exposure on rocky hilltops in this part of the Site, although these are not clear from aerial imagery. The elevated risk ranking is considered to be an artefact of the grid-based assessment, with a deep peat record and steep slope present in different parts of the cell. It does not, therefore, accurately reflect the risk status at this location.

No construction work is proposed immediately adjacent to the highlighted area, with the nearest works at Turbine 12 160 m to the south. Works here would involve excavation and construction of the crane hardstanding and turbine foundation plus new and upgraded sections of access track.

All works would be under the supervision of the Environmental Clerk of Works at all times.

Revised risk ranking:

Low



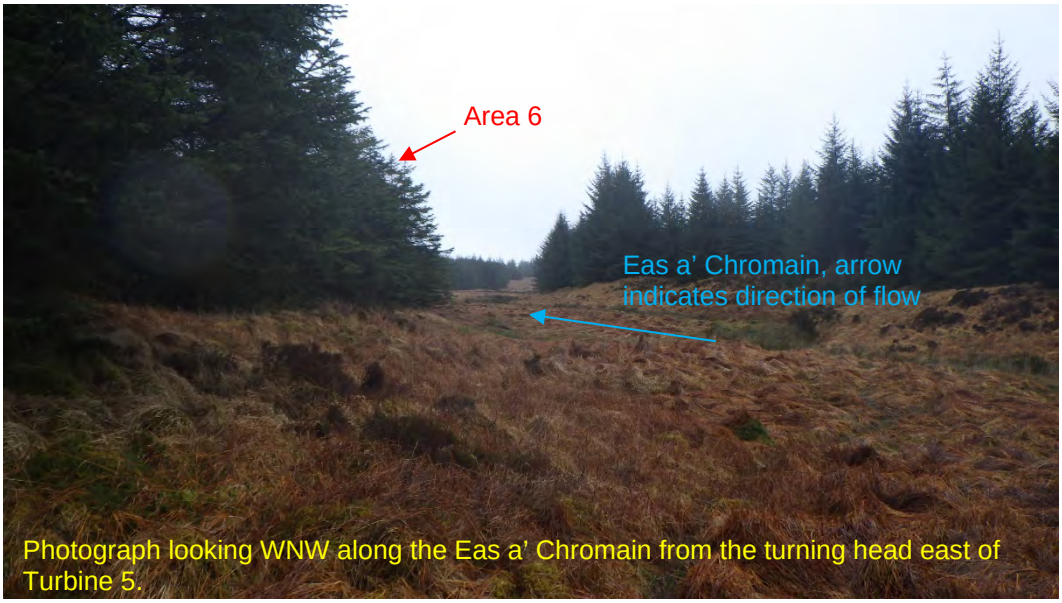
Area 6:

A single cell with Moderate Risk ranking is located on the slope immediately south of Turbine 5 crane pad. The assigned risk level relates to the measured peat depth within this cell and to the comparatively steep slope present in the area.

Calculated likelihood for the cell is Probable, reflecting the combination of a deep peat depth measurement and steep slope angles within the cell. The risk is also increased by the presence of a convex break-in-slope in the south-easternmost corner of the cell. Construction activity is proposed to take place within the highlighted cell, to allow construction of the turbine crane hardstanding. This is in the very northernmost part of the cell.

The measured peat depth is 2.1 m, with an average slope angle for the cell of 11.5°.

Potential runout from any failure: Any failure in this area would be directed north to the Eas a' Chromain, a distance of 150-250 m away. Given that the turbine crane hardstanding is located on a flat area, it is likely that any failure would terminate in this area rather than extending right across to the Eas a' Chromain, although this cannot be ruled out. Runout paths are indicated by arrows.



Photograph looking WNW along the Eas a' Chromain from the turning head east of Turbine 5.

Photographs in this area show that the area where Turbine 5 and its crane hardstanding are located are on relatively flat ground, comparable with the open ground visible in the photograph above, taken from about 300 m W of Area 6. Peat depths are variable but generally <1 m. The deep peat recorded at the southern margin of the crane hardstanding appears to form a small and restricted pocket of peat on the southern side of the flat area.

West of the turbine area the ground begins to fall away more steeply towards the Skipness River; this area is largely without peat.

Calculated likelihood for all the nearby peat records are Low or Negligible. Calculated likelihood for the peat depth record within the highlighted cell is Moderate, as the peat depth is located at the foot of the slope forming the back of the flatter area just before the slope angles become much gentler.

No signs of instability were observed in the area during site visits.

Mitigation

The southernmost margin of the crane hardstanding, and the deep peat record, are located just where the slope forming the back of the flat platform area changes to much gentler angles. It is recommended that the crane hardstanding is microsited north by approximately 10-15 m to avoid this localised change in slope angle and associated pocket of deeper peat.

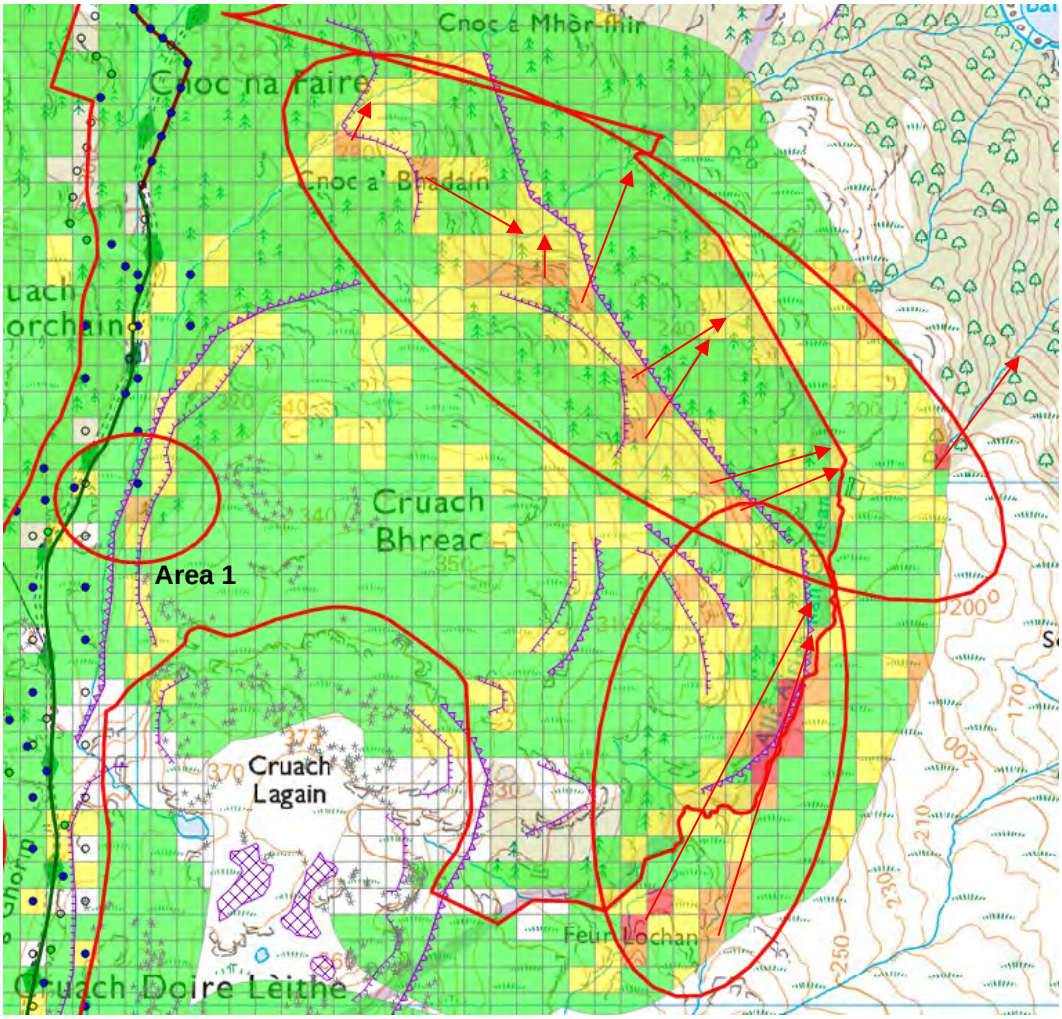
Records from around the flat platform area indicate that the peat forms a localised pocket and that the steeper slopes to the north, west and south have no peat, indicating that there is very little risk of a peat slide in this area. However, avoiding excavation in areas of deeper peat is preferred and this can be achieved by localised micrositing of the crane hardstanding.

The elevated risk ranking is partly a result of the coincidence of the foot of the slope with the beginning of the pocket of deeper peat, and partly a result of the break-in-slope located futher to the south. The break-in-slope lies in an area with no peat, so there is no increase in risk in peat failure as a result of this. Micrositing of Turbine 5 would remove construction works from the area of deeper peat and away from the slopes steeper than 4° along the southern margin. Works in the area would involve excavation and construction of the crane hardstanding and turbine foundation.

All works would be under the supervision of the Environmental Clerk of Works at all times and best practice construction methods would be followed for all construction works in the area.

Revised risk ranking:

Low



Area 7:

A number of High and Moderate Risk cells are apparent near the eastern application boundary to the east of Cruach Bhreac. The cells are 330 m east of the nearest section of access track, in the northern part, and 1.4 km north of Turbine 9. The cells are all located either on steep slopes (up to 40°) or along distinct convex breaks-in-slope, of which there are several in this part of the Site. All peat depths in this area are estimates from interpolation, with depths varying between 0.5 and 2.5 m.

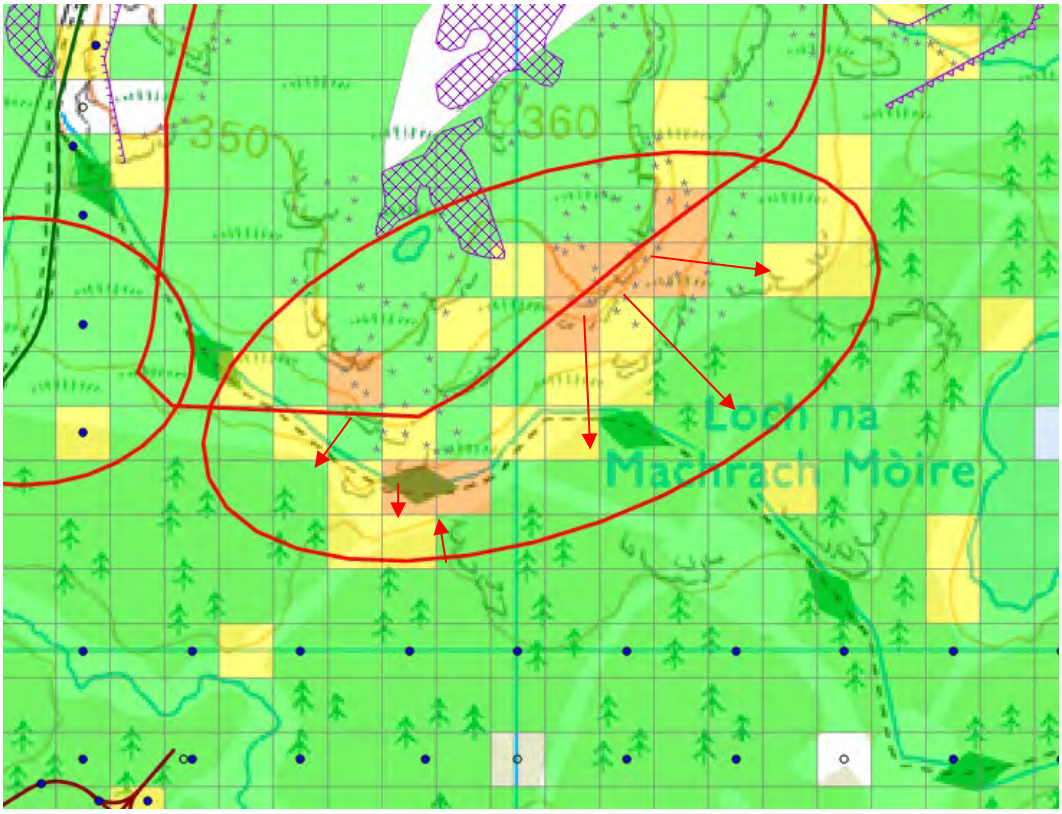
Potential runout areas: Some failures in this area have the potential to extend all the way to the coast, a distance of over 1 km in some areas. Failure zones would be likely to extend beyond the application boundary. Runout paths are indicated by arrows.

No indications of peat instability or developing instability were recorded in nearby areas during the peat depth and reconnaissance surveys.

Mitigation

There are no plans for any Development activity to take place within 300 m of these cells and it is unlikely that any construction activity would have any influence on their stability.

Should a natural slide occur, this may affect areas downslope of the identified cells, including land outwith the application boundary.



Area 8:

A number of Moderate Risk cells are apparent along the application boundary at the north margin of Skipness forest, to the south of Cruach Doire Lèithe. The cells are 270 m east of the nearest section of access track and 370 m north-east of Turbine 7. The cells are mainly on relatively steep slopes (up to 25°). All peat depths in this area are estimates from interpolation, with depths varying between 0.5 and 2.5 m. The higher Risk ranking is partly a result of the high Consequence rating assigned to the Kintyre Way footpath and areas of sensitive habitat in this part of the Site.

Potential runout areas: Highlighted cells in the western part of the area have potential runout zones terminating in an unnamed watercourse running alongside the Kintyre Way. Highlighted cells in the eastern part have potential runout zones terminating on a large flat area of ground north-west of Loch na Machrach Mòire. This area is likely to include peat deposits. Failure zones may originate outwith the application boundary, with the main failure tracks within the boundary. Runout paths are indicated by arrows.

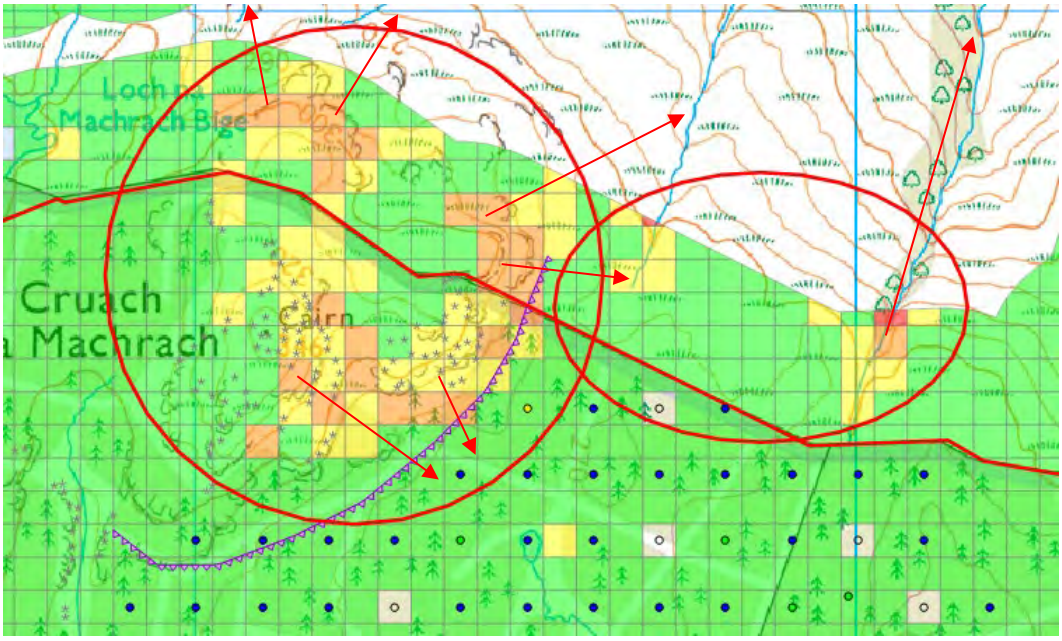
No indications of peat instability or developing instability were recorded in nearby areas during the peat depth and reconnaissance surveys.

Mitigation

There are no plans for any development activity to take place within 250 m of these cells and it is unlikely that any construction activity would have any influence on their stability. The nearest activity is confined to widening of the existing access track, which would have limited capacity to trigger slope instability of this kind.

Most of this area is noted to include substantial areas of bedrock outcrop. It is likely, therefore, that the peat depth has been considerably over-estimated as part of the interpolation and that actual peat depths are much shallower. Peat in this area is likely to be very variable in depth over short distances, as a result of the rock outcrop.

Should a natural slide occur, this may affect areas downslope of the identified cells, including land outwith the application boundary.



Area 9:

A number of Moderate Risk cells are present along either side of the application boundary on the north-east side of Cruach na Machrach. There are also two High Risk cells outwith the boundary in this area. The cells are 530 m north of the nearest proposed construction at Turbine 9. The cells are mainly on relatively steep ground (mainly up to 30°, with slopes up to 45° in places). Most peat depths in this area are estimates from interpolation, with depths varying between 0.5 and 4.5 m.

Potential runout areas: It is unlikely that any of these cells would have runout zones extending to the coast. Cells around Cruach na Machrach would have runout zones to the north, east or south-east depending on their location on the hill. Cells east of Cruach na Machrach would mostly run out northwards. Runout zones would terminate in watercourses to the north and east, or on the large area of flat ground south-east of Cruach na Machrach. This flat area is known to have considerable depths of peat, with peat depth measurements up to 6.2 m in places. Failures could be located both within and outwith the application boundary. Runout paths are indicated by arrows.

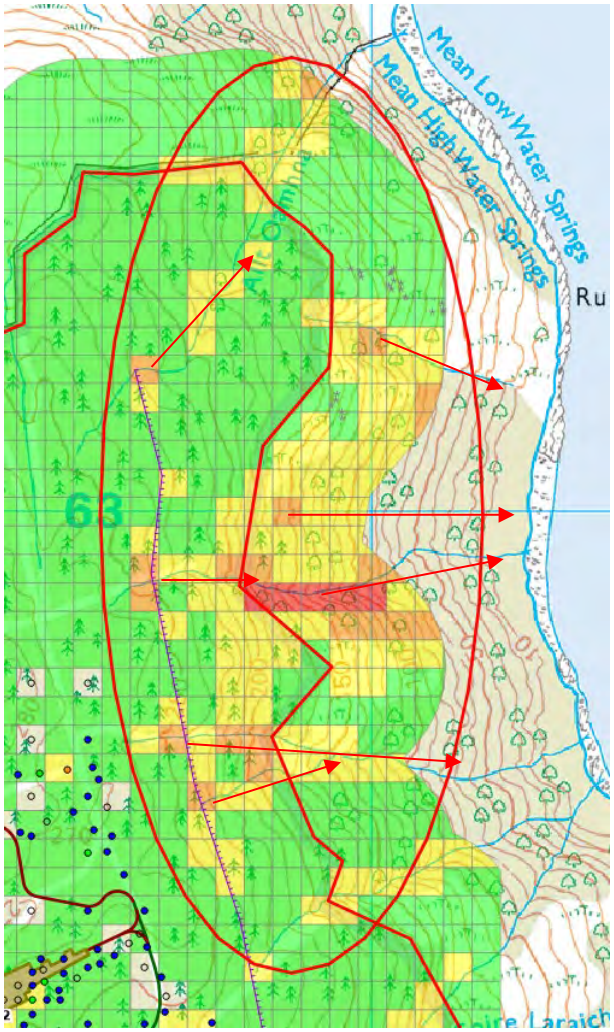
No indications of peat instability or developing instability were recorded in nearby areas during the peat depth and reconnaissance surveys.

Mitigation

There are no plans for any development activity to take place within 300 m of these cells and it is unlikely that any construction activity would have any influence on their stability.

Much of this area is noted to include substantial areas of bedrock outcrop. It is likely, therefore, that the peat depth has been considerably over-estimated as part of the interpolation and that actual peat depths are much shallower. Peat in this area is likely to be very variable in depth over short distances, as a result of the rock outcrop. Very deep peat is known to be present, but this part of the area is not indicated to be at risk of instability.

Should a natural slide occur, this may affect areas downslope of the identified cells, including land outwith the application boundary.



Area 10:

A number of High and Moderate Risk cells are apparent adjacent to the application boundary approximately 400 m north of the solar area and 320 m north-east of Turbine 2. The cells are all located either on steep slopes (up to 35°) or along a distinct convex break-in-slope. All peat depths in this area are estimates from interpolation, with depths varying between 0.5 and 1.5 m.

Potential runout areas: Any failure in this area has the potential to extend all the way to the coast, a distance of up to 700 m from the westernmost cells. Failure zones would be likely to extend beyond the application boundary. Runout paths are indicated by arrows.

No indications of peat instability or developing instability were recorded in nearby areas during the peat depth and reconnaissance surveys. Parts of this area have recently undergone clear felling activity.

Mitigation

There are no plans for any development activity to take place within 300 m of these cells and it is unlikely that any construction activity would have any influence on their stability. Native tree planting has been suggested for part of the northern part of this area. Risk ranking is lower in this area. It is recommended that surveys are carried out to record peat depth and any local signs of instability that may be present in this area before undertaking any planting works.

Should a natural slide occur, this may affect areas downslope of the identified cells, including land outwith the application boundary.

Mitigation

7.8 The following mitigation measures would be implemented to ensure that slope stability is maintained across the study area and to minimise the risk of inducing a peat slide.

7.9 Construction work would make use of current good practice guidance relating to developments in peatland areas. A risk management system, such as a geotechnical risk register, would be developed as part of the post-consent detailed design works. This would be maintained through all subsequent stages of the proposed Development and updated as necessary whenever new information becomes available. During construction, members of project staff would undertake advance inspections and carry out regular monitoring for signs of peat landslide indicators. A geotechnical specialist would be on call to provide advice, if required by study area conditions.

7.10 Micrositing would be used to avoid possible problem areas. This would be assisted by additional verification of peat depths, to full depth, in any highlighted areas where construction work is required. Track drainage would be installed in accordance with published good practice documentation and would be minimised in terms of length and depth in order to minimise concentration of flows.

7.11 Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse or within areas of identified deeper peat. Careful track design would ensure that the volume and storage timescale for excavated materials would be minimised as far as practicable during construction works.

7.12 Vegetation cover would be re-established as quickly as possible on track and infrastructure verges and cut slopes, by re-laying of excavated soil turves and peat acrotelm, to improve slope stability and provide erosion protection. Additional methods, including hydroseeding and/or use of a biodegradable geotextile, would be considered, if necessary, in specific areas.

7.13 Construction staff would be made aware of peat slide indicators and emergency procedures. Emergency procedures would include measures to be taken in the event that an incipient peat slide is detected.

7.14 Key early indicators of peat instability are:

- Tension cracks in the upper layers or to full depth of peat, and may indicate an accumulation of stress in peat soils. In addition, cracking can provide a route for surface water to infiltrate rapidly through the peat body, contributing to elevated pore water pressure and lubrication along lines of weakness.
- Compression ridges, usually indicative of displacement upslope which has led to formation of ridges within the peat body.
- Peat creep, usually visible as tilting of fence posts or young trees.

Infrastructure design

7.15 Careful and informed infrastructure design forms a key measure for prevention of induced instability in peat. The collated peat depth information has been used to inform the proposed infrastructure layout throughout the design process. Incursion into areas of deeper peat would be kept to a practical minimum by careful design and micrositing, in order to minimise disruption to peatland ecosystems and hydrology, and to avoid the risk of induced peat instability.

7.16 Access tracks are anticipated to be constructed using established cut-and-fill construction methods for peat of 1.2 m deep or less, with floating construction intended for the small areas where peat deeper than 1.2 m needs to be crossed. Any peat present along the cut-and-fill track routes would be excavated and stored for use in reinstatement of trackside verges and other elements of project infrastructure where appropriate.

7.17 Trackside ditches would be constructed as required. For tracks parallel or sub-parallel to contours, best practice recommendations are for a ditch along the uphill side only, with cross-drains installed at regular intervals below the track to minimise flow concentration. Cross-drains would discharge onto vegetated ground where possible, to encourage spread of surface flow rather than focused flow and the consequent development of new drainage channels. Tracks crossing contours may require ditches or swales on both sides. In all cases, lengths and depths of trackside drainage would be minimised, particularly in areas where peat deeper than 1.0 m is present. There would be a requirement for some trackside drainage to minimise track surface erosion and damage.

8 CONCLUSIONS

8.1 A detailed assessment of peat slide risk has been carried out for the proposed Development. All proposed new and upgraded infrastructure has been covered by the assessment.

8.2 The assessment found that the majority of the Site has a negligible or low risk of peat landslide.

8.3 Six individual single cells, located close to proposed infrastructure, have been identified as having a Moderate risk of peat instability. These have been individually appraised in in greater detail taking into account location-specific details. In most cases, the apparent risk is an artefact of the assessment mechanism, which uses maximum peat depth and average slope for each grid cell. In the highlighted cells, the areas of measured or interpolated deep peat and areas of steeper slope were not coincident, meaning that the actual risk of instability is Negligible or Low rather than the initial assessment of Moderate.

8.4 Area 6 has a record of deep peat in an area of comparatively steep slope, as a result of the turbine crane hardstanding location on a shelf or platform within an area of steeper slopes. The deep peat has a slight overlap with the steeper slopes forming the back (southern side) of the platform, just as the slope angles become much gentler to form the main platform area. Micrositing of the crane hardstanding a short distance (10-15 m) north to avoid this coincidence and minimise construction in the deeper peat would reduce the apparent risk in this location.

8.5 Four additional areas of apparent High and Moderate risk have been identified. These are mainly associated with areas of steep slope along the eastern side of the Site, and with localised steep ground associated with hilltops and river valleys. In all of these areas, the peat depths used in assessment have been determined through interpolation and are likely to over-estimate the actual peat depths on the ground. These areas are all distant from proposed infrastructure and there would be no requirement for construction activity to approach these areas. It is recommended that construction areas are demarcated and all site staff are made aware of the requirement to stay within the marked construction corridor at all times.

8.6 For all ten areas, mitigation measures have been recommended to control the peat landslide hazard. For all areas, the peat landslide hazard can be controlled by use of good construction practice and micrositing. Revised risk rankings taking into account location specific details and mitigation measures are Negligible or Low across the Site.

8.7 Good construction methods and appropriate micrositing would also be effective at controlling residual peat landslide risk for lower risk locations at the Site. Providing that the recommended mitigation measures are put in place and adhered to, the risk of peat landslide as a result of the proposed Development is not significant.

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10 ANNEX 1: PEAT CORE LOGS

Notes to accompany peat coring results
Peat coring was undertaken by RSK on 7 August 2020, during the Phase 2 peat depth surveying. Four locations were identified by RSK to be targeted, prior to the works.

Main findings
Coring locations C1, C2 and C3 were located within areas of forestry plantation, located near T07, T03 and T11, respectively. Ground conditions at location C1 were well-drained/slightly boggy, and ground conditions at locations C2 and C3 were well-drained. C4 was situated in a clearing adjacent to the proposed construction compound. Ground conditions at this location were slightly boggy. Vegetation at all locations included Spaghnum moss, with additional rushes and grasses at location C4. In forestry locations, falling litter is degrading Spaghnum moss.

Core recovery was to shallower depths than was probed due to the tip of the peat corer preventing recovery from the basal 0.20 m.

Cores from C1 returned peat to a depth of 1.00 m bgl. This consisted of a thin undecomposed layer at the surface, with primarily moderately decomposed peat below (with smaller layers of moderately highly and highly decomposed peat). Peat had low moisture content at all depths. This is likely due to the influence of commercial forestry drainage systems.

Cores from C2 returned peat to a depth of 1.00 m bgl. This core recovered a mulchy thin layer of slightly decomposed peat at the surface at the surface, with highly decomposed peat with tree roots throughout making up the majority of the first core. This core did not exhibit the typical trend of increasing decomposition at depth and the basal 0.05 m of the first core (0.45-0.50 m) comprised slightly decomposed peat. Below this depth, there was another thin layer of highly decomposed peat. However, from 0.56 m to the base, peat was primarily slightly decomposed. Peat had low moisture content at all depths. This is likely due to the influence of commercial forestry drainage systems.

Cores from C3 returned peat to the maximum depth of 2.50 m bgl. This consisted of a layer of moderately highly decomposed peat at the surface, likely a soil layer formed from decomposing tree litter. Below, peat was very slightly to slightly decomposed. Increasing in decomposition with depth, peat from 1.72 to 2.39 m bgl was moderately decomposed, with some pieces of woody plant material from 1.72 to 2.14 m bgl. The basal 0.20 m was slightly more decomposed, comprising moderately highly decomposed peat. Cores from C3 returned very fibrous peat with a strong network of interconnected roots, particularly at shallow depths. This may have been impacted by the location of C3, within an area of forestry. Peat had moderate to high moisture content until 2.14 m depth, after which peat had low moisture.

Cores from C4 returned very fibrous, almost entirely undecomposed peaty soils to depths of 0.50 m bgl. Peat had a high moisture content, reflecting the core's location within a clearing and the absence of enhanced drainage systems.

Photographs of all recovered cores are included at the end of this document.

Peat Core Logs

ID	X	Y	Peat Depth (m)	Notes
C1	187538.97	662630.71	1.15	Sampled 0.90 - 0.95 m bgl. 0.00 - 0.05 m bgl: H1 B2, completely undecomposed peat with easily identifiable plant remains. Sphagnum moss at the surface. 0.05 - 0.14 m bgl: H6 B2, moderately highly decomposed peat with a very indistinct plant structure. 0.14 - 0.90 m bgl: H5 B2, moderately decomposed peat with a very small amount of amorphous granular peat escaping between fingers when squeezed. 0.90 - 1.0 m bgl: H7 B2, highly decomposed peat. Contains a lot of amorphous material with very faintly recognisable plant structure. About one-half of peat escaped between fingers.
C2	190822.09	661099.05	1.05	Sampled 0.85 - 0.95 m bgl. 0.00 - 0.05 m bgl: H4 B2, crumbly and mulchy slightly decomposed peat with bits of plant matter. Some Sphagnum moss at the surface. 0.05 - 0.44 m bgl: H7 B2, highly decomposed peat with tree roots visible throughout. Contains a lot of amorphous material with very faintly recognisable plant structure. 0.44 - 0.50 m bgl: H4 B2, slightly decomposed peat. Plant remains are slightly pasty and have lost some of their identifiable features. 0.50 - 0.56 m bgl: H7 B2, highly decomposed peat. Contains a lot of amorphous material with very faintly recognisable plant structure. 0.56 - 1.00 m bgl: H4 B2, slightly decomposed peat. Plant remains are slightly pasty and have lost some of their identifiable features.

ID	X	Y	Peat Depth (m)	Notes
C3	190509.36	662478.80	2.60	Sampled 2.30 - 2.45 m bgl. 0.00 - 0.13 m bgl: H6 B3, moderately highly decomposed peat with a very indistinct plant structure. When squeezed, about one-third of the peat escaped between the fingers. The reside is very pasty. Sphagnum moss at the surface. 0.13 - 0.87 m bgl: H3 B3, very slightly decomposed reddish-brown peat with a strong network of interconnected roots. Plant remains still identifiable and no amorphous material present. 0.87 - 1.00 m bgl: H3 B4, more wet and loosely compacted than above section. Very slightly decomposed peat with a strong network of interconnected roots. Plant remains still identifiable and no amorphous material present. 1.00 - 1.50 m bgl: H3 B3, very slightly decomposed peat with a network of interconnected roots. Plant remains still identifiable and no amorphous material present. 1.50 - 1.72 m bgl: H4 B3, slightly decomposed peat. When squeezed, no peat is passed through fingers. Plant remains are slightly pasty and have lost some of their identifiable features. 1.72 - 2.14 m bgl: H5 B3, moderately decomposed peat with a few pieces of woody plant material. When squeezed, a very small amount of amorphous granular peat escaped between fingers. 2.14 - 2.39 m bgl: H5 B2, moderately decomposed peat. The structure of the plant remains is quite indistinct although it is still possible to recognize certain features. The residue is pasty. 2.39 - 2.50 m bgl: H6 B2, grayer than previous rusty coloured layer. Moderately highly decomposed peat with a very indistinct plant structure.
C4	188563.97	661902.02	0.55	Sampled 0.24 - 0.41 m bgl. 0.00 - 0.10 m bgl: no recovery. Mostly grasses with some Sphagnum moss at the surface. 0.10 - 0.50 m bgl: H2 B4, very fibrous, almost entirely undecomposed peat. When squeezed, released nearly clear water.

Location: C1	Depth: 0.00 – 0.50 m bgl	Date:07/08/2020

Notes: Coring section shows moderately highly decomposed peat overlying moderately decomposed peat with Sphagnum moss at surface.

Location: C1	Depth: 0.50 – 1.00 m bgl	Date:07/08/2020

Notes: Interior of core sections showing primarily moderately decomposed peat, with a small amount of highly decomposed peat at the base.

Location: C2	Depth: 0.00 – 0.50 m bgl	Date:07/08/2020

Notes: Core interior showing primarily highly decomposed peat. Some Sphagnum moss at the surface.

Location: C2	Depth: 0.50 – 1.00 m bgl	Date:07/08/2020

Notes: Core interior showing primarily slightly decomposed peat.

Location: C3	Depth: 0.00 – 0.50 m bgl	Date:07/08/2020

Notes: Moderately highly decomposed peat with a very indistinct plant structure overlying very slightly decomposed reddish-brown peat with a strong network of interconnected roots.

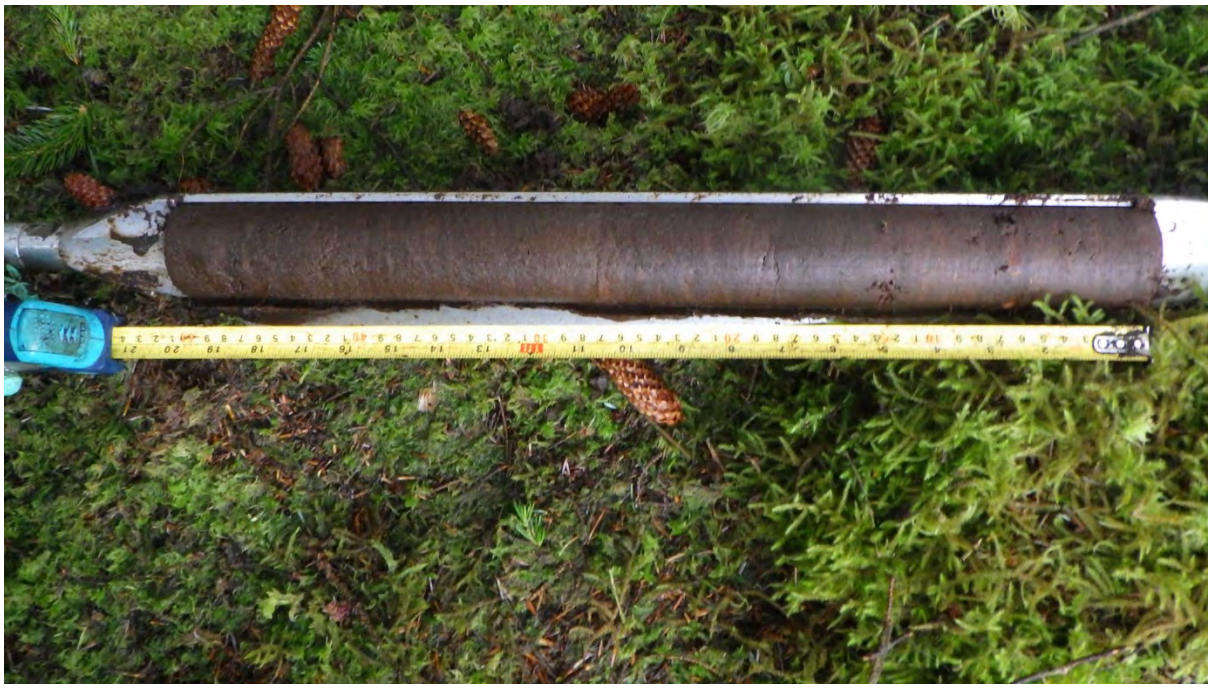
Location: C3	Depth: 0.50 – 1.00 m bgl	Date:07/08/2020

Notes: Very slightly decomposed reddish-brown peat with a strong network of interconnected roots.

Location: C3	Depth: 1.00 – 1.50 m bgl	Date:07/08/2020

Notes: Very slightly decomposed peat with a network of interconnected roots.

Location: C3	Depth: 1.50 – 2.00 m bgl	Date:07/08/2020

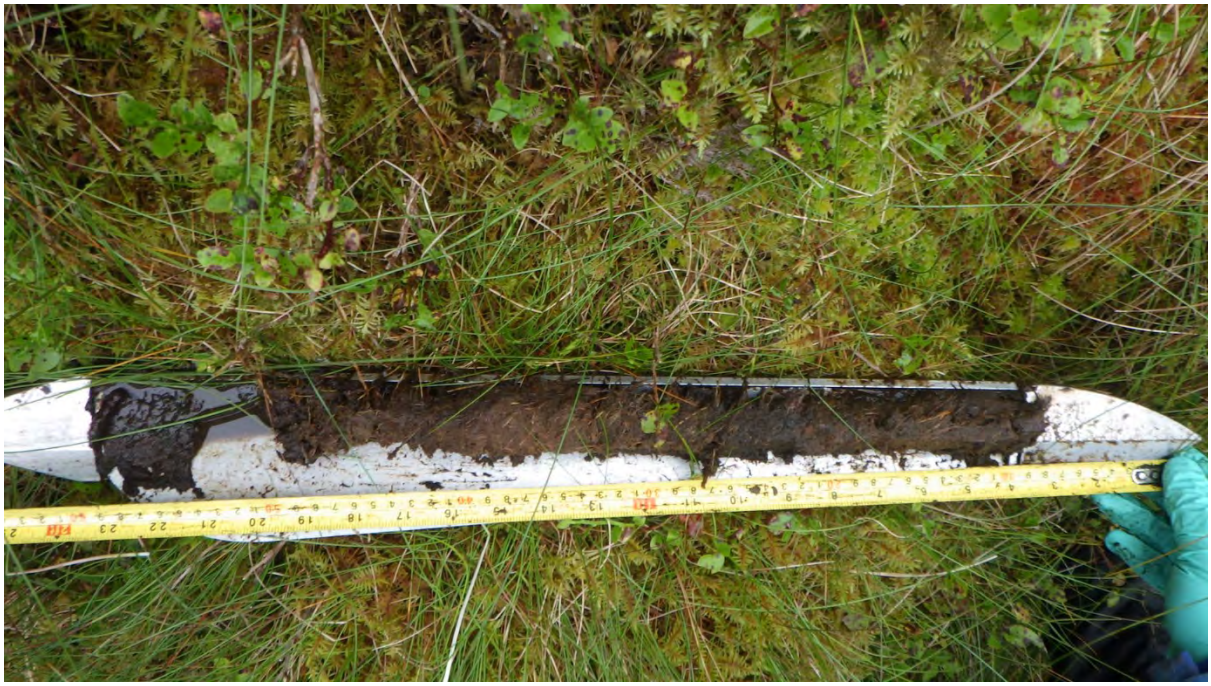


Notes: Slightly decomposed peat overlying moderately decomposed peat with some pieces of woody plant material.

Location: C3	Depth: 2.00 – 2.50 m bgl	Date:07/08/2020

Notes: Moderately decomposed peat with some pieces of woody plant material.

Location: C4	Depth: 0.00 – 0.50 m bgl	Date:07/08/2020



Notes: Very fibrous almost entirely undecomposed peat. Grasses with some Sphagnum moss at the surface.

11 ANNEX 2: AUTHOR EXPERIENCE

This report was produced by Casey McGuire and Andrew Cunningham, under the supervision of Catherine Isherwood.

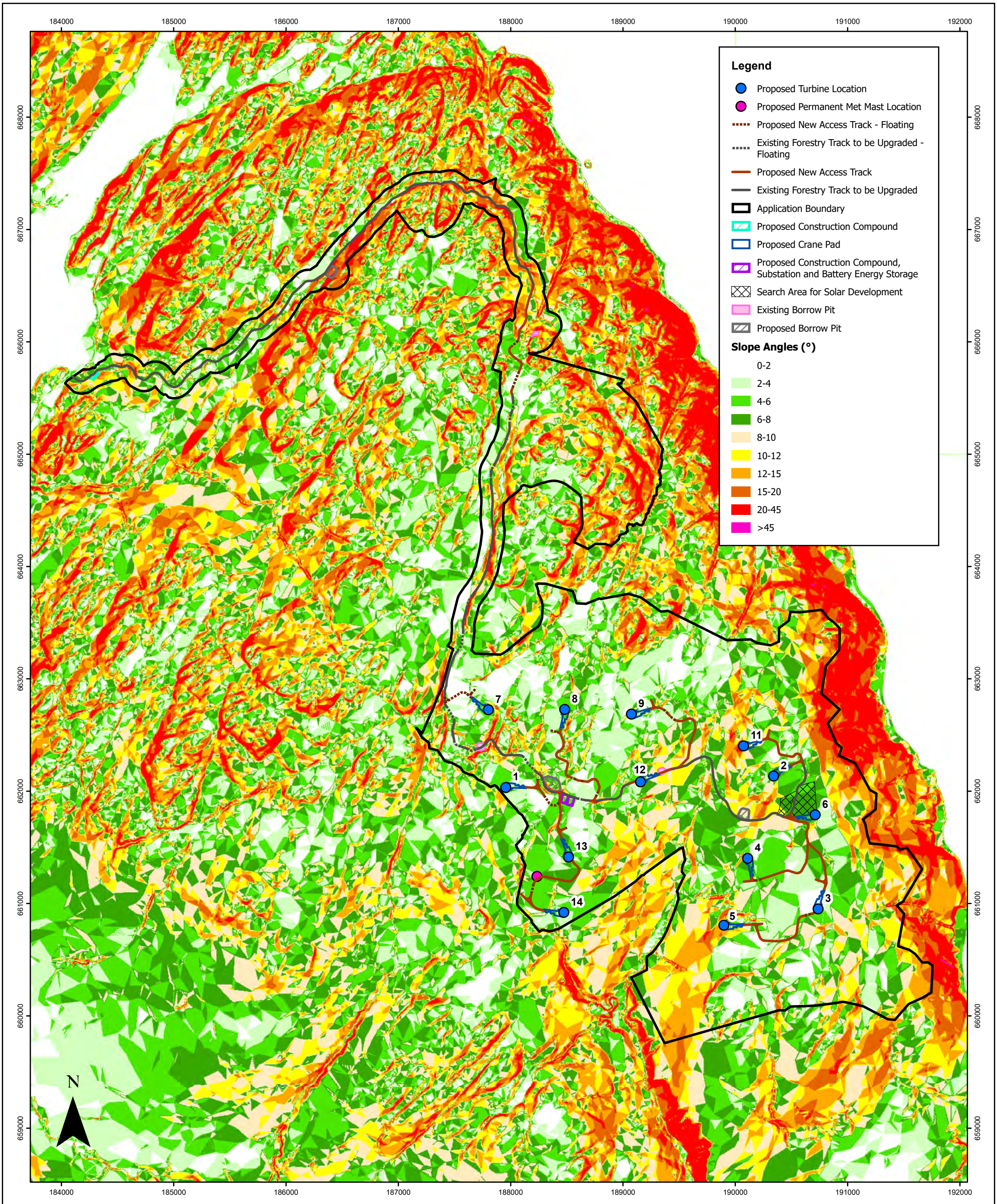
Field surveys were undertaken by Andrew Cunningham and Casey McGuire, both Fellows of the Geological Society of London and working towards chartership, with assistance from Adam Paterson and Iain Storey. Both Andrew and Casey have significant experience of peat surveying and classification from windfarm developments, peatland restoration surveys, overhead line route studies and ground investigation works, and other infrastructure projects including substation development and major road alignments. Andrew has over eight years' experience in environmental consultancy and Casey has over three years' experience in this field.

Catherine Isherwood is a Chartered Geologist with an MA and PhD in Geological Sciences from the University of Cambridge and an MSc in Hydrogeology from Newcastle University. She has over 15 years' experience in environmental impact assessment and the assessment of peat and slope stability.

The report has been reviewed and authorised by Catherine Isherwood.

The assessment method was developed with input from a Chartered Engineer and a Chartered Environmentalist with a combined experience of more than 35 years.

12 FIGURES



Earraghail Renewable Energy Development

Peat Slide Risk Assessment

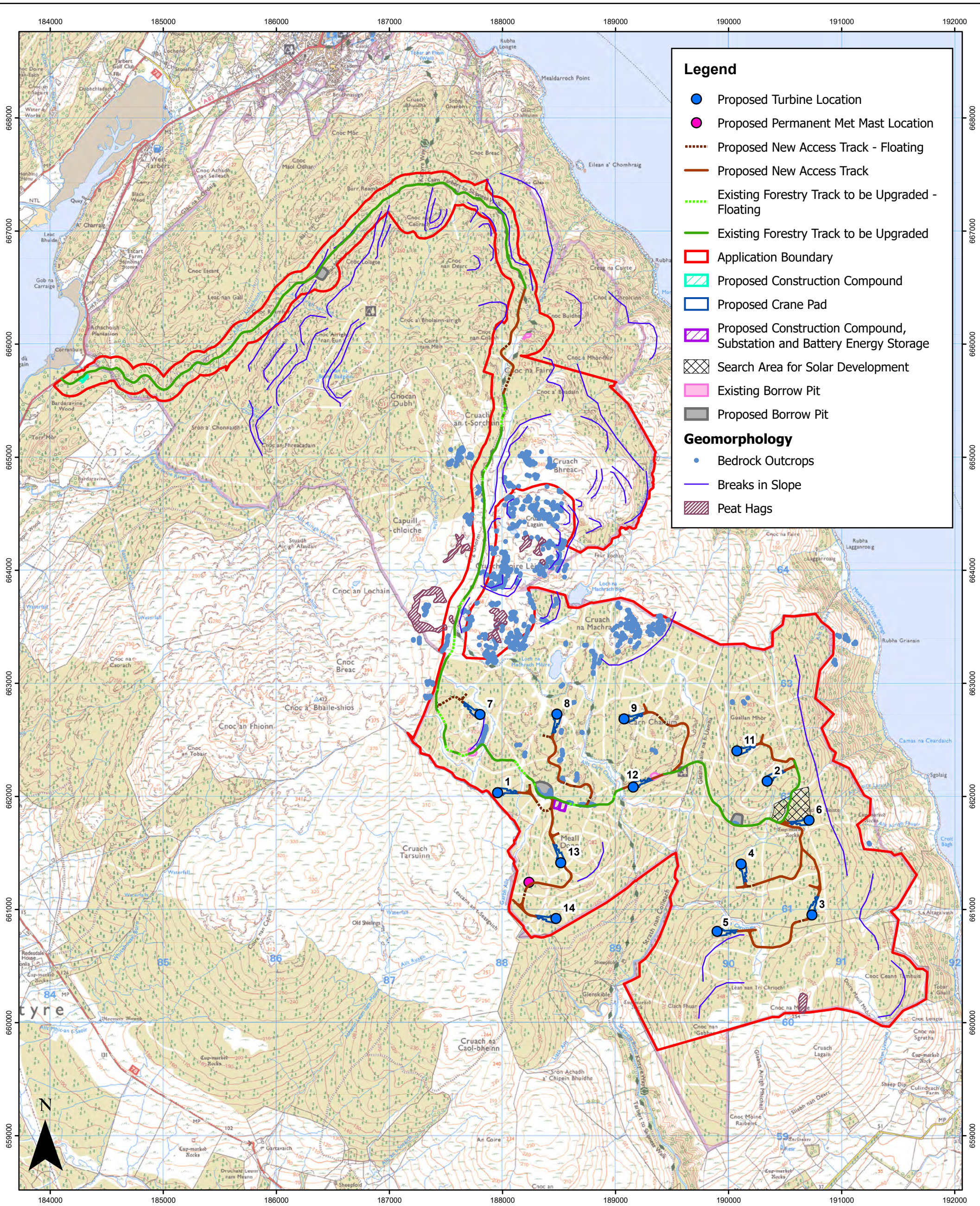
Slope Mapping

Rev	Date	By	Comment
D	01/12/21	CM	Revised track and logo
E	06/12/21	CM	Updated RLB
F	13/01/22	CM	Updated turbine locations

1:31,000 Scale @ A3

0 0.25 0.5 1 Km

Figure	Date	Rev	Dwg No.	Datum: OSGB36 Projection:TM
10.1.1	13/01/22	F	EHAIL-RSK-I-063	



SCOTTISHPOWER RENEWABLES

Earraghail Renewable Energy Development

Peat Slide Risk Assessment

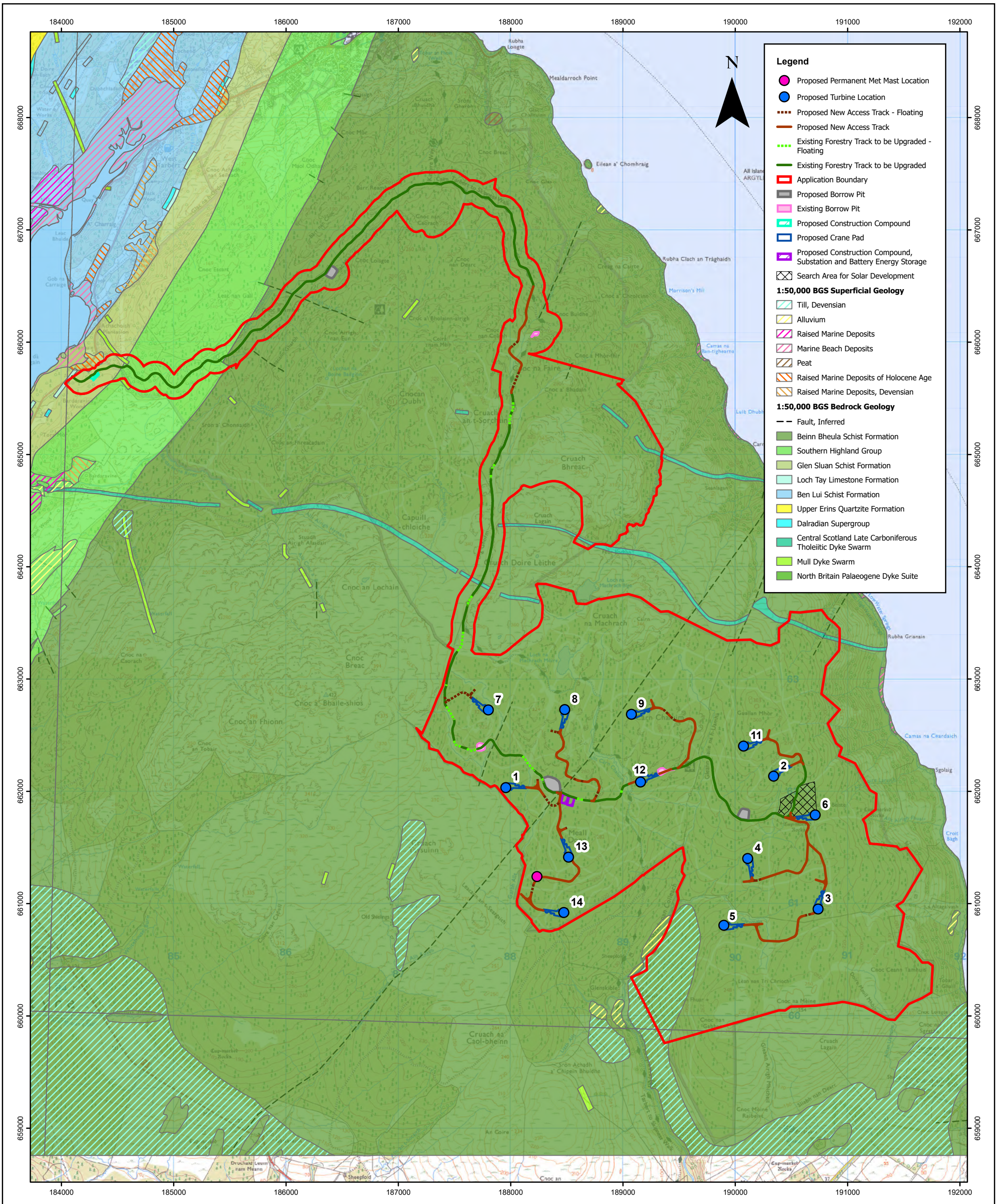
Geomorphology Mapping

Rev	Date	By	Comment
E	01/12/21	CM	Revised track and logo
F	06/12/21	CM	Updated RLB
G	13/01/22	CM	Updated turbine locations

1:31,000 Scale @ A3

0 0.25 0.5 1 Km

Figure	Date	Rev	Dwg No.	
10.1.2	13/01/22	G	EHAIL-RSK-I-063	Datum: OSGB36 Projection:TM



Earraghail Renewable Energy Development

Peat Slide Risk Assessment

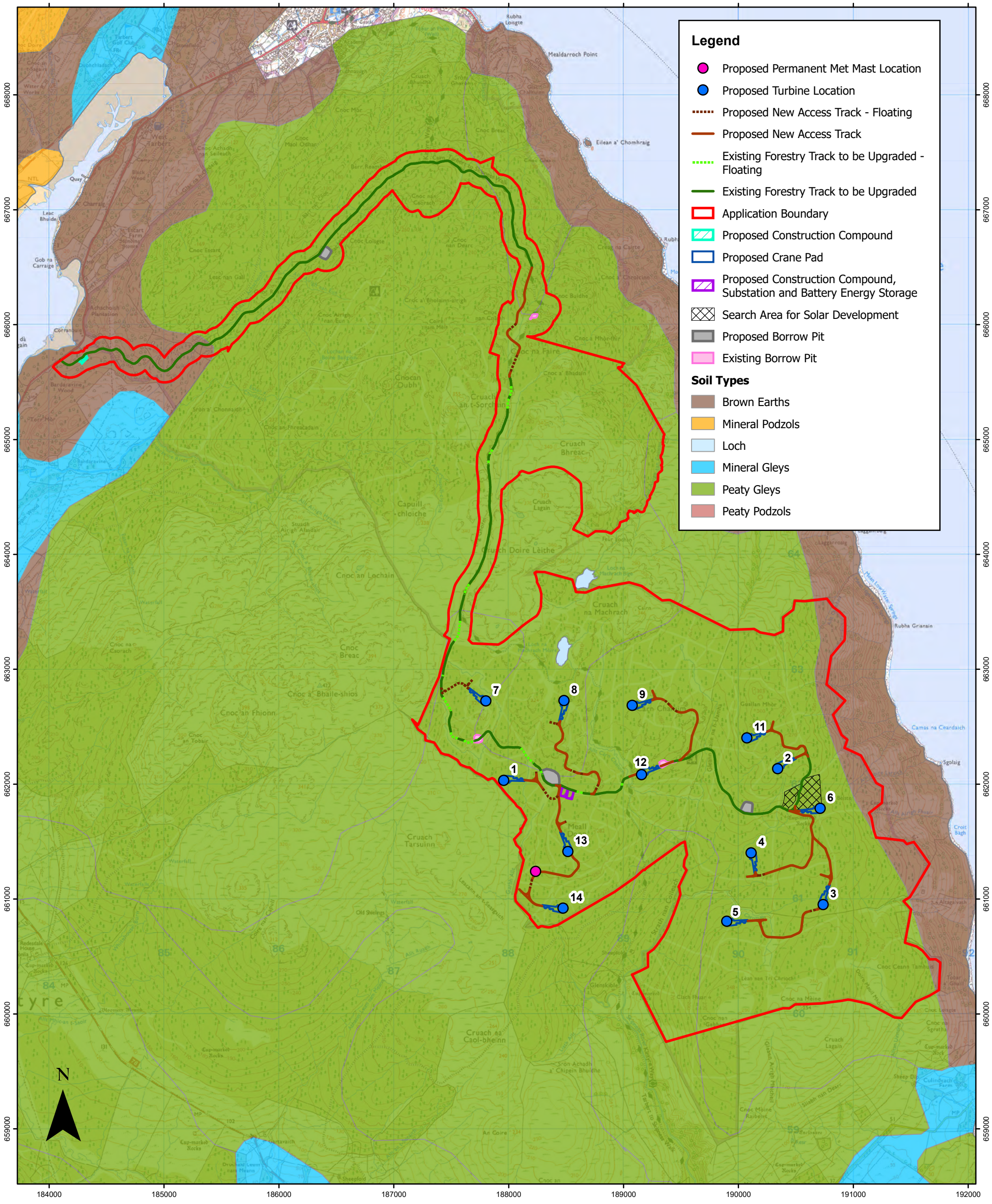
Geology Mapping

Rev	Date	By	Comment
E	01/12/21	CM	Revised track and logo
F	06/12/21	CM	Updated RLB
G	13/01/22	CM	Updated turbine locations

1:31,000 Scale @ A3

0 0.25 0.5 1 Km

Figure	Date	Rev	Dwg No.	Datum: OSGB36 Projection:TM
10.1.3	13/01/22	G	EHAIL-RSK-I-063	



Earraghail Renewable Energy Development

Peat Slide Risk Assessment

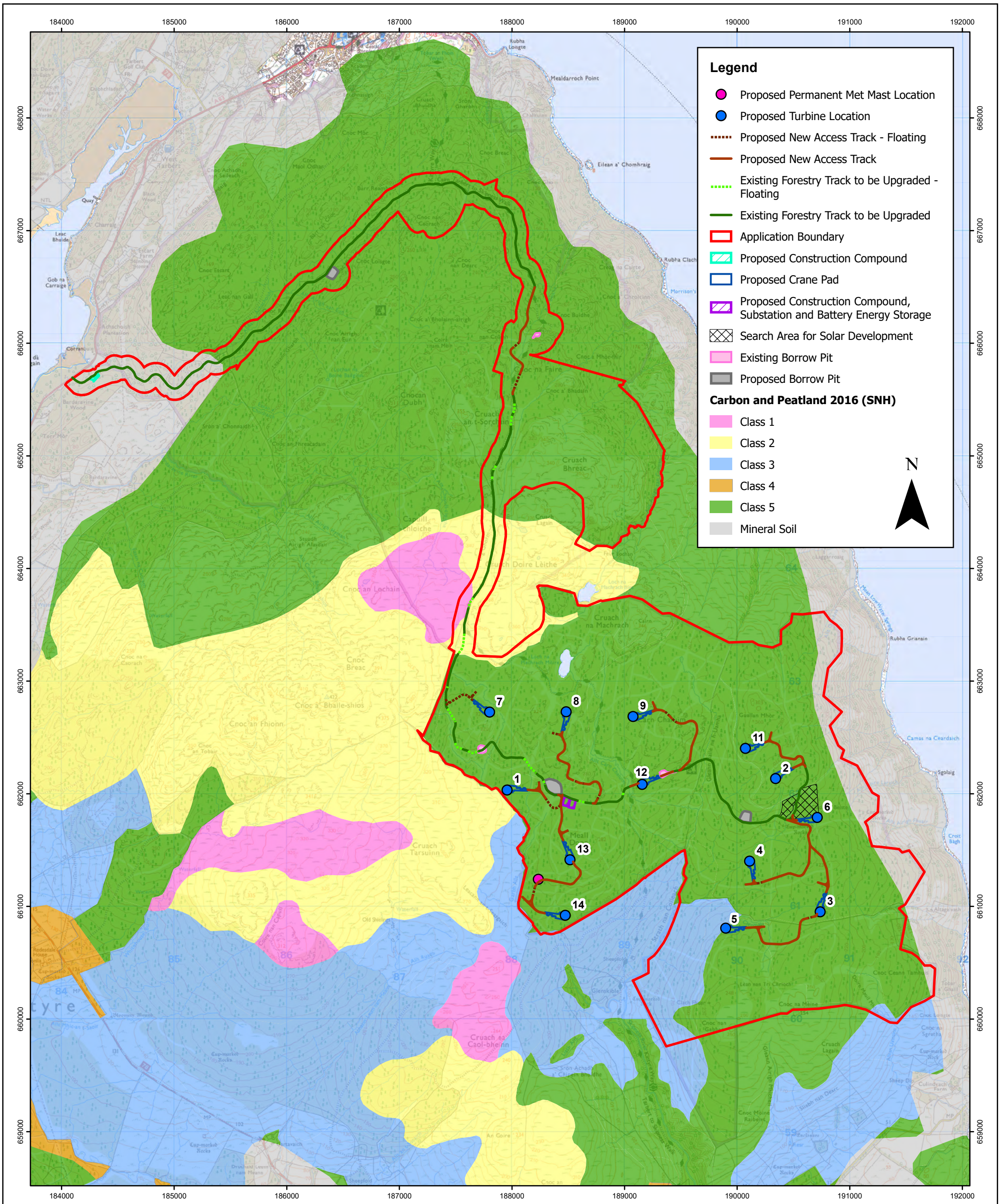
Soils Mapping

Rev	Date	By	Comment
E	01/12/21	CM	Revised track and logo
F	06/12/21	CM	Updated RLB
G	13/01/22	CM	Updated turbine locations

1:31,000 Scale @ A3

0 0.25 0.5 1 Km

Figure	Date	Rev	Dwg No.	Datum: OSGB36 Projection:TM
10.1.4a	13/01/22	G	EHAIL-RSK-I-063	



Earraghail Renewable Energy Development

Peat Slide Risk Assessment

Peat and Carbon Mapping

Rev	Date	By	Comment
E	01/12/21	CM	Revised track and logo
F	06/12/21	CM	Updated RLB
G	13/01/22	CM	Updated turbine locations

1:31,000 Scale @ A3

0 0.25 0.5 1 Km

Figure	Date	Rev	Dwg No.	
10.1.4b	13/01/22	G	EHAIL-RSK-I-063	Datum: OSGB36 Projection:TM