Appendix 8.2: Peat Survey Report

KAYA CONSULTING

EDF Energy Renewables Ltd

Dunside Wind Farm

Appendix 8.2: Peat Survey Report

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1 Introduction

Kaya Consulting Limited was commissioned by EDF Energy Renewables Ltd, through LUC, to undertake a peat depth survey for the proposed wind farm development at Dunside (the Proposed Development) in the Scottish Borders. The proposed site (the Site) is adjacent to the existing operational Fallago Rig Wind Farm in the Lammermuir Hills.

The Site covers an area of approximately 2,006 hectares (ha) and comprises mixed upland heath and bog. **Figure 1** (see end of document) shows the site boundary and extent of the peat survey.

The terrain across the Site is consistent, with gently sloping hilltops dropping steeply towards the Dye Water and other watercourses. The steepest of these slopes consist of bare rock and soil.

This report covers the methodology and output of the Phase 1 (preliminary, low-density survey), and the Phase 2 (detailed, high-density) peat surveys undertaken at the Site. The purpose of the surveys was to establish an understanding of the peat depths at the Site to help optimise site design and layout.

The Phase 1 survey comprised surveying a 100m grid across the full area proposed for infrastructure within the Site boundary. The results of the Phase 1 survey helped inform the initial layout of the Proposed Development.

The Phase 2 survey used a 20m grid to cover areas in detail where there will be infrastructure associated with the Proposed Development. The survey extent includes the footprint of the turbine locations, working areas and construction compounds. Additional survey, at 50m intervals with offsets, was undertaken along the proposed access tracks.

This document should be read in conjunction with **Chapter 8: Hydrology, Hydrogeology and Geology (including Peat)** of the Dunside Wind Farm EIA Report.

2 Methodology

2.1 Desk-based Initial Assessment

The SNH Carbon and Peatland Map 2016 (Scottish Natural Heritage (now NatureScot), 2016) was consulted prior to the Phase 1 peat survey. The map contains information on the likely peatland classes present within the survey area. The Carbon and Peatland map was developed to be used as "*a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities*".

Within the SNH Carbon and Peatland map, Class 1 and Class 2 peatlands are identified as areas of "*nationally important carbon-rich soils, deep peat and priority peatland habitat*". Class 1 peatlands are also "*likely to be of high conservation value*" and Class 2 "*of potentially high conservation value and restoration potential*".

The SNH Carbon and Peatland map for the Site is shown in **Figure 1**. The peatland mapping indicates large areas of the high ground in the north and south of the Site are Class 5 peatland, with smaller areas of Class 4 peatland at lower elevations. The relevant Class descriptions are below:

- Class 4 – Area unlikely to be associated with peatland habitat or wet and acidic type. Area unlikely to include carbon-rich soils.
- Class 5 – Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.

The steepest slopes within the site are classed as non-soil (Class -2) and the lower lying sections of the site around the base of the river valleys are classed as mineral soil (Class 0), with no peat indicated. There are no areas of Class 1 or 2, nationally important, priority peatlands within the Site.

The results of the desk-based assessment indicated that peat was likely to be present within the boundaries of the Site.

2.2 Survey Methodology

The survey methodology follows current guidance in Scotland (Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only). The field survey was undertaken by a team of two with the appropriate experience of assessing hydrology, hydrogeology, geology, soil, and peat for onshore windfarms in upland environments.

2.2.1 Survey Dates

The Phase 1 peat survey was undertaken on the following dates:

- 28th to 31st March 2022 (inclusive); and
- 29th of September 2022.

The weather conditions during the Phase 1 survey were mixed, with dry, sunny weather on the 28th and 29th of March followed by intermittent snow on the 30th and 31st. Weather on the 29th of September was dry.

The Phase 2 peat survey was undertaken on the following dates:

- 12th and 13th of December 2022 (inclusive); and
- 19th to 21st of December 2022 (inclusive).

The weather conditions across the Phase 2 survey dates were cold, with snow cover and freezing temperatures in the first week of survey (12th and 13th of December) followed by wet and blustery conditions on the second week of survey (19th to 21st of December). Peat depth and core data were unaffected by the conditions.

2.2.2 Phase 1 Peat Survey

The following methods were employed for the Phase 1 peat survey:

- The site was sampled using a 100m systematic grid. The survey points were aligned to best fit the Ordnance Survey National Grid reference grid. The grid was generated using QGIS software.
- A total of 1,019 sampling points were surveyed. The extent of the Phase 1 peat survey is illustrated in **Figure 1**.
- The peat survey was carried out using an extendable fibreglass utility probe capable of sampling to 5m.

Dangerously steep terrain occasionally limited access to point locations on the 100m grid within the site's developable area. Where this was the case no data was collected. However, due to the gradient of the slopes, peat was not expected to be present on steep slopes.

In addition to the data collected by Kaya Consulting, peat survey data collected in 2015, in support of the EIA for the Fallago Rig Wind Farm development to the north-west, was also made available. 11 probe depth points from this survey - in the vicinity of the existing Fallago Rig substation - were merged with the 2022 Phase 1 dataset. Surveying new peat depth survey in that area was not possible due to the proximity of the substation and risk of underground electricity infrastructure.

2.2.3 Phase 2 Peat Survey

The following methods were employed for the Phase 2 peat survey:

- Peat probing was undertaken on a 20m grid around areas of proposed infrastructure, including turbine footprints, working areas and construction compounds.
- The proposed access track route centreline was probed at 50m intervals along the track, with 10m offsets probed on either side of the track.
- A total of 2,069 sampling points were surveyed. The extent of the Phase 2 peat survey is illustrated in **Figure 1**.
- The peat survey was carried out using an extendable fibreglass utility probe capable of sampling to 5m.
- Peat cores were taken using a gouge auger (20mm diameter) to confirm the existence and composition of peat. Cores were taken at proposed turbine locations and other representative locations across the site. The locations of the cores are shown in **Figure 1**.

It is noted that following the Phase 2 survey there were several minor design changes to the final layout. These are described in **Chapter 2** of the **EIA Report.**

The track to turbine 13 and 15 was re-aligned to avoid a watercourse crossing. As a result, of this design change there is no Phase 2 peat probing of the re-aligned track. However, this is not considered a limitation as there is a 100m peat depth grid covering this area and the proposed track will be floated over the deeper peat.

The track to T3 was also re-aligned post Phase 2 peat surveys. However, the 100m Phase 1 grid shows no peat here and detailed probing is not required.

No Phase 2 peat probing was carried out on the steeper lower slopes, where borrow pits are proposed. These slopes are too steep for peat, and there was no peat expected at these locations. In addition, no peat probing was undertaken at the existing construction compound and proposed battery storage, as these areas are already hardstanding/ gravel.

3 Results

3.1 Peat Depths

A summary of the peat depth data is presented in **Table 1** and **Image 1**.
The Scottish Government guidance document on peat landslide hazard and risk assessment (Scottish Government, 2017) defines peat as a soil greater than 0.5m in depth, with an organic matter content of more than 60%. Soils of less than 0.5m depth are classified as organo-mineral soils, with soils less than 0.25m not classified as peat. This is further evidenced by JNCC (2011), SNH (Bruneau, et al, 2014) and the James Hutton Institute (2019).
At the Proposed Development Site:

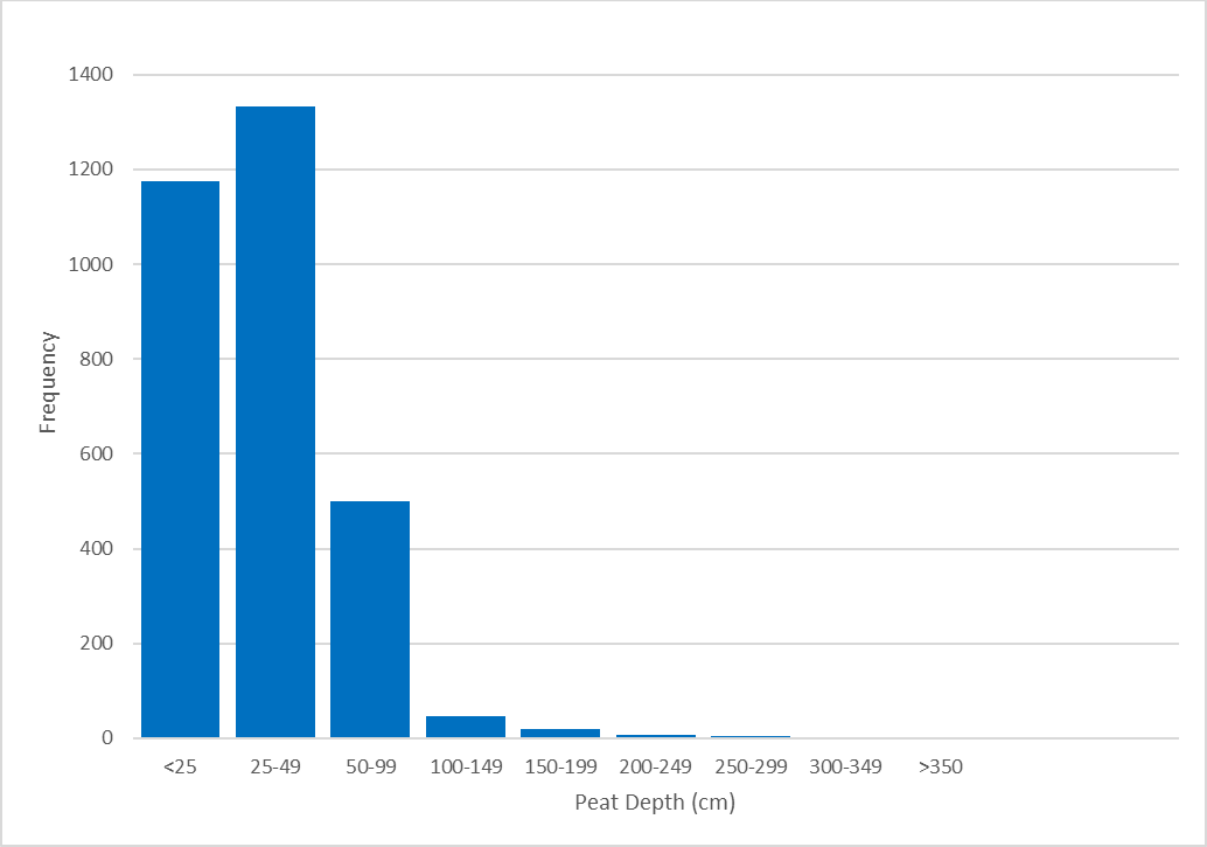
- 38.1% of probes were recorded as having a depth of less than 25cm. These probes are not classified as peat.
- 43.1% of probes were recorded as having a peat depth of between 25-50cm. These probes are classified as organo-mineral soils and not formally considered to be peat.
- 16.2% of probes were recorded as having a peat depth of between 50-100cm.
- 2.7% of the probes were recorded as having a peat depth of over 100cm.

It should be noted that these peat depth distributions are not directly representative of the peat coverage over the Site, as a significant proportion of the probes were obtained during the high-resolution Phase 2 survey which focused on areas of Proposed Development which had been purposefully situated outside the areas with deeper peat, identified during Phase 1.
Figure 1 at the end of the report shows the extent of the peat survey undertaken with the NatureScot Carbon and Peatland classes, while **Figures 2a – 2e** provide a close-up map of the peat depths recorded with the existing and proposed infrastructure shown underneath.

Table 1: Peat Depth Summary

Peat Depth Range (cm)	Number of Probes	Percentage of Total Probes
< 25	1,175	38.1%
25 – 49	1,332	43.1%
50 – 99	499	16.2%
100 – 149	46	1.5%
150 – 199	20	0.6%
> 200	16	0.5%
Total	**3,088**	**100%**

Image 1: Peat Depth Histogram



3.2 Peat Cores

Table 2 shows the information collected from the peat coring. A total of 15 cores were taken; the locations of which are shown in **Figure 1**.

Despite the lack of deep peat across much of the Site, a consistent approach was taken to the core sampling, with a core taken in the deepest peat or peaty soil identified at each turbine location. Most of the areas containing peat identified in the survey had been heavily modified by muirburn and erosion and, as a result, the acrotelm and catotelm layers in the peat cores were often poorly defined. Several cores were also found to be unusually dry at lower layers despite the wet antecedent conditions.

The areas cored were all found to be underlain with stony clay.

A representative example of the cores taken is shown in **Image 2**.

Table 2: Collected Core Data

Turbine Number	Peat	Acrotelm Thickness (cm)	Catotelm Thickness (cm)	Von Post	Notes
1	Yes	40	0	H3-H5	Clay base
2	Yes	10	35	H3-H4	Lower 15cm dry
3	Yes	25	0	H2	Dry with clay base
4	Yes	15	45	H6-H9	Clay base
5	No	0	0	N/A	Clay soil
6	Yes	15	5	H2	Dry
7	Yes	25	0	H4	Clay base
8	Yes	20	20	H5	Dry catotelm

9	Yes	25	0	H5	Peaty clay base
10	Yes	35	15	H2-H4	Clay base
11	Yes	15	0	H7	Clay base
12	Yes	25	0	H3	Clay base
13	Yes	5	25	H2-H5	Dry
14	Yes	25	0	H1-H3	Peaty clay base
15	Yes	10	35	H2-H4	Dry

Image 2: Representative Peat Cores (turbine number shown)

3.3 Peatland Condition

The Site is composed mainly of upland heath and bog most of which has been heavily modified by human influences. As shown in **Image 3**, muirburn is practiced across much of the site. The site is also grazed by sheep and deer. These factors have led to the drying and erosion of much of the peat present across the site (**Images 3, 4, 5 and 6**).

Local topography on the site affects the peat distribution, with the hillslopes generally too steep and well drained to support the formation of peat. The tops of the hills throughout the site are gently rolling, with most of the peat present in poorly drained natural low points on this plateau.

Most of the drainage on site is natural, though some small areas of artificial drainage are present, with small cut channels observed in the peat.

Image 3: Evidence of Muirburn Across Site Area

Image 4: Peat Hags

Image 5: Gully Erosion in Area of Muirburn

Image 6: Erosion in Grazed Area

4 Summary

Kaya Consulting Limited was commissioned by EDF Energy Renewables Ltd, through LUC, to undertake Phase 1 and 2 peat depth survey for the Proposed Development.

This report covers the methodology and output of all the peat survey undertaken at the site. The purpose of the survey was to establish an understanding of the peat depths at the site to optimise site design and layout to minimise both the extent of disruption to peatlands and the quantity of peat excavated.

A total of 3,088 probes were collected across the Phase 1 and Phase 2 peat surveys for the Proposed Development and the results summarised below:

- 38.1% of probes were recorded as having a depth of less than 25cm. These probes are not classified as peat.
- 43.1% of probes were recorded as having a peat depth of between 25-50cm. These probes are classified as organo-mineral soils and not formally considered to be peat.
- 16.2% of probes were recorded as having a peat depth of between 50-100cm.
- 2.7% of the probes were recorded as having a peat depth of over 100cm.

A total of 15 cores were taken across the survey area, all in areas at or adjacent to proposed infrastructure. It was determined that the acrotelm layer was between 10cm and 40cm. Clay was the dominant source of base material.

The condition of the majority of peat found across the site was found to be poor with muirburn, trampling, grazing and drainage causing much of the peat surveyed to be dry and eroding.

References

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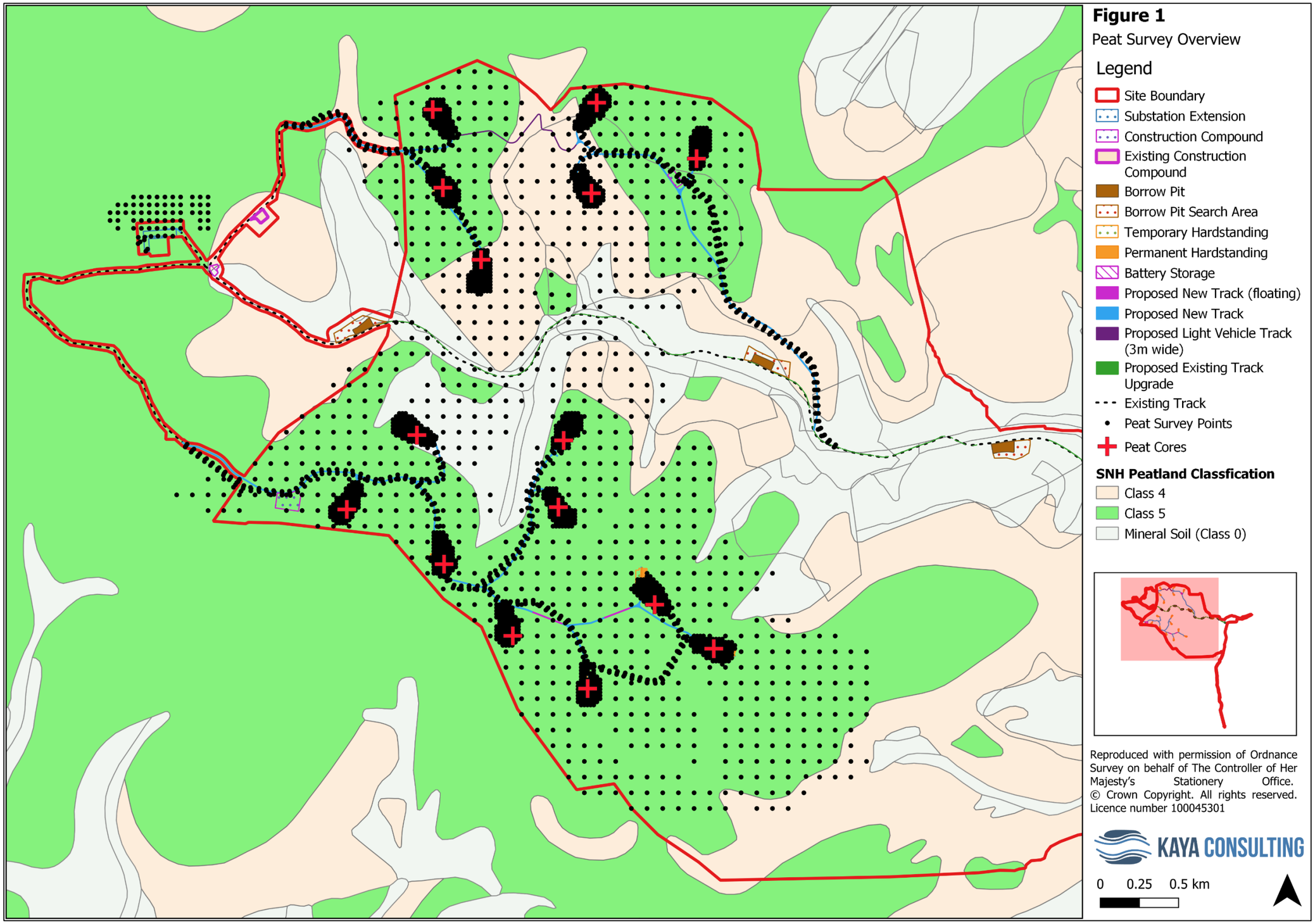
Figure 1
Peat Survey Overview
Legend
Site Boundary
Substation Extension
Construction Compound
Existing Construction Compound
Borrow Pit
Borrow Pit Search Area
Temporary Hardstanding
Permanent Hardstanding
Battery Storage
Proposed New Track (floating)
Proposed New Track
Proposed Light Vehicle Track (3m wide)
Proposed Existing Track Upgrade
Existing Track
Peat Survey Points
Peat Cores
SNH Peatland Classfication
Class 4
Class 5
Mineral Soil (Class 0)
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0 0.25 0.5 km

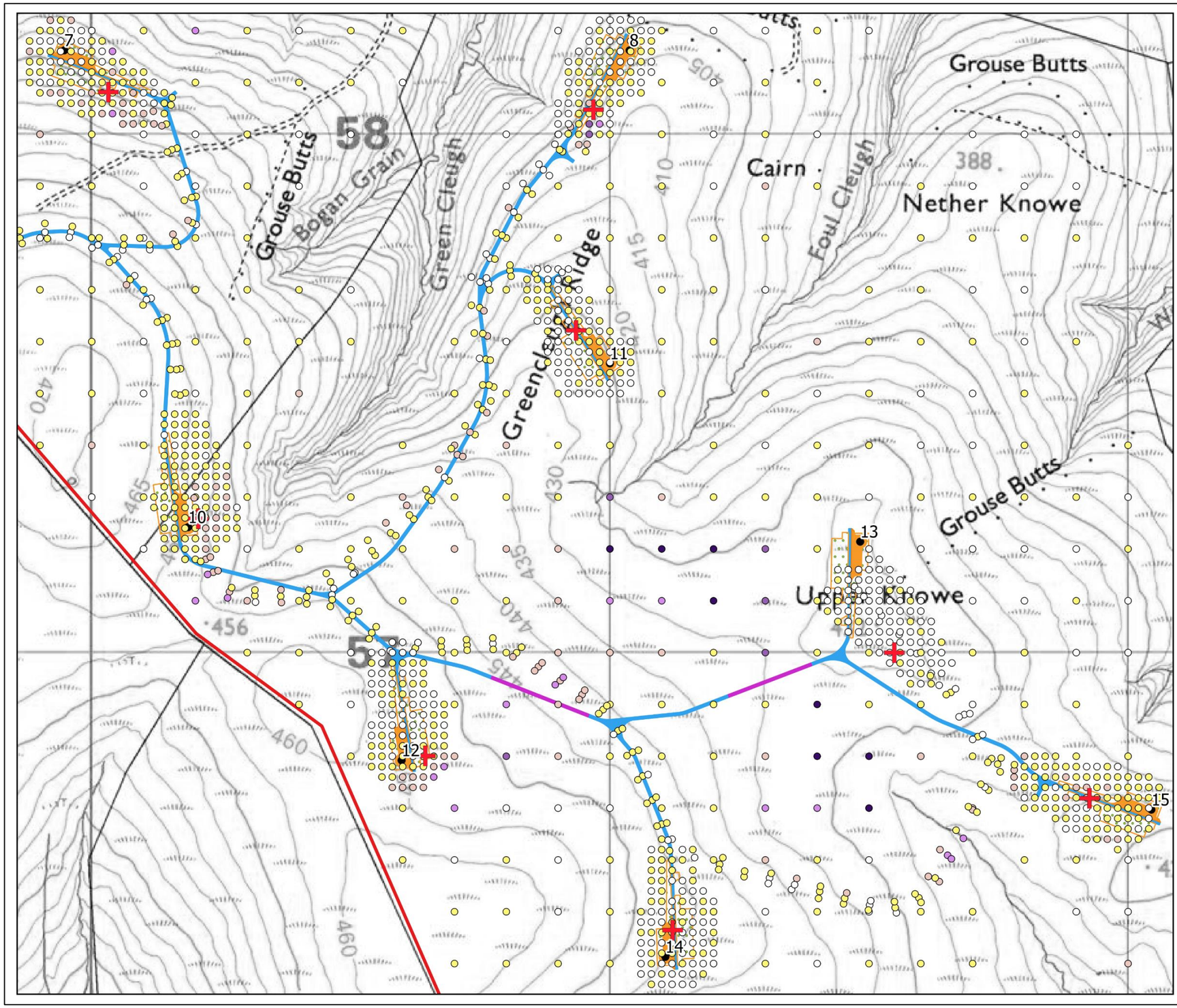


Figure 2a

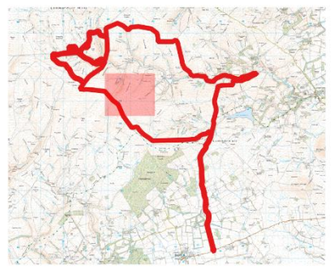
Peat Depths Closeup

Legend

- Site Boundary
- Turbine (labelled)
- Temporary Hardstanding
- Permanent Hardstanding
- Proposed New Track (floating)
- Proposed New Track

Peat Depth (cm)

- < 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Peat Cores



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0 0.125 0.25 km

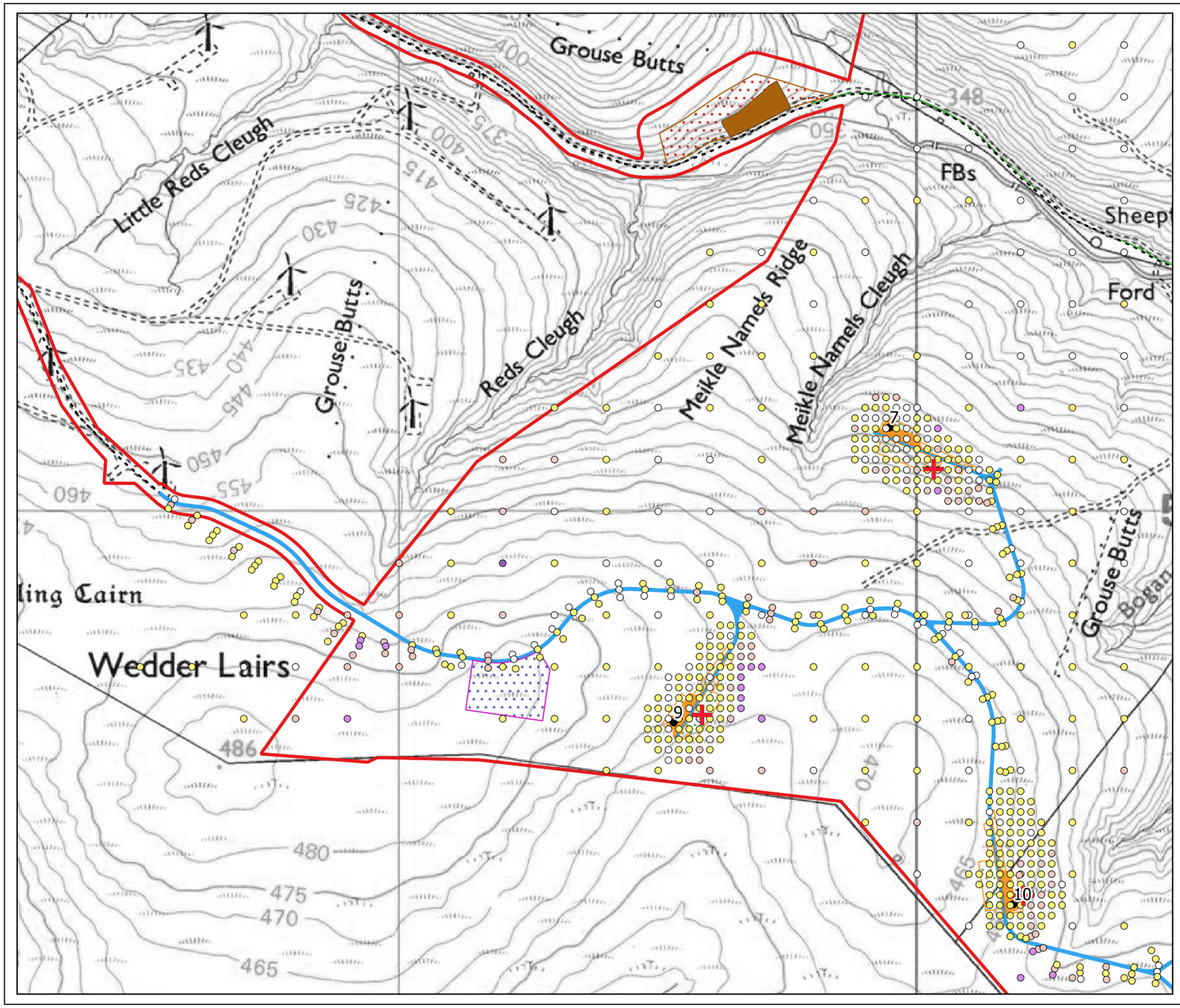


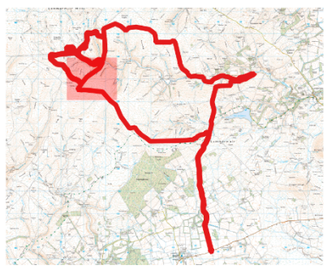
Figure 2b
Peat Depths Closeup

Legend

- Site Boundary
- Turbine (labelled)
- Construction Compound
- Borrow Pit
- Borrow Pit Search Area
- Temporary Hardstanding
- Permanent Hardstanding
- Proposed New Track
- Proposed Existing Track Upgrade
- Existing Track

Peat Depth (cm)

- < 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- Peat Cores



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0 0.125 0.25 km

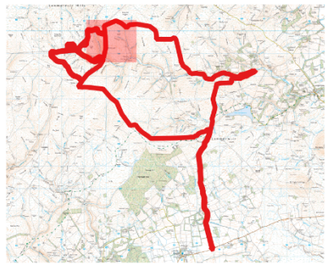
Figure 2c
Peat Depths Closeup

Legend

- Site Boundary
- Turbine (labelled)
- Borrow Pit
- Borrow Pit Search Area
- Temporary Hardstanding
- Permanent Hardstanding
- Proposed New Track
- Proposed Light Vehicle Track (3m wide)
- Proposed Existing Track Upgrade
- Existing Track

Peat Depth (cm)

- < 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Peat Cores



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0 0.125 0.25 km

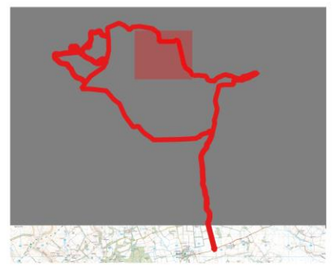
Figure 2d
Peat Depths Closeup

Legend

- Site Boundary
- Turbine (labelled)
- Construction Compound
- Borrow Pit
- Borrow Pit Search Area
- Temporary Hardstanding
- Permanent Hardstanding
- Proposed New Track
- Proposed Existing Track Upgrade
- Existing Track

Peat Depth (cm)

- < 25
- 25 - 50
- 50 - 100
- 100 - 150
- Peat Cores



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0 0.125 0.25 km

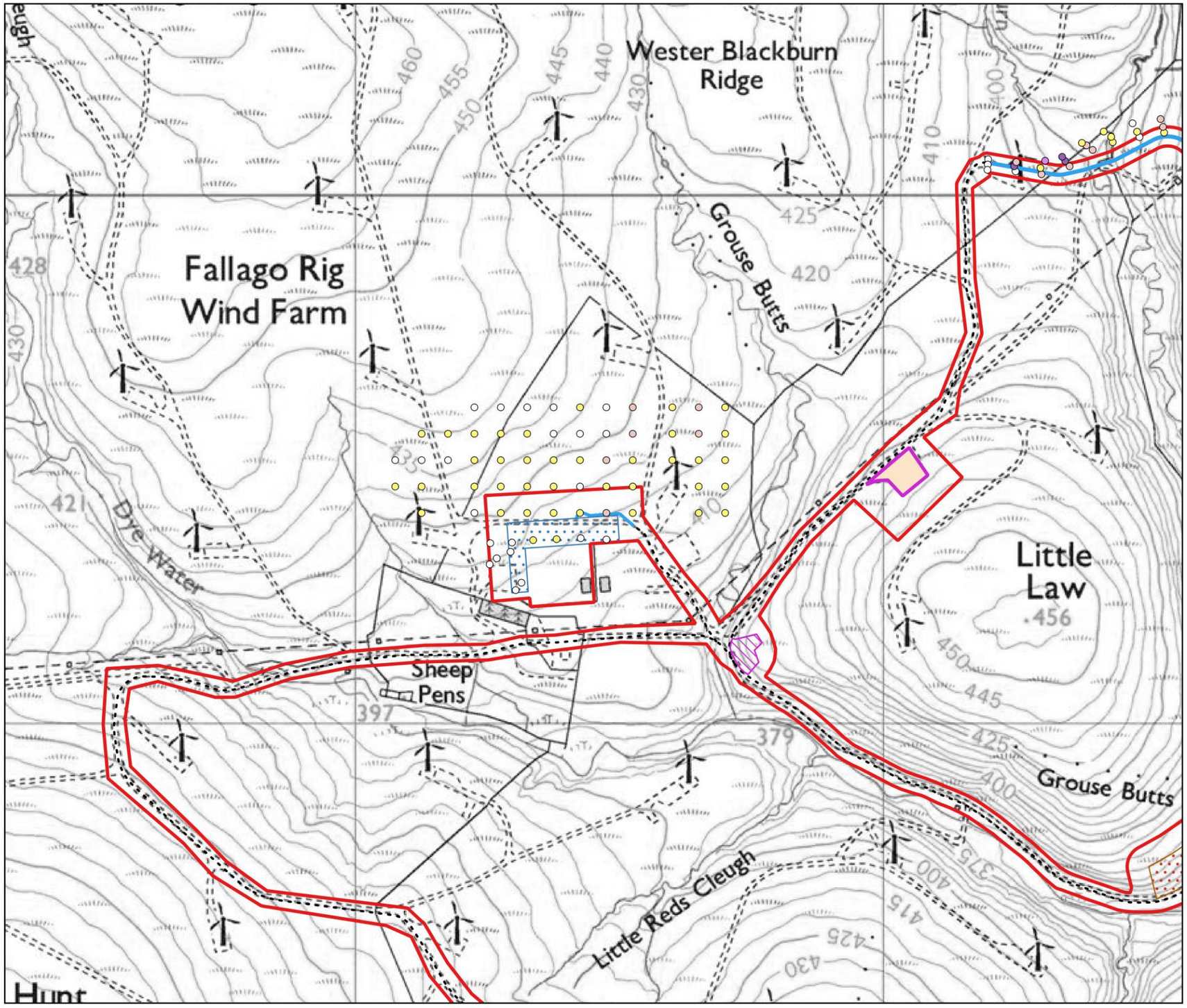


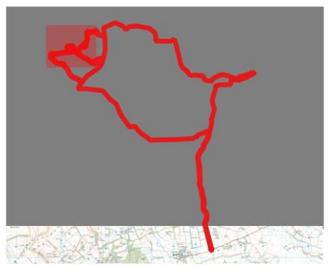
Figure 2e
Peat Depths Closeup

Legend

- Site Boundary
- Substation Extension
- Existing Construction Compound
- Borrow Pit Search Area
- Battery Storage
- Proposed New Track
- Existing Track

Peat Depth (cm)

- < 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200



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0 0.125 0.25 km