



Technical Appendix 9.4 Peat Assessment Report

ENVIRONMENTAL IMPACT ASSESSMENT

June 2025



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1. Introduction

Locogen's Environment Team were commissioned to undertake the Phase 2 Peat Survey to gather detailed information on the peat deposits within the study area of the proposed Balgray Wind Farm (the Site).

This report covers the methodology applied to the Phase 2 Survey and presents the outputs from the probing measurements and core samples. This work was undertaken between the 16th and the 20th of September 2024. The purpose of which, was to gain a deeper understanding of peat depths around the proposed infrastructure for the Balgray Wind Farm and minimise the extent of disruption to peatland through micro-siting, where necessary.

This includes an additional Phase 2 Survey for the proposed turning head at the north of the Site, undertaken on the 25th of March 2025.

This report should be read in conjunction with Chapter 9, Hydrology, Geology and Hydrogeology within the Environmental Impact Assessment Report (EIAR).

The Phase 2 Peat Survey and this Technical Report have the following aims:

- Inform the layout of the Proposed Development to help reduce the impacts associated with peatland habitats and allow for any required micro-siting;
- Provide peat depth data to inform calculations on the volume of excavated peat arising from construction; and,
- Provide data to inform an outline Soil and Peat Management Plan (SPMP)

1.1. Project Description

1.1.1. The proposed Balgray Wind Farm site is located in Dumfries and Galloway, close to the small village of Sibbaldbie approximately 6km northeast of Lockerbie. The 'Site' is comprised of six turbines, with embedded Battery Energy Storage System (BESS) and ancillary infrastructure. The Site is defined predominantly as rural upland hills with some areas of forestry.

1.1.2. The proposed Site location and Red Line Boundary (RLB) is shown in Figure 1 below.



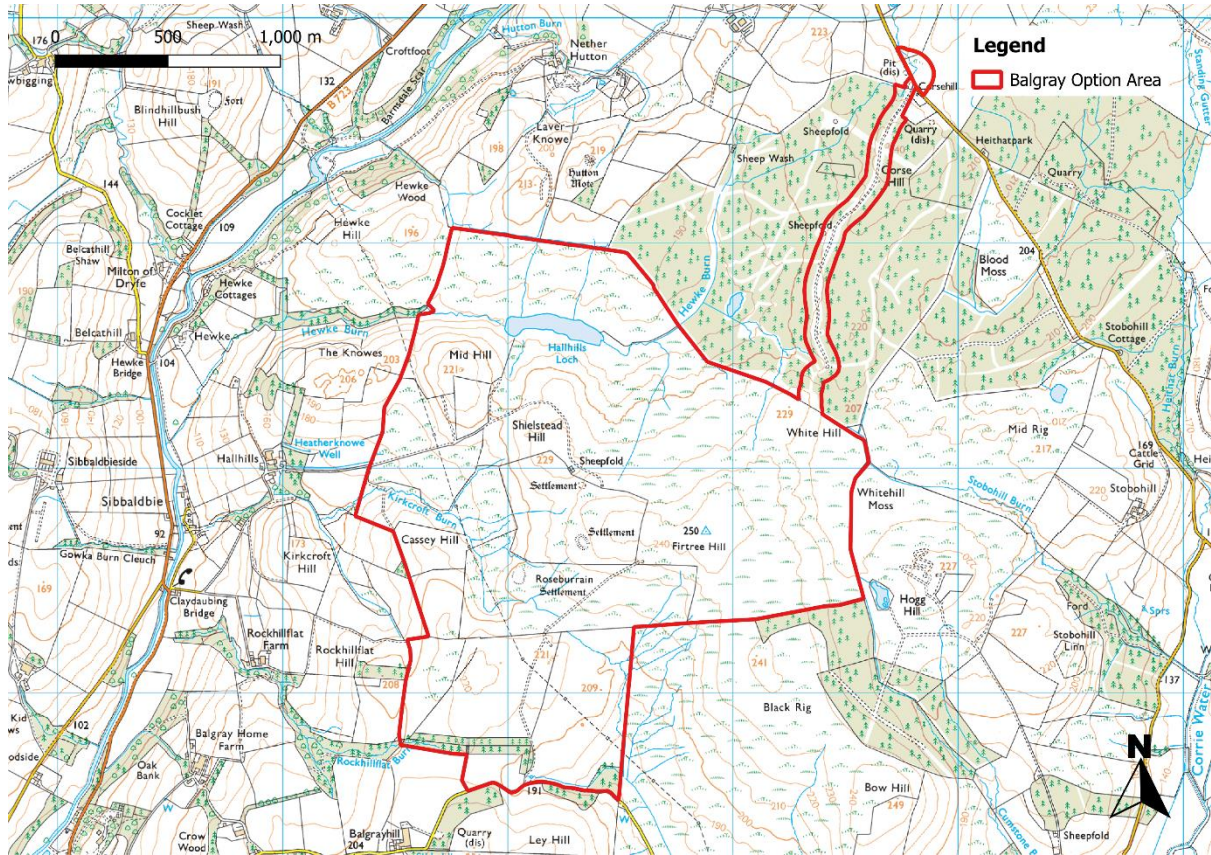
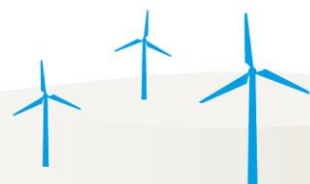


Figure 1: Site boundary with red line boundary

2. Methodology

2.1.1. The methodology used for the surveys follows current guidance in Scotland for Phase 2 Peat Surveys: Guidance on Developments on Peatland (Scottish Government, Scottish Natural Heritage, SEPA, 2017). The surveys were undertaken between the 16th and 20th of September 2024.

2.1.2. The Phase 2 survey comprised peat probing along proposed access tracks and turning heads at 50m centres with 10m offsets. Additional points were added where proposed tracks were wider. Furthermore, at a later time an additional survey was conducted due to a turning head at the north access track being necessary for transportation logistics. 10m crosshair probing at each turbine location and across all other infrastructure elements such as substations, BESS locations, and borrow pits was applied. This extended out to 100m in all directions, except for cases where points intersected with those from another area. This methodology was applied, in comparisons to 10 x 10m grids across all infrastructure, due to the low peat depths reported across the Site during the Phase 1 surveys completed by Atmos Consulting.



2.1.3. Van Walt peat probes were used to take depth measurements, with results recorded on Q-Field GIS software and locations cross checked with Garmin GPS devices to ensure accuracy. Depths were recorded to the nearest centimetre.

2.1.4. A total of 978 sampling points were surveyed during Phase 2. This included a large grid to the southeast of the Site to allow for potential micro-siting of Turbine 1 and an additional area to the north for a proposed turning head. The location of Turbine 1 was determined by the Phase 1 results as having potential for deep peat.

2.1.5. Peat cores were taken using a Van Walt Russian Corer¹ at all turbine locations, as well as at the centre of other infrastructure elements (substation, borrow pits, BESS). Samples were also abstracted from these locations to be sent for laboratory analysis. This analysis included bulk density, total moisture, loss on ignition at 550°C, and pH. Samples were gathered across two days before being shipped to a UKAS accredited laboratory. It should be noted that due to the shallow depths and consequently difficulty of obtaining a large enough sample, moisture content and bulk density were unable to be calculated.

2.1.6. Core samples were analysed in the field with the following information recorded:

- Photograph of each core
- Depth of core
- Degree of humification (Hodgson, 1974²): to establish amorphous, intermediate, or fibrous content
- Degree of humification (Von Post Scale³)
- Fine fibre content: F0 (none) to F3 (very high)
- Coarse fibre content: R0 (none) to R3 (very high)
- Water content: B1 (dry) to B5 (very wet)

2.1.7. It should be noted that due to the shallow depth of the peat, which in most cases resembled peaty soil, it was not possible to extract a full core sample at some locations. However, soil was still gathered for laboratory analysis.

¹ Van Walt (2024). Russian Corer, Available at: <https://www.vanwalt.com/equipment/russian-peat-corer-set/>

² Hodgson (1974). Soil Survey Field Handbook.

³ Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only. Available at: <https://www.gov.scot/publications/peatland-survey-guidance/>



3. Results

3.1. Peat Depths

Phase 1 Survey

3.1.1. The results of the Phase 1 survey, completed by Atmos Consulting, are shown in Figure 2. The map shows an Inverse Distance Weighted (IDW) interpolation. It should be noted that the further from a probed point, the less accurate the data is likely to be. This data was used to inform the current design layout and the Phase 2 peat survey.

3.1.2. This data was collected on a 100m x 100m grid across the whole Site. The results shown in Figure 2 were used to microsite some infrastructure elements and determine the site layout. This was then used to design the survey for Phase 2.

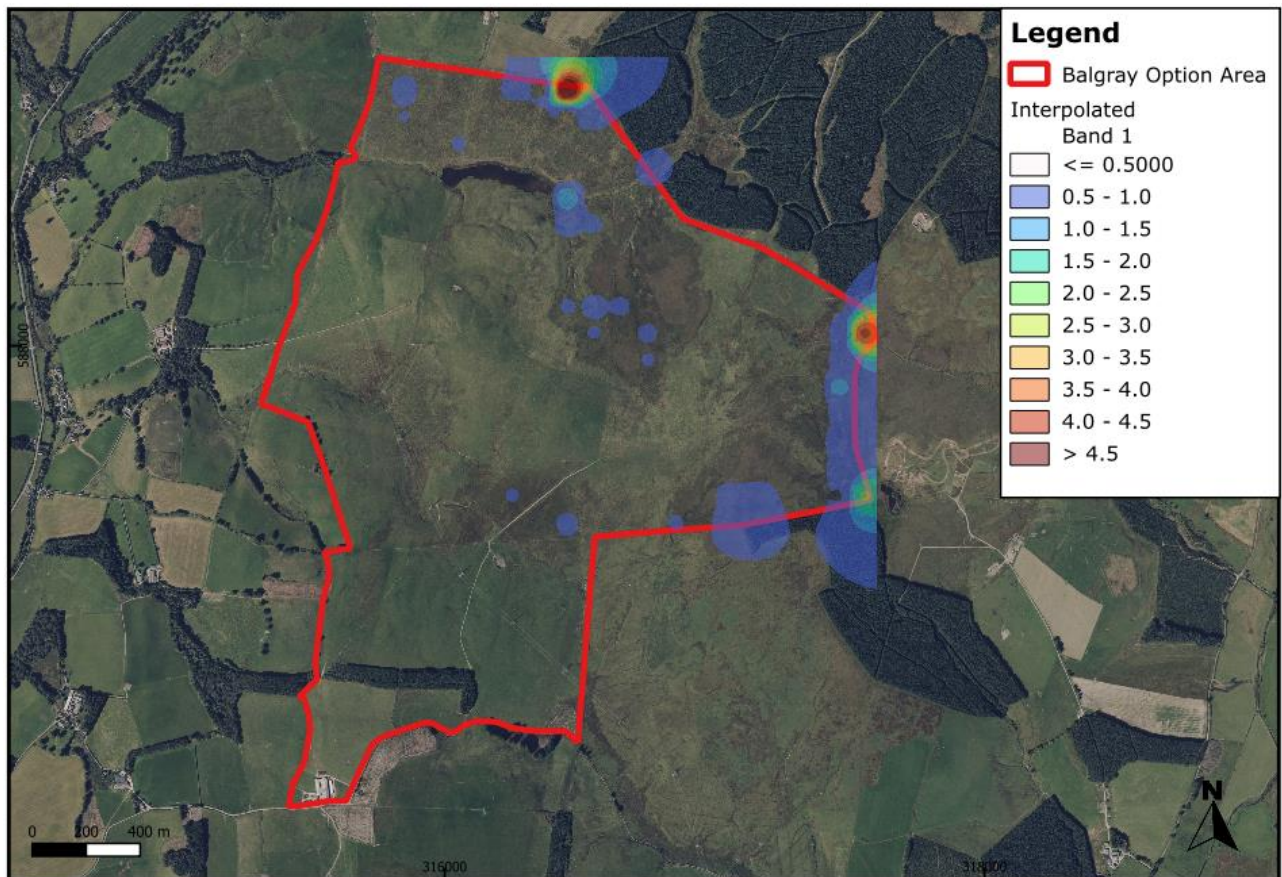
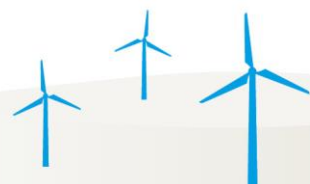


Figure 22: Interpolated peat depth from the phase 1 survey



Phase 2 Survey

3.1.3. The depths observed during the Phase 2 survey were relatively shallow. Peat is defined as a soil greater than 0.5m in thickness with over 60% organic carbon content⁴. As shown in Table 1, only 18 measurements were equal to or greater than this value. Overall, 98.16% of measurements taken were below 0.5m. Only one point was found to be greater than 1m, located along the access track towards Turbine 6. The depth of peat at infrastructure locations can be defined as low, with most areas characterised as peaty soils. Figure 3 shows a further break down of the depths across the Site.

Table 1: Peat depth summary

Peat Depth Range	Number of Probes	Percentage of Probes
0-0.24m	616	62.99%
0.25-0.49m	344	35.17%
0.5-0.74m	16	1.64%
0.75-0.99m	1	0.10%
1-1.24m	1	0.10%

⁴ NatureScot (2023). Advising on Carbon-rich Soils, Deep Peat and Priority Peatland Habitat in Development Management.



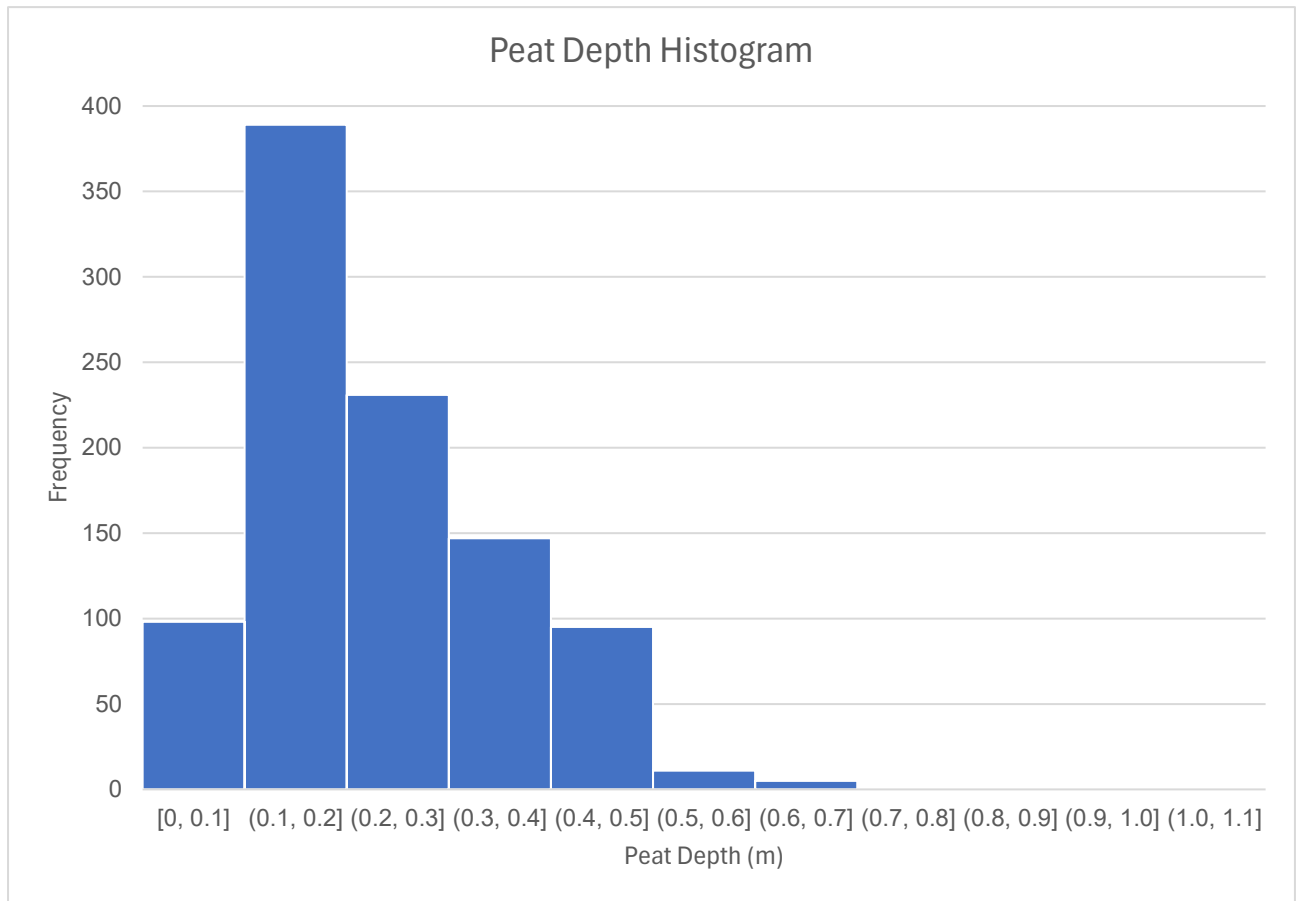
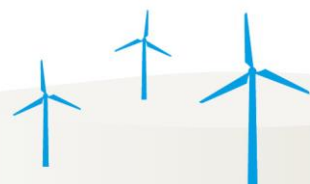


Figure 33: Peat depth histogram from the Phase 2 Survey

3.1.4. The depth across the Site is illustrated in Figure 4. This data was gathered during the Phase 2 survey and focusses on the infrastructure and track locations. Images showing each section of the Site in greater detail are presented in Appendix 2



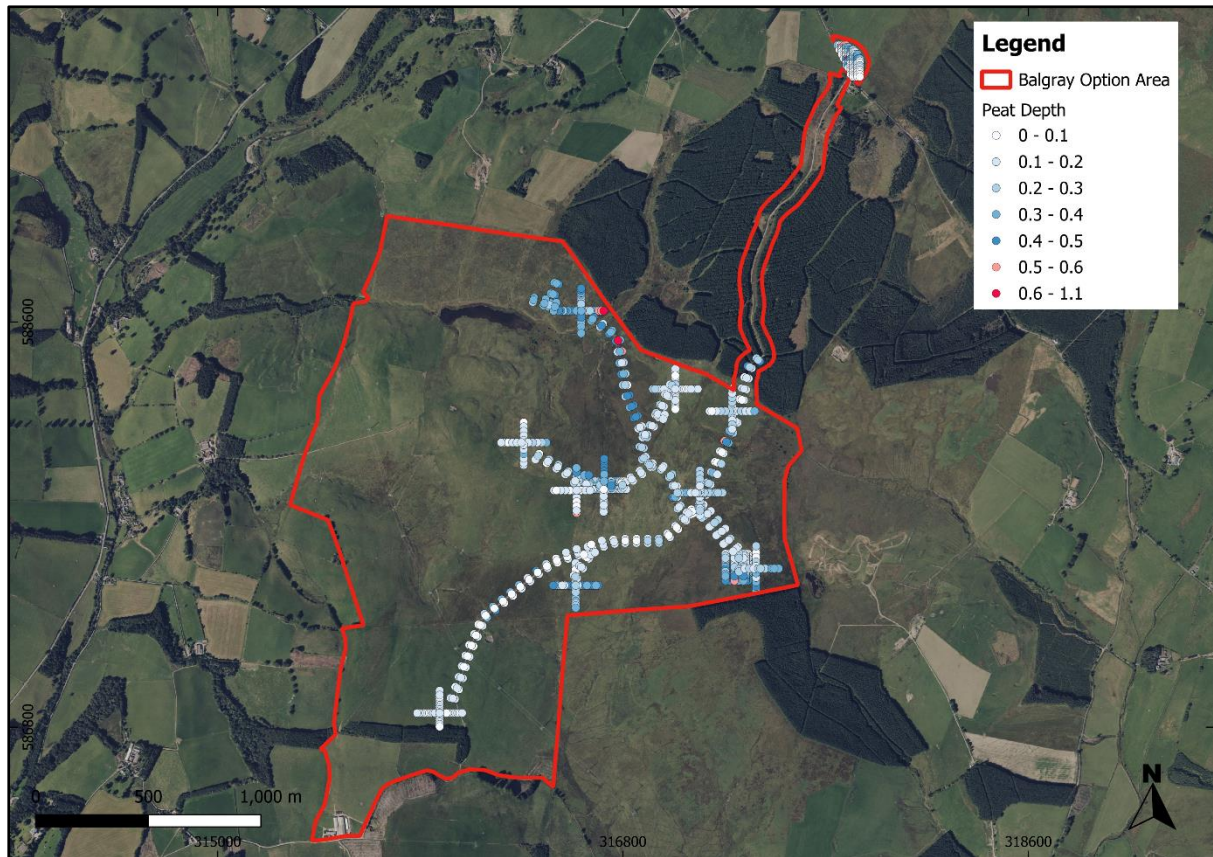


Figure 44: Phase 2 peat depth results

3.2. Peat Cores

- 3.2.1. A total of 11 core samples were attempted. It was determined, due to the depth and composition of the soil extracted, that all samples contained peaty soils, as opposed to peat. It was not possible to determine the depth of the acrotelm from any of the sample, as there were no saturated sections extracted. It should be assumed that the thickness of acrotelm is the total depth, for the purpose of construction and turve reinstatement.
- 3.2.2. Table 2 shows some of the information collected during coring, with the data presented in full in Appendix 1 at the end of the document. The Von Post humification scale is a measure of decomposition within organic soils, this ranges from H1 to H10, with H1 being the least and H10 being the most decomposed. The results indicate minimal decomposition within the core samples taken. This suggest that soils are lacking organic material and can therefore be defined as peaty soils. Due to this, construction is likely to have a limited impact on peatland habitats. Samples were also found to be unsaturated, reducing the overall condition of peat.

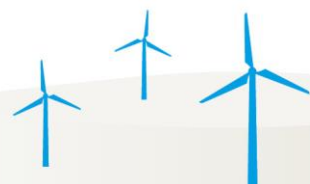


Table 2: Core data

Sample Number	Associated Infrastructure	Depth (m)	Von Post	Peat	Notes
1	BESS	0.16	H1	No	No liquid produced when compacted. Very little plant matter.
2	Turbine 2	0.25	H3	No	Some liquid and decomposition observed.
3	Turbine 3	0.18	H2	No	Some liquid when squeezed, very little decomposition present
4	Control Room	0.38	H4	No	Liquid produced when compacted, coarse fibres showing some decomposition
5	Substation	0.1	H2	No	Very shallow, some liquid when squeezed. Contained live roots.
6	Borrow Pit 2	0.12	H1	No	Shallow sample with lots of live roots.
7	Turbine 1	0.32	H4	No	Darker in colour and produced brown liquid when compacted.
8	Turbine 4	0.2	H2	No	Very little liquid produced. Mostly live roots
9	Borrow Pit 1	0.12	H1	No	Very shallow sample, dry and contained live roots with little decomposition
10	Turbine 5	0.11	H2	No	Some liquid, contained little decomposition.
11	Turbine 6	0.4	H5	No	Produced brown liquid. Decomposition occurring while matter remains identifiable.

3.2.3. All 11 samples were sent to the laboratory for analysis, however, due to the shallow depth it was not possible to test for total moisture or bulk density in any of the samples. Results were obtained for Loss on Ignition and pH, and these are also presented in Appendix 1.



3.3. Peatland Condition

- 3.3.1. The Site is comprised predominantly of rural farmland, with some small, isolated areas of bog and forestry. The Site has been heavily influenced by agricultural grazing. There were no erosion features present across the site.
- 3.3.2. Drainage across the Site is mostly natural, with the only signs of artificial channels being those running along the sides of the southern access track. Small channels drain away from higher ground in the centre of the Site. There is a loch present in the northwest. Peat depth was deepest to the north and east, with pockets of deeper peat situated around watercourse channels.
- 3.3.3. The majority of the points recorded, 84.56%, was classified as Peatland Condition 2 - Modified, due to the influence agriculture has had on the area. There were small areas classed as Near Natural, due to soil saturation and vegetation. This comprised 14.42% and was located on the northern crosshair of the control room, as well as the microsites grid in southeast at Turbine 1. These areas corresponded with deeper peat measurements; however, all infrastructure is located outside of areas with peat depths greater than 0.5m, with the exception of the access track leading to Turbine 6 mentioned above.
- 3.3.4. The Site could benefit from the restoration of peatlands around the planned infrastructure to create improved wetlands. Further details are discussed in Chapter 6 Ecology within the EIA, and Outline Biodiversity and Habitat Management Plan (OBHMP) in Technical Appendix 8.5
- 3.3.5. Material excavation volumes associated with the construction of the Proposed Development have been calculated using the results from the surveys and interpolation using the GIS package ArcGIS. Excavation volumes are summarised in **Technical Appendix 9.5** Table B and detailed in **Annex A** and based on the following assumptions:
- Interpolation of probe depth was undertaken using the Spline interpolation method;
 - An assumption that the probe depths are representative of the actual depth of soil/peaty soils and validated by site observations; and
 - The excavated volumes will comprise primarily peaty soils.
- 3.3.6. The total volume of soil predicted to be excavated is **23,865m³**.
- 3.3.7. This does not exceed the intended total material reuse volume of **27,525m³**, therefore no excess material is required to be disposed off-site as a consequence of the Proposed Development.



4. Recommendations

- 4.1.1. The results from the Phase 2 Survey were used to ensure all tracks and infrastructure are located to avoid areas of deep peat. From the results it was deemed that all turbine locations and associated infrastructure was adequately positioned, based on the shallow depths and abundance of peaty soils across the Site. No further micro-siting is required based on the results presented within this report.
- 4.1.2. One survey point, located on the track to Turbine 6, was found to run over an isolated area of deep peat (Figure 4, shown in more detail in Appendix 2) greater than 1m in depth. As stated previously, the average in this section was found to be 0.61m, using the two measurements either side. Storage and handling of excavated peat should be outlined in a Peat Management Plan, prior to the start of construction, this should be incorporated into the Construction Environmental Management Plan (CEMP). Peat and peaty soils turves should be utilised across the Site upon being removed during construction for final restoration. Due to the shallow depth observed across the infrastructure and track locations, there should be very minimal amounts of peat generated out with the turves.



5. Summary and Conclusions

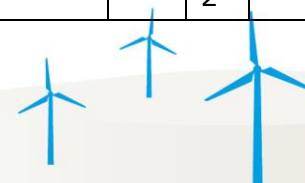
- 5.1.1. Locogen Consulting Ltd. was commissioned to undertake the Phase 2 peat depth survey for the proposed Balgray Wind Farm project. This report covers the methodology used, as well as the outputs from the Phase 1 (undertaken by Atmos Consulting) and Phase 2 detailed survey. The purpose of the surveys was to establish an understanding of peat depth across the Site, particularly around the proposed infrastructure locations. This is required to optimise the layout and minimise the impact on peatlands.
- 5.1.2. Of the 978 measurements taken during the Phase 2 survey, 960 were found to be less than 0.5m in depth. These are classified as peaty soils. 18 were found to be greater than 0.5m and one greater than 1m. Based on the depth and low decomposition observed by using the Von Post humification scale, the soils have been characterised as peaty soils, as opposed to peat. Construction will have a limited impact on peatland habitats.
- 5.1.3. A total of 11 cores were taken across the Site, with samples from each sent for lab analysis. Due to the low depth, the acrotelm was unable to be defined at all locations. It is therefore assumed that the depth of the acrotelm is the total depth measurement taken at each.
- 5.1.4. There were no further constraints due to the survey results to be imposed on the design layout and no further micro-siting was required.



Appendix 1

Table 3: Full core sample descriptions

Core Sample	Infrastructure	X	Y	Depth	Colour	Amorphous	Intermediate	Fibrous	Fine Fibres (F)	Coarse Fibres (R)	Water Content (B)	Von Post	pH	Loss on Ignition (440 degrees C)
1	BESS	315985	586862	0.16	Medium brown	N	N	Y	1	0	2	H1	5.8	37%
2	Turbine 2	316590	587430	0.25	Medium-dark brown	N	N	Y	1	1	3	H3	5.2	42%
3	Turbine 3	316359	588064	0.18	Medium brown	N	N	Y	1	1	2	H2	6.1	23%
4	Control Room	316716	587892	0.38	Dark brown	N	N	Y	1	2	3	H4	4.6	81%
5	Substation	316714	587856	0.1	Medium-dark brown	N	N	Y	2	2	2	H2	5.0	43%
6	Borrow Pit 2	316593	587851	0.12	Medium brown	N	N	Y	2	1	2	H1	5.5	28%
7	Turbine 1	317391	587504	0.32	Dark brown	N	Y	N	2	1	4	H4	4.2	58%
8	Turbine 4	317391	587504	0.2	Medium-	N	N	Y	1	2	2	H3	4.2	89%



					dark brown									
9	Borrow Pit 1	317284	588204	0.12	medium brown	N	N	Y	2	1	2	H1	5.4	39%
10	Turbine 5	317032	588302	0.11	Medium brown	N	N	Y	1	2	2	H2	5.9	41%
11	Turbine 6	316614	588650	0.4	Medium-dark brown	Y	N	N	1	1	3	H5	5.3	21%



Appendix 2

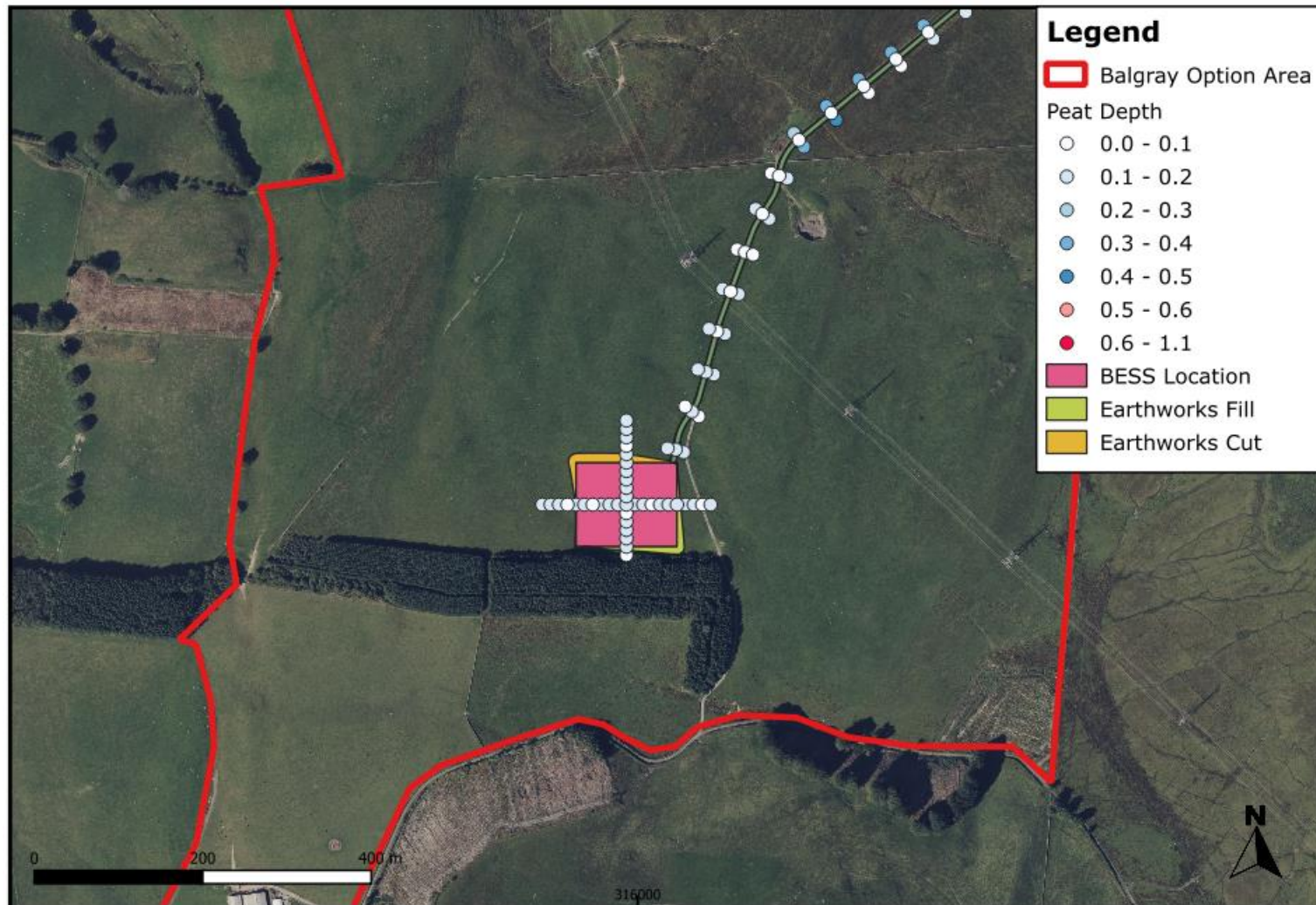


Figure 55: BESS location

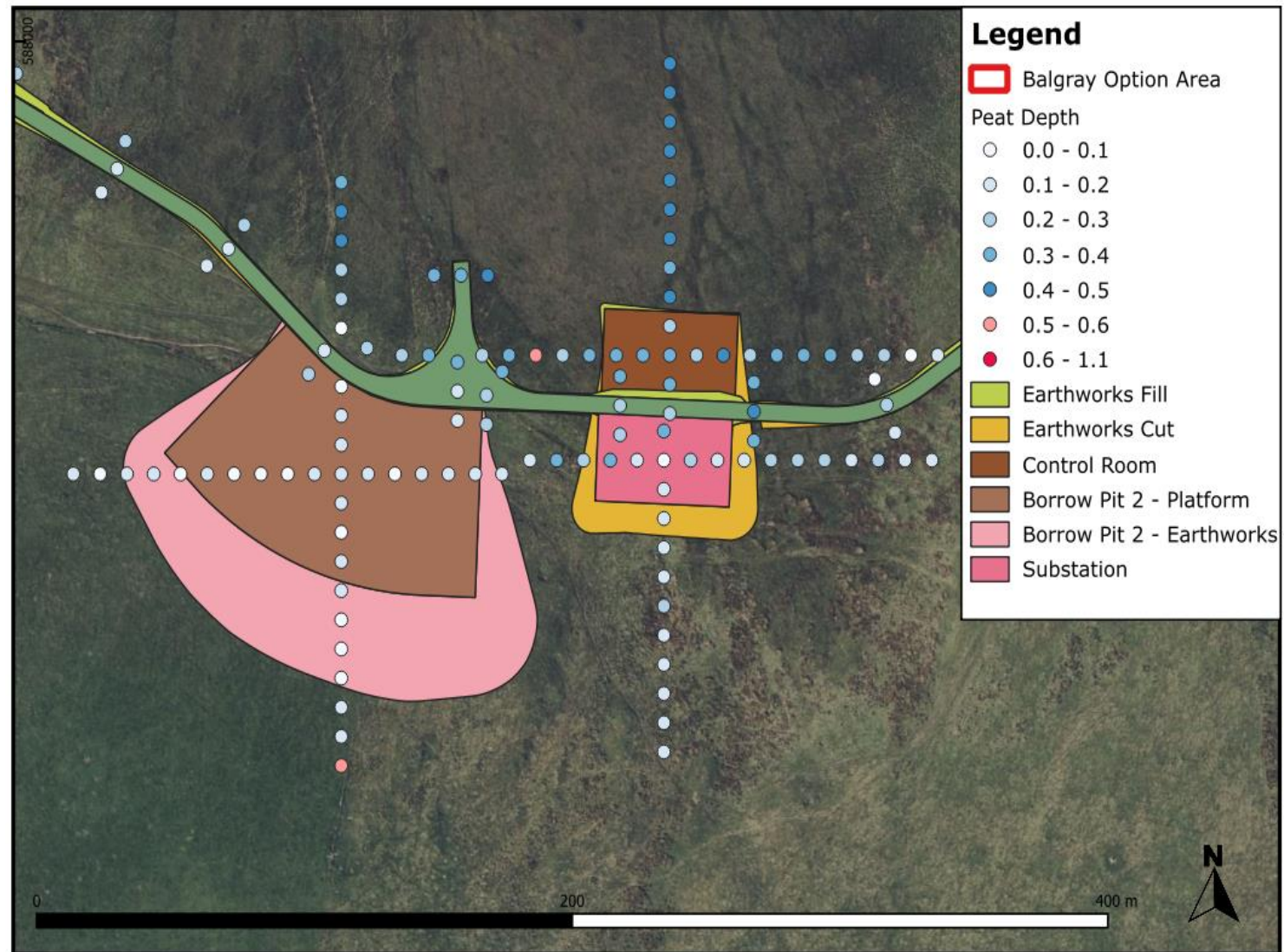


Figure 66: Control room, Borrow Pit 2, and Substation



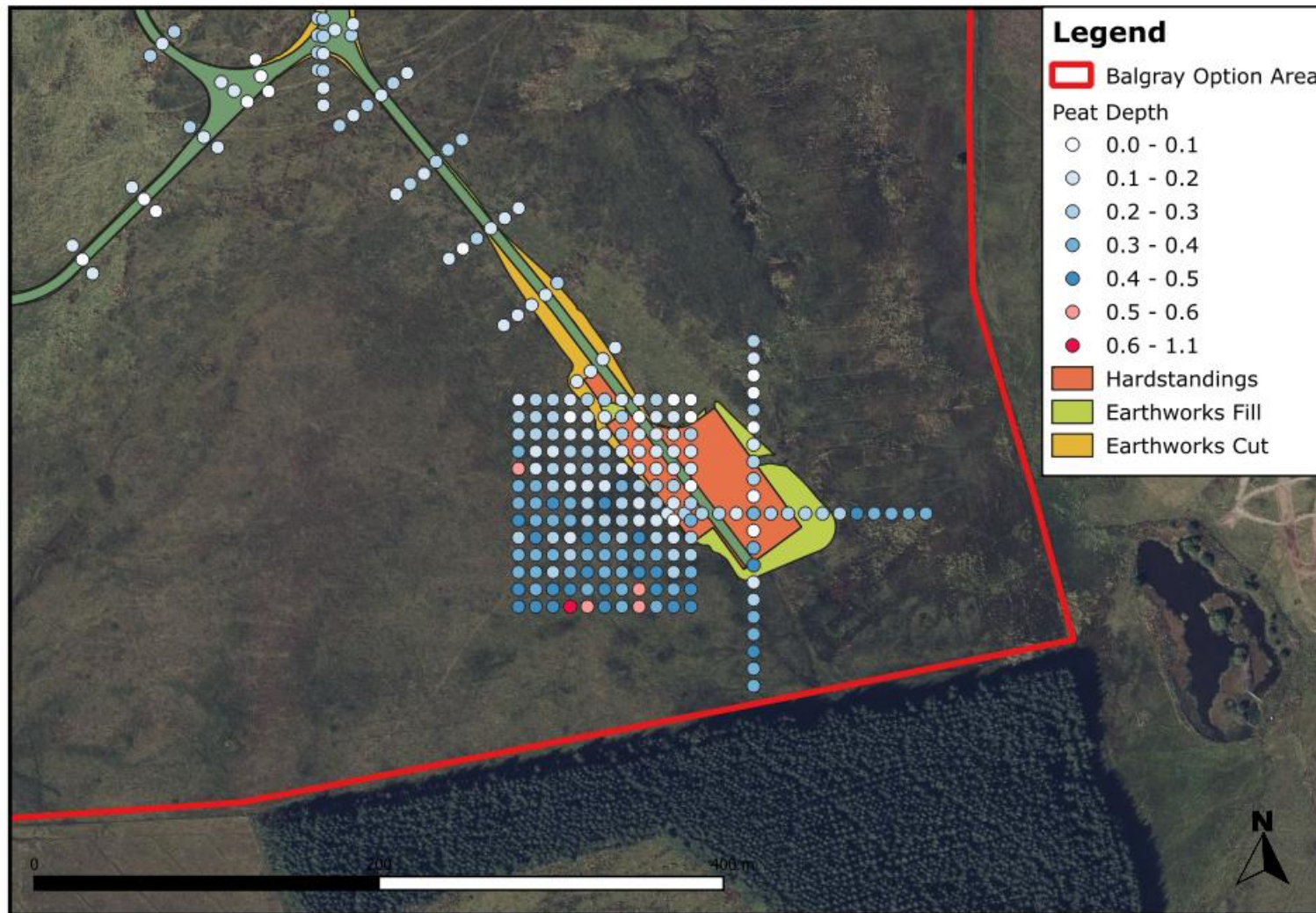
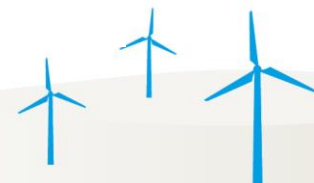


Figure 77: Turbine 1 with extra micro-siting grid



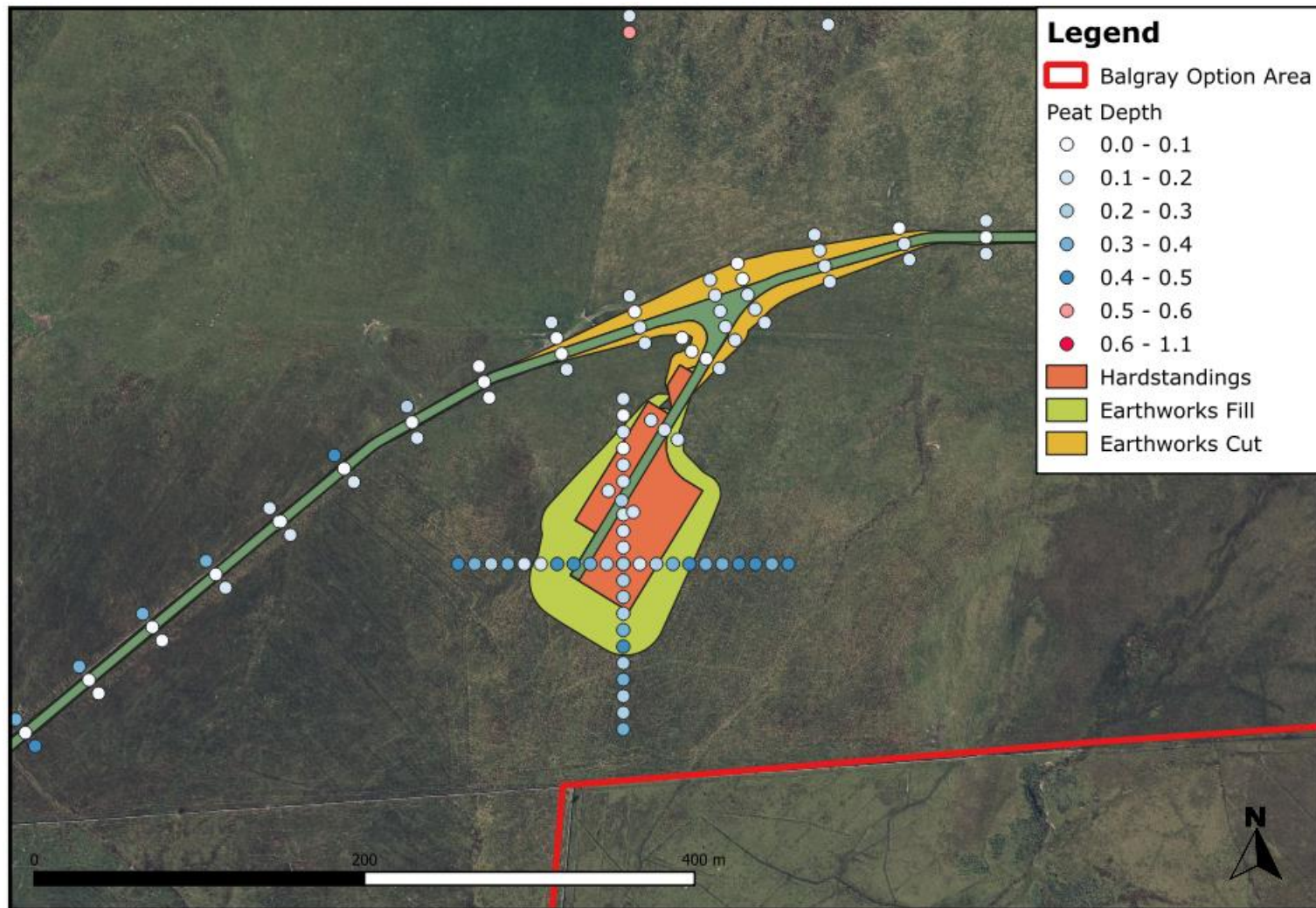


Figure 88: Turbine 2



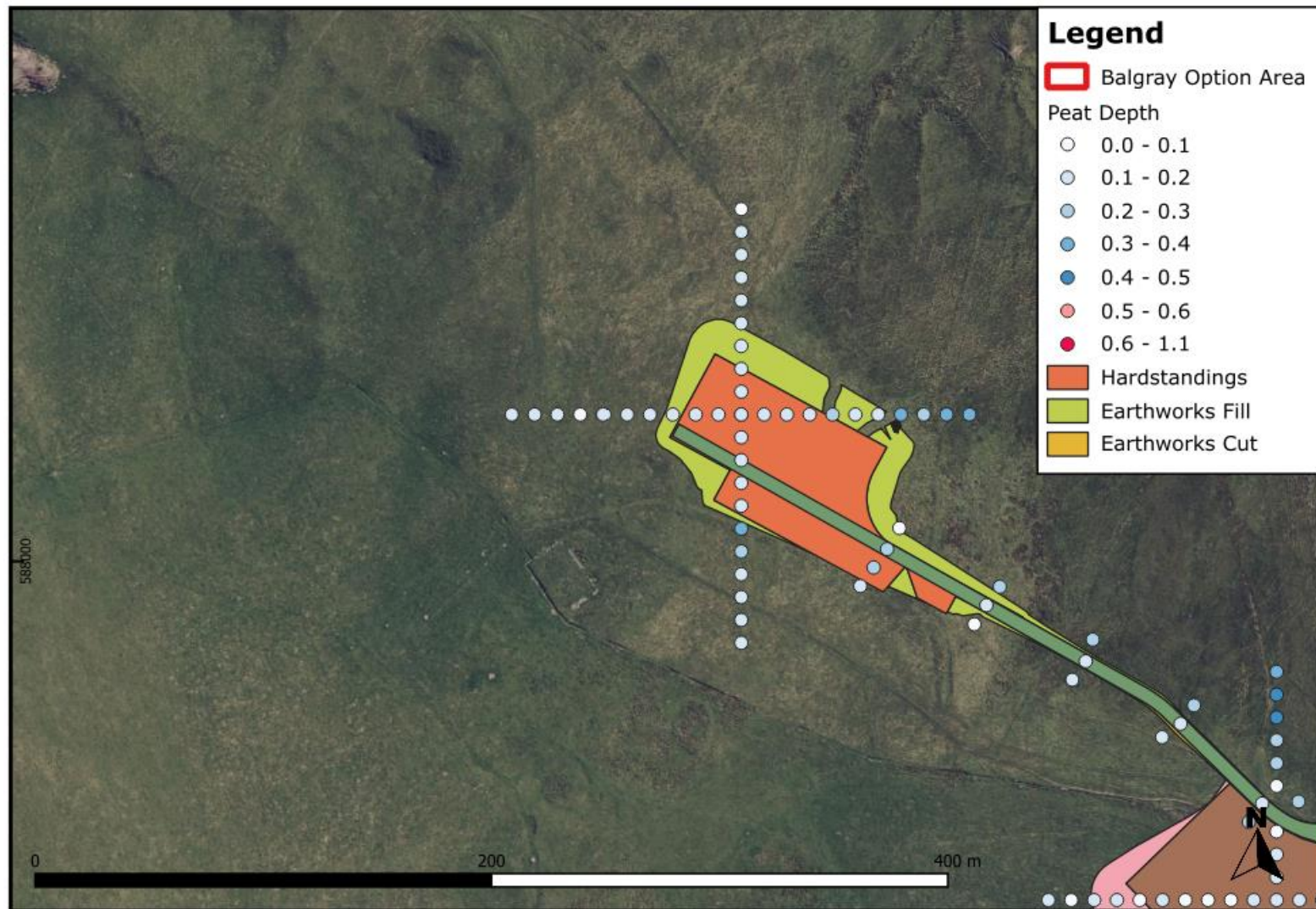
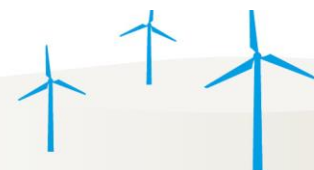


Figure 99: Turbine 3



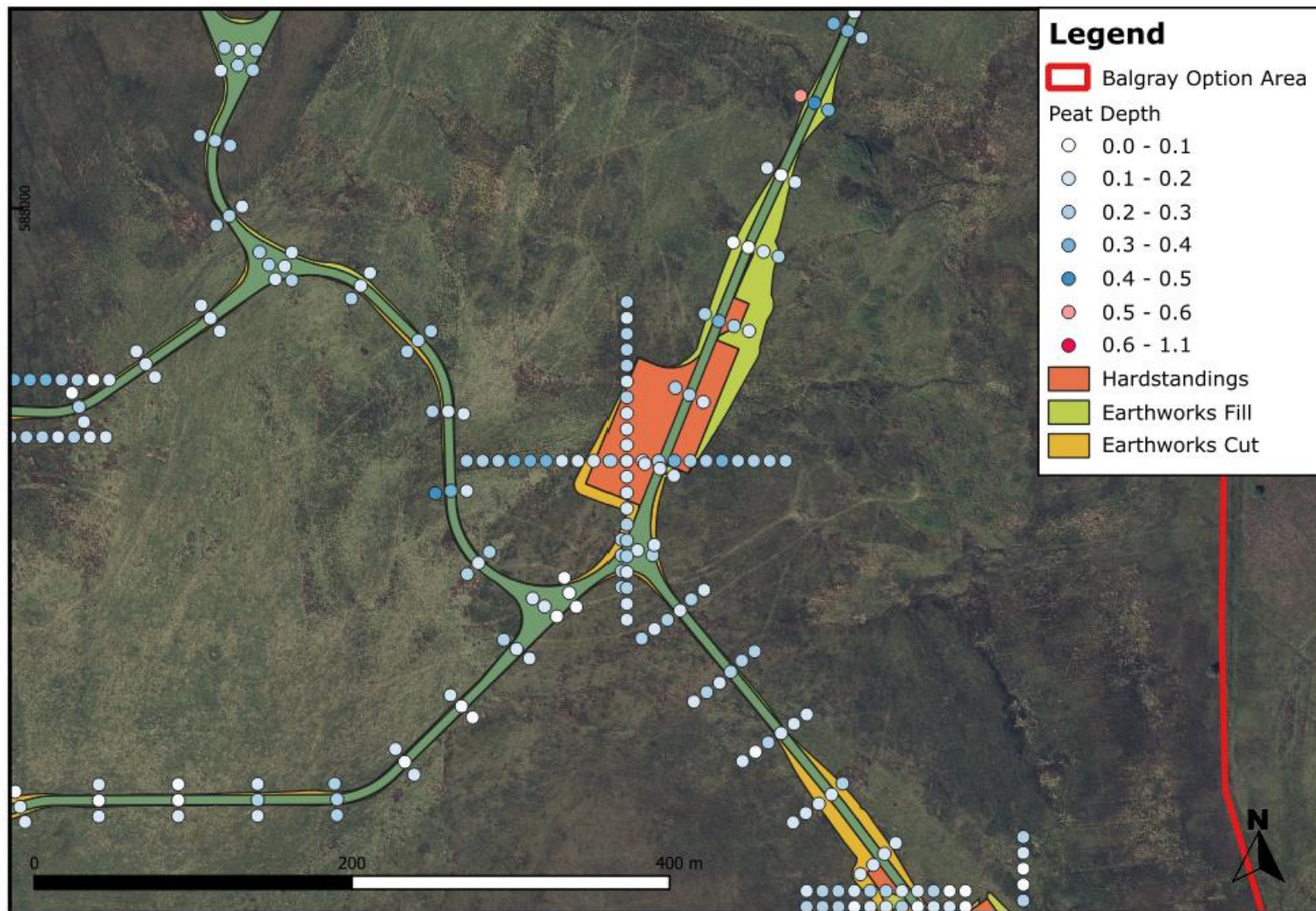
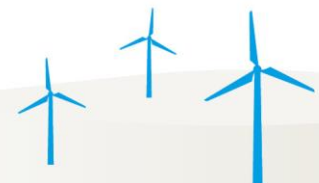


Figure 1010: Turbine 4



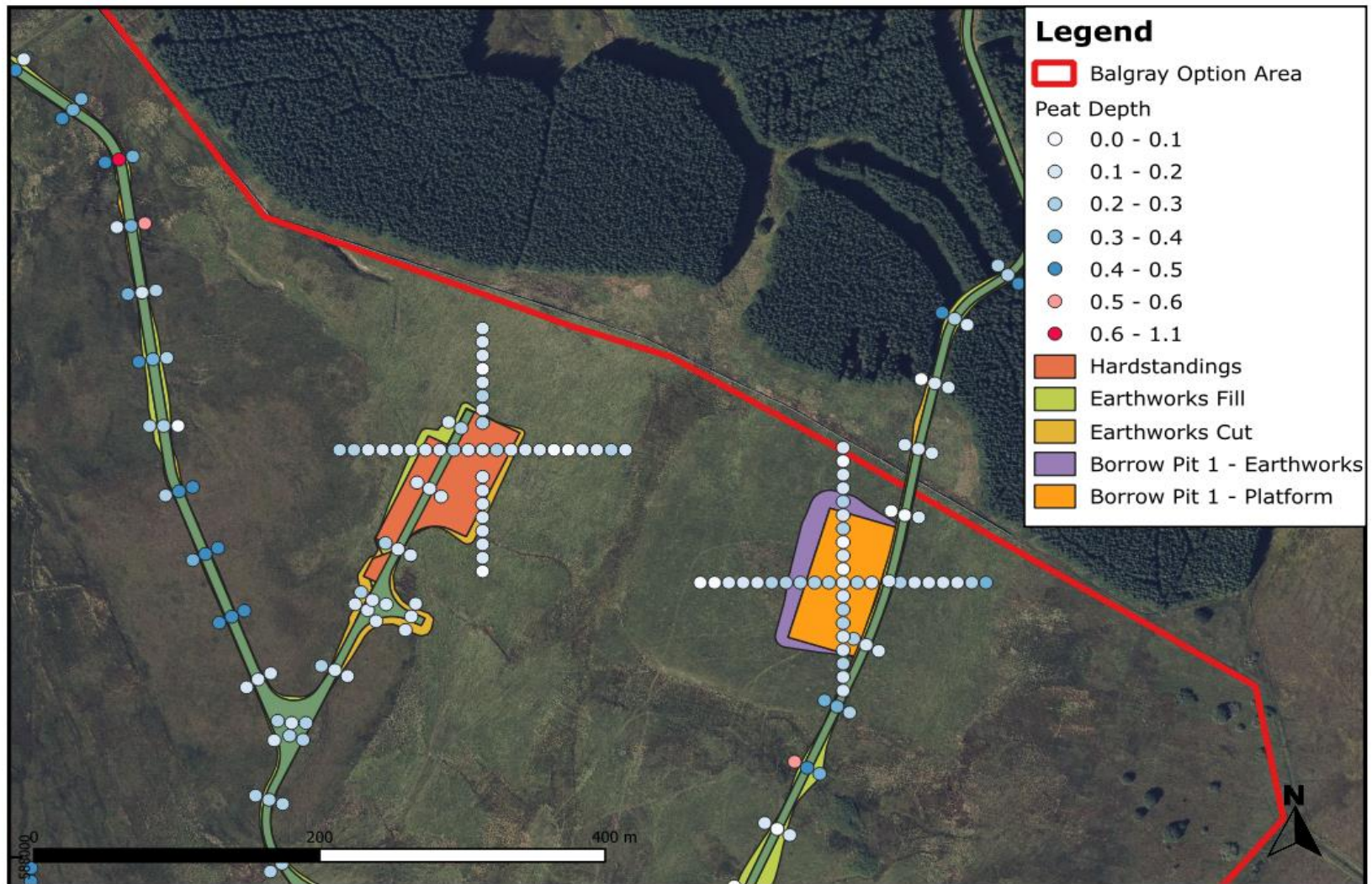
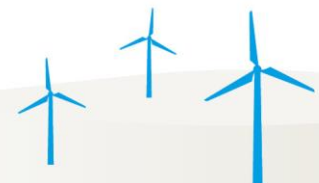


Figure 1111: T5 and Borrow Pit 1



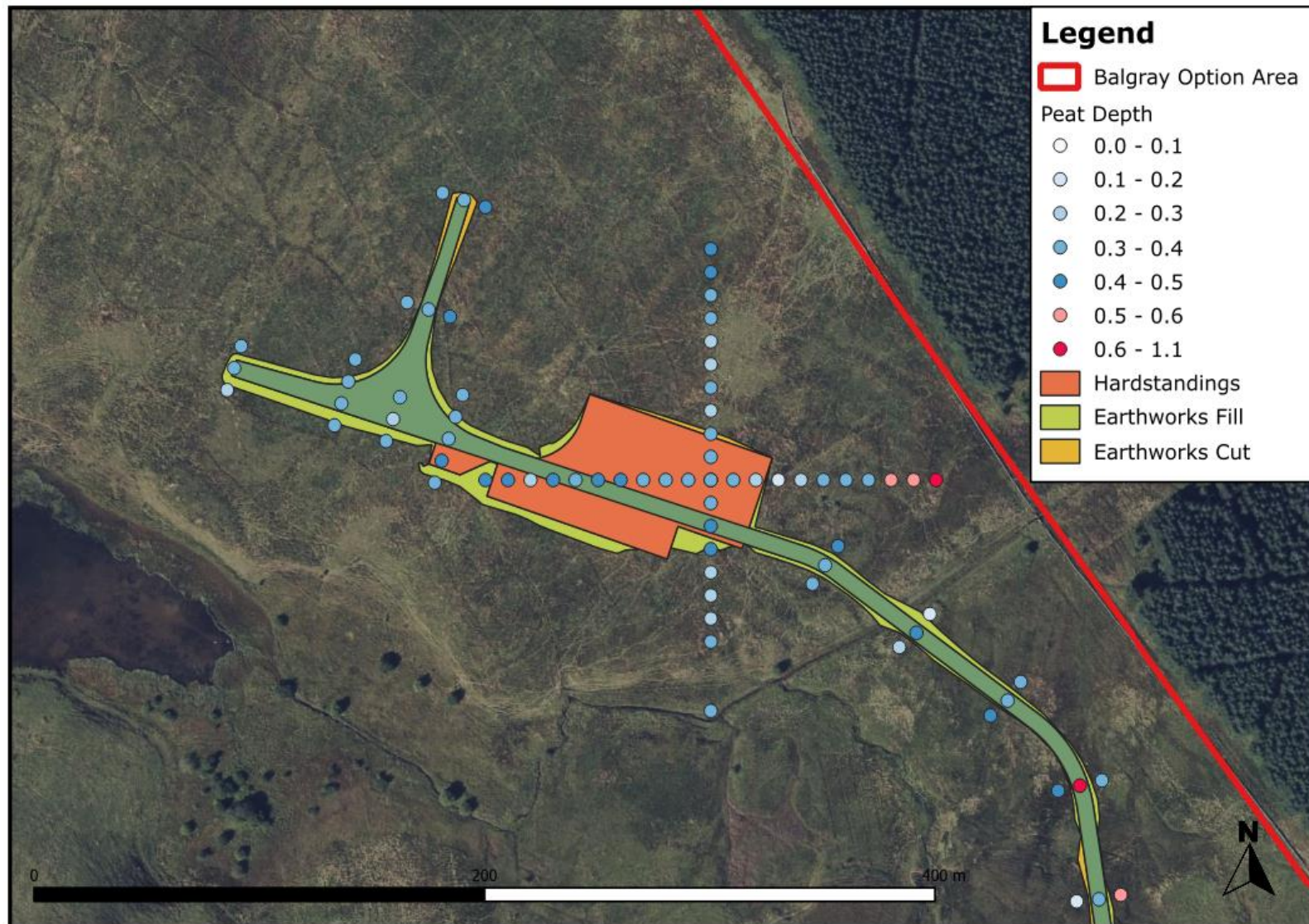


Figure 1212: Turbine 6



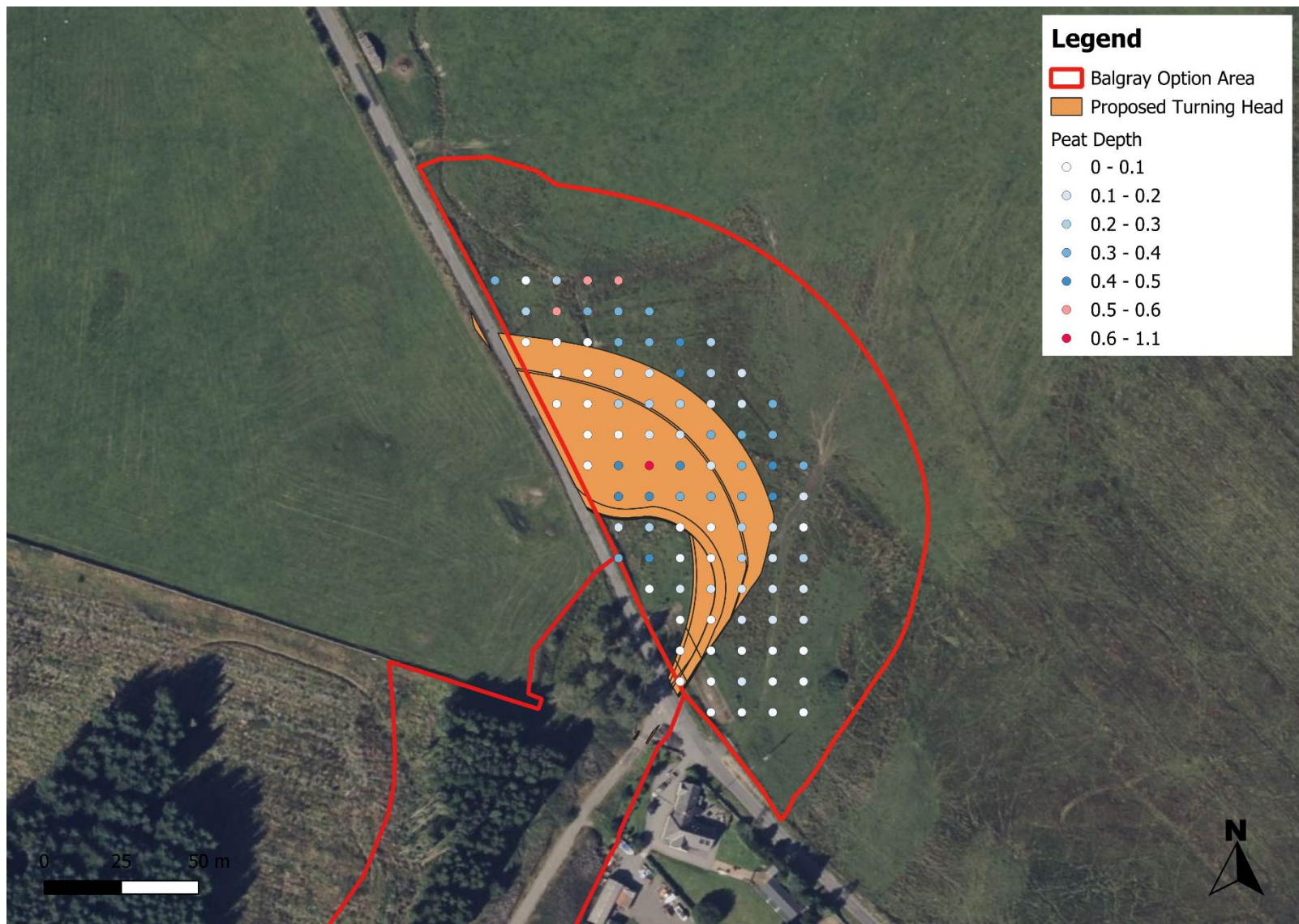
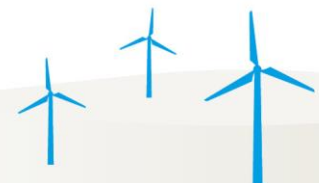


Figure 1313: Turning head at northern access road



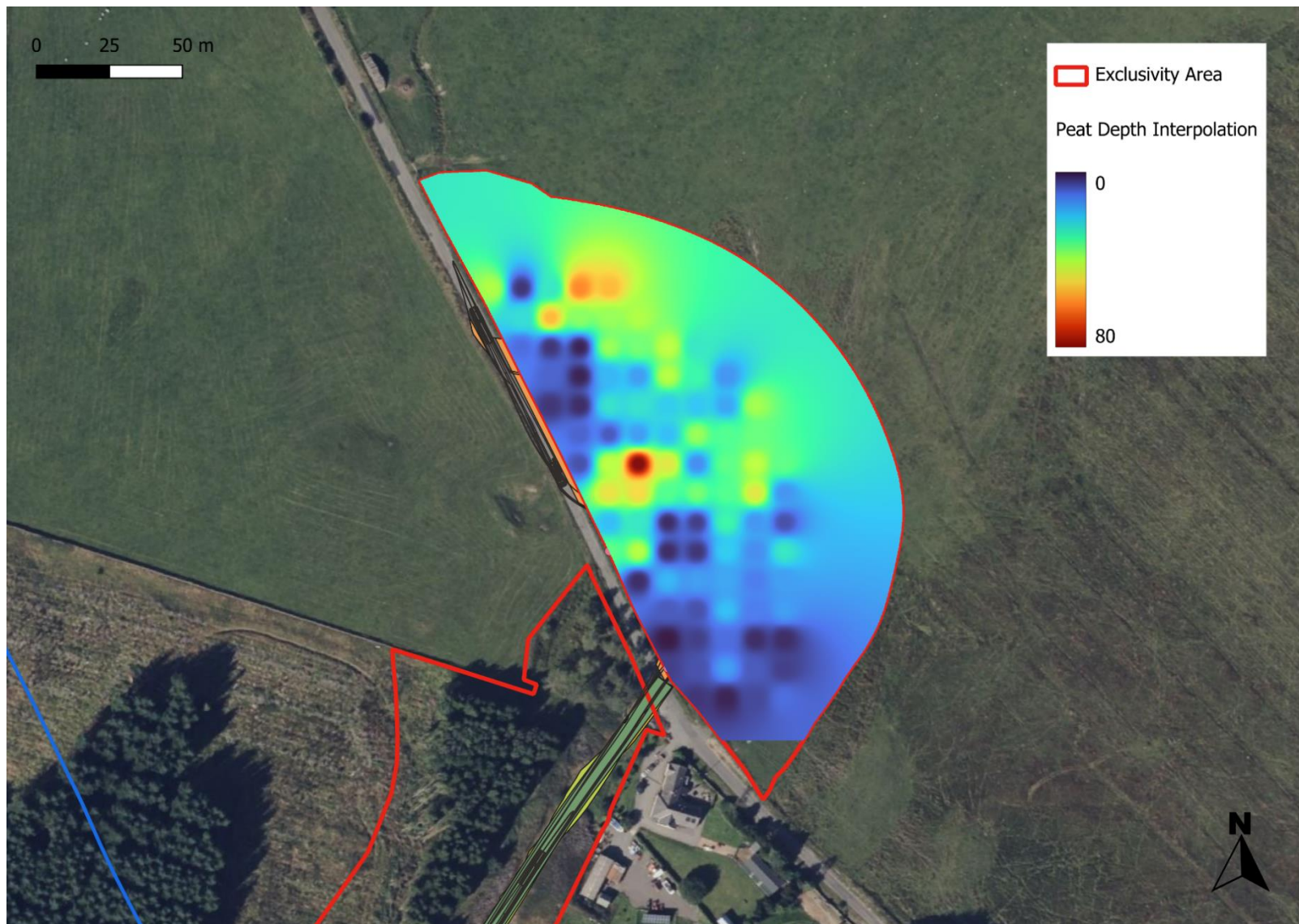


Figure 1414: Interpolation of peat depths of turning head at northern access road





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