



# ARCUS

**MOORSHIELD WIND TURBINES  
2020/0217/TP**

**APPENDIX 4: PEAT  
MANAGEMENT PLAN**

**V3.0**

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Prepared By:

**Arcus Consultancy Services**

7<sup>th</sup> Floor  
144 West George Street  
Glasgow  
G2 2HG

**T** +44 (0)141 221 9997 | **E** [info@arcusconsulting.co.uk](mailto:info@arcusconsulting.co.uk)  
**w** [www.arcusconsulting.co.uk](http://www.arcusconsulting.co.uk)

Registered in England & Wales No. 5644976

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## 1 INTRODUCTION

### 1.1 Overview

This Peat Management Plan (PMP) has been prepared by Arcus Consultancy Services Ltd (Arcus) on behalf of Moorshield Wind Farm Limited (the Applicant) for three turbines and associated infrastructure (the Development) on land located at Moor Road, Kirkhill, East Renfrewshire (the Site).

The planning application for Moorshield Wind Farm (020/0217/TP) was submitted on 17<sup>th</sup> April 2020 and validated on 4<sup>th</sup> May 2020. An objection letter from SEPA (PCS/171270 24<sup>th</sup> June 2020) requests more information is provided in the form of a detailed Peat Management Plan. The PMP follows the guidance in section 4 of SEPA's response;

- SEPA 4.2 – the planning submission must a) demonstrate how the layout has been designed to minimise the disturbance of peat and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat.
  - Moorshield PMP addresses 4.2 a) as stated above, through illustrating the site layout changes to reduce or avoid in places, the impact on deep peat, as shown on Figure 3 'Interpolated Peat Depths.' And part b) in sections 3.5, 3.6 and 3.7 of this report, respectively.
- SEPA 4.3 – The submission must include: **a) A detailed map of peat depths** (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements (including peat storage areas) overlain to demonstrate how the development avoids areas of deep peat and other sensitive receptors such as Groundwater Dependent Terrestrial Ecosystems.; and **b) a table which details the quantities of acrotelmic, catotelmic and amorphous peat** which will be excavated for each element and where it will be re-used during reinstatement. Details of the proposed widths and depths of peat to be re-used and how it will be kept wet permanently must be included.
  - Moorshield PMP includes detailed map of peat depths and corresponding table (Figures 2 and 3). Section 3.4 details the quantities of acrotelmic, catotelmic which will be excavated and re-used during reinstatement.
- SEPA 4.4 – To avoid delay and potential objection proposals must be in accordance with Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste and our Developments on Peat and Off-Site uses of Waste Peat.
  - This PMP has been prepared in accordance with the guidance as listed in section 1.2, specifically the guidance document noted in SEPA consultation, note 4.4, which states that the PMP should be produced that clearly shows the expected tonnages of peat to be excavated, along with a peat balance of where any such peat is going to be reused onsite. This PMP includes tabulated excavated peat estimation, details reuse potential, in Tables 2, 3 and 4 while the design of the site layout has strived to minimise peat disturbance. The peat re-use estimation provides an indication of a peat balance through reinstatement of windfarm infrastructure and habitat management programme. The PMP also

includes comments on the wetting of peat and maintaining the integrity of the peat where it may need to be stored before secondary use onsite.

- SEPA 4.5 –Dependent upon the volumes of peat likely to be encountered and the scale of the development, **applicants must consider whether a full Peat Management Plan (as detailed in the above guidance) is required** or whether the above information would be best submitted as part of the schedule of mitigation
  - This preliminary Peat Management Plan should be updated prior to construction following detailed design of the site layout and further site investigations.

This PMP will detail the proposed peat and soils management methodologies to be employed during the construction of the Development.

By undertaking detailed peat survey work a consistent approach to the management of peat across the Site can be achieved.

This is achieved through:

- Ensuring the characteristics of the Site are understood through sufficient peat probing;
- Assessing the topography of the Site;
- Developing a feasible design.

A peat survey was undertaken at the Site in September 2019, which focused on the proposed infrastructure proposed as part of the Development, including access track, substation, construction compound and turbine positions.

## 1.2 Sources Informing the Peat Management Plan

- Scottish Government, Energy Consents Unit Guidance Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, 2012 (superseded by Second Edition, 2017) <sup>1</sup>
- SEPA. (2010). Regulatory Position Statement – Developments on Peat. SEPA<sup>2</sup>;
- Scottish Renewables & SEPA. (2012). Developments on Peatlands Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste<sup>3</sup>;
- SEPA, (2017) 'Developments on Peat and Off-Site Uses of Waste Peat' (SEPA)<sup>4</sup>; and
- SNH & Forestry Commission Scotland. (2010). Floating Roads on Peat - A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland<sup>5</sup>.

This PMP has been produced in accordance with the guidance documents listed above and as SR & SEPA (2012) states that the key aim of any development on peat is to demonstrate;“ how, through site investigation and iterative design, the proposed development has been structured and designed to minimise, so far as reasonably practicable, the quantity of peat which will be excavated”.

The design evolution is detailed within section 3.2 of this Peat Management Plan and is illustrated in Figures 1, 2 and 3 in Annex 1. This PMP assesses the peat anticipated to be

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<sup>1</sup> <https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/>

<sup>2</sup> [https://www.sepa.org.uk/media/143822/peat\\_position\\_statement.pdf](https://www.sepa.org.uk/media/143822/peat_position_statement.pdf)

<sup>3</sup> <https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/>

<sup>4</sup> <https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf>

<sup>5</sup> <http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf>

excavated during the construction of the wind farm, which has been designed, where possible, to minimise the excavation of peat, and estimates the anticipated re-use potential.

Whilst this PMP provides a base standard for good practice, where avoidance or further minimisation of risks to the environment can be demonstrated through use of alternative methods or improvements to current practices, the Principal Contractor will implement these wherever possible and will correspond with SEPA and East Renfrewshire Council.

## 1.3 The Site

### 1.3.1 *General Description*

The Site is located at Moor Road, Kirkhill, East Renfrewshire, approximately 6 kilometres (km) southwest of Eaglesham and 10 km northeast of Stewarton, East Ayrshire. The Site is located within a rural area, both within and surrounded by agricultural land belonging to two farming units: nearby Shieldhill Farm to the west and South Moorhouse farm which is located to the east. Sporadic forestry plantations are located to the west and north of the Site, with Bennan Loch close to the northern boundary.

The site entrance is taken from the B764, located immediately south of the Site. Whitelee Wind Farm is located immediately south of the B764.

Figure 1 Illustrates the site layout including all infrastructure to be considered for this PMP.

### 1.3.2 *Published Geological Mapping*

#### 1.3.2.1 *Superficial Soils*

Based on BGS and Scotland's Soils<sup>6</sup> maps pertaining to superficial soils show the Site to be dominated by peat. There is a pocket of till in the more elevated eastern Site area which in which T1 is situated.

#### 1.3.2.2 *Bedrock Geology*

Published bedrock geology mapping indicates the southern and central areas to be underlain by Caradoc aged rocks comprising Kirkcolm Formation Wacke and the northern area to be underlain by Blackcraig Formation Wacke. Minor faulting was noted throughout the Site and locally dykes belonging to the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite were noted.

#### 1.3.2.3 *National Soils of Scotland Map*

The National Soils Map of Scotland, found within Scotland's Soils, Scotland's Environment Website<sup>7</sup>, illustrates the various soil groups pertaining to the Site area. The Soil group which dominates the terrain is 'Dystrophic Blanket Peat', commonly found in uplands and northern lowlands with gentle and strong slopes. There are two pockets of 'Peaty Gleyed Podzols with Peaty Gleys with Dystrophic Blanket Peat', commonly found in hills with gentle to strong slopes which are slightly rocky, to the eastern and north western Site area.

<sup>6</sup> British Geological Survey, *Onshore GeoIndex* [Online] Available at: <http://mapapps2.bgs.ac.uk/geoindex/home.html> (Accessed 09/07/2020)

<sup>7</sup> Scotland's Environmental Website: <http://soils.environment.gov.scot/> (Accessed 09/07/2020)

*1.3.2.4 Carbon & Peatland Map (2016, SNH)*

The Carbon and Peatland Map, also found within the Scotland's Environment Website, illustrates the carbon and peatland classes across the whole of Scotland. The entire Site area is Class 1 peatland, blanket peat.

## **2 OBJECTIVES**

### **2.1 Background**

The purpose of this PMP is to:

- Define the materials that will be excavated as a result of the Development, focusing specifically on the excavation of peat;
- Report detailed investigations into peat depths within the Site;
- Detail proposals for the management of excavated peat and other soils;
- Provide estimation of volumes of excavated arisings, and proposals for re-use or reinstatement using excavated materials; and
- Detail management techniques for handling, storing and depositing peat for reinstatement.

### **2.2 Approach to Minimising Peat Excavation**

The following steps have been taken during the design stage of the Development to minimise the impact on peat:

- The Development, which comprises of three Turbines, access tracks and other elements of infrastructure has been specifically designed to avoid the areas of deep peat where practicable; and
- Local topography has been taken into consideration to minimise the disturbance of peat where avoiding peat is not practicable.

These steps will be further supplemented by taking the following measures to minimise disturbance:

- Maximisation of slope angles in cuttings;
- Consideration of implementation of floating tracks; and
- The use of appropriate construction plant to avoid unnecessary disturbance of the ground surface.

The success of the PMP is based on gathering a thorough understanding of the Site to inform the design of the Development and address the objectives of the PMP which are applicable to the Site.

### **2.3 Objectives of the Peat Management Plan**

The main objective of this PMP is to detail how excavated peat will be managed and re-used during the construction of the Development.

The main objective will be achieved as follows:

- Providing a description of peat conditions on-site and methodology as to how this data was gathered;
- Estimation of peat volumes to be excavated and re-used;
- Considering the arrangement of reinstated peat to promote the regeneration of peatland vegetation;
- Determining, and describing, if temporary storage of peat will be required during construction and how this will be done to ensure suitability for re-use; and
- Consider the potential for peat not being suitable for re-use and any requirement for a Waste Management Plan for the Development.

The response to these objectives is provided in the following sections.

### 3 PEAT MANAGEMENT

#### 3.1 Site Investigations

A peat depth survey was undertaken in September 2019 focusing on the proposed access track and turbine locations. A grid methodology was incorporated, with probes taken at 50 m intervals along the infrastructure locations; additional probes were taken at up to 25 m intervals either side of the central probe location along the tracks. The proposed turbine locations were probed in a 10 m grid formation to provide an accurate understanding of the surrounding underlying peat profile.

#### 3.2 Peat Depths Results

A total of 259 probes were recorded with depths ranging between 0 metres (m) and 5.4 m.

Peat depth varied across the Site, with 89 probes (34%) reaching depths of between 0 and 0.5 m, however, a high concentration of probes in the centre of the Site area recorded peat depths of up to 5.4 m. As shown in Figure 3 'Interpolated Peat Depths' proposed infrastructure layouts prior to detailed peat surveying have been altered to avoid areas of deeper peat. Specifically altered infrastructure include Turbine 2 and associated infrastructure, the spur originating approximately 100 m south of the construction compound heading west towards T2 and spur which veers north up to T1 from the middle of the initial spur intended for the original position of T2. Deep peat (where the depth was greater than 1.0 m) was recorded in 129 (50%) of locations probed. The average peat depth was noted as 1.6 m.

The recorded peat depths and associated interpolation is illustrated on Figure 2 and 3 respectively, while Table 1 summarises the peat depths recorded. The full tabulated peat depths are included in Annex 3 of this PMP.

**Table 1: Peat Survey Summary**

Peat Depth Range (m)	Nº of Peat Probes	Percentage of Total
0.00 - 0.50	89	34%
0.51 - 1.00	41	16%
1.01 - 1.50	4	2%
1.51 - 2.00	22	8%
2.01 - 2.50	28	11%
2.51 - 3.00	45	17%
3.01 - 3.50	9	3%
3.51 - 4.00	9	3%
4.01 - 4.50	5	2%
4.51 - 5.00	5	2%
5.01 - 5.50	2	1%
Σ =	259	

#### 3.3 General Peat Classification

While no peat cores were obtained during the preliminary peat probing works and surveys for the planning application, the following information provides an overview of general types and classifications of peat.

Actotelmic peat is the upper layer of peat consisting of living and partially decayed material with a higher hydraulic conductivity and a variable water table. These deposits are generally found to exist in the upper 0.5 m of peat deposits and are typically suitable for re-instatement as it contains viable plant life to assist in the regeneration of peatland vegetation and carbon sequestration and is generally associated with the H<sub>3</sub> & H<sub>4</sub> categories on the von Post (1992) scale of Peat Classification.

Catotelmic peat is variable in characteristics, with decomposition of fibres generally increasing with depth. Water content can be highly variable and affects the structural strength of the material. Suitability for re-use generally depends on fibre and water content. The upper catotelm is commonly deemed as being appropriate for re-use in restoration due to its relatively high fibre content. This semi-fibrous peat layer is associated with the H<sub>5</sub> to H<sub>7</sub> categories on the von Post scale, which generally increases with greater depth until the extreme end of the scale which is classified as Sapric (amorphous) peat which is the least fibrous and most decomposed peat, less suitable for peat reinstatement.

#### Von Post Scale – Degree of Humification

H1	Completely undecomposed peat free of amorphous material. On squeezing, clear colourless water is pressed out.
H2	Nearly undecomposed peat, free of amorphous material, yielding only yellowish brown water on pressing.
H3	Very slightly decomposed peat, containing a little amorphous material. On squeezing, muddy brown water but no peat passes between the fingers. Residue is not pasty.
H4	Slightly decomposed peat containing some amorphous material. Strongly muddy brown water but no peat passes between the fingers. Residue is somewhat pasty.
H5	Moderately decomposed peat containing a fair amount of amorphous material. Plant structure recognisable though somewhat vague. On squeezing, some peat but mainly muddy water issues. Residue is strongly pasty.
H6	Moderately decomposed peat with a fair amount of amorphous material and indistinct plant structure. On pressing, about one third of the peat passes between the fingers. Residue is strongly pasty, but shows the plant structure more distinctly than in unsqueezed peat.
H7	H7 Strongly decomposed peat with much amorphous material and faintly recognisable plant structure. On squeezing, about one half of the peat is extruded. The water is very dark in colour.
H8	Strongly decomposed peat with much amorphous material and very indistinct plant structure. On squeezing, two thirds of the peat and some water passes between the fingers. Residue consists of plant tissues capable of resisting decomposition (roots, fibres, wood, etc.).
H9	Practically fully decomposed peat with almost no recognisable plant structure. Nearly all the peat squeezed between the fingers as a uniform paste
H10	Completely decomposed peat with no discernible plant structure. On squeezing, all the peat, without water, passes between the fingers.

Generally excavated semi fibrous catotelmic peat from the Site will have sufficient structural strength to be able to be used in the lower layers of verge restoration as it will not be 'fluid'. The catotelmic peat would be capped with a surface layer of actrotelm to re-establish the peat vegetation. If any fluid like wet catotelmic peat is encountered then it would be placed in appropriate locations such as flatter, low-lying areas or concave deposition areas.

Due consideration is given to potential construction risk and effects on environmentally sensitive receptors including deep peat, watercourses and Ground Water Dependent

Terrestrial Ecosystems (GWDTEs). However, with reference to SEPA survey guidance (Site Survey Guidance for Development on Peatlands 2014) which states "*Deep peat: a peat soil with a surface organic layer greater than 1.0 m deep*".

The peat on Site is described in Appendix 5 Annex B which details the habitat and protected species report. The report details two main areas of blanket bog, extending further south and west of the Site boundary, both degraded with multiple ditches drying out. The blanket bog to the west of the Site extend to the north east, into the Site boundary towards Bennan Loch where there is evidence of active drainage. The peat in this section is characterised as extensively dry consisting of large areas of bare peat. This area of peat resulted in the deepest readings during the peat survey that caused the iteration of the initial design.

### 3.4 Excavation Calculation

Calculations of peat excavation volumes have been derived from understanding the footprint directly impacting on the peat depths as determined from site surveys. For the calculation, the proposed track widths were used with a conservative estimate for the associated verge and earthworks being estimated. Details of the excavation calculation are included in Annex 2.

Through these calculations it is possible to derive an estimated volume of peat excavation and using best practice guidance to develop the re-use potential as a result of the Development. Table 2 shows the construction activities that will generate excavated peat, and the expected volumes produced from each activity based on the modelling exercise. Volumes are based on soft ground survey with the assumption that peat between surface level and 0.5 m is acrotelmic and catotelmic thereafter.

**Table 2: Peat Excavation Volumes based on Construction Activity**

Development Component	Anticipated Volume of Excavated Peat (m <sup>3</sup> )	Anticipated Volume of Acrotelmic Peat (m <sup>3</sup> )	Anticipated Volume of Catotelmic Peat (m <sup>3</sup> )
Turbines, crane hardstands and associated earthworks/verges	6,073	2,151	3,922
Tracks and associated earthworks/verges	8,300	3,125	5,175
Construction and substation compound and associated earthworks/verges	450	450	0
<b>SUB-TOTAL</b>	<b>14,823</b>	<b>5,726</b>	<b>9,097</b>
Deduction for Floating Tracks	5,550	1,125	4,425
<b>TOTAL</b>	<b>9,273</b>	<b>4,601</b>	<b>4,672</b>

A detailed assessment of excavated volumes by location within the Site is provided in Annex 2 of this PMP.

### 3.5 Peat Re-use Requirements

The principles of re-instating peat and peat soils should be adhered to for the Development, comprising the below:

- Peat and peaty soils will be reinstated within cable trench footprint with turves placed on the upper horizons encouraging re-vegetation;
- Where peat underlying track positions exceeds 1.0 m depth, floating tracks will be utilised to minimise the excavation of peat (as summarised in Section 3.4 and as illustrated in Figure 3 in Annex 1 and the details provided on Figure 5 'Typical Section Through Track' included in the Planning Application);
- Peat and peaty soils will be used to reinstate tracks, crane hardstand and construction compound verges;
- All peat, soil and turves excavated from beneath infrastructure will be re-instated in the vicinity of its source;
- Any wet catotelmic peat will be placed at the bottom of any restoration profile, followed by semi fibrous catotelmic peat and then acrotelmic should be placed on top;
- Peat bog restoration and ditch blocking in accordance with the post-consent Habitat Management Plan; and
- Restoration activities will be overseen by the Ecological Clerk of Works (ECoW) to ensure methods are properly adhered to.

### **3.5.1 Peat Restoration**

Appendix 5: Biodiversity and Natural Heritage Appraisal Report (Appendix 5) of the Supporting Statement lodged with the planning application for the Development includes details on proposed habitat management that will be incorporate peat management.

A programme of ditch blocking will be implemented to promote re-wetting of selected peatland, particularly areas of M17a blanket bog (as identified in Appendix 5 of the Supporting Statement) around the central area of the Site. Drains appear to be frequent here and further surveys will be required to identify those which are eroding, or potentially eroding, following best practice guidelines such as SNH Peatland Action Guidance<sup>8</sup>. The ditch-blocking programme would aim to block ditches and re-wet an area of at least the same size of the total area of blanket bog lost as a consequence of the Development (0.37 ha). Significant peat haggling is also present in this part of the site.

Table 3 shows the opportunities for re-use of peat within the Site including the demand for acrotelm and catotelm peat. Table 3 summarises the total peat balance estimated during construction of the Development.

### **3.6 Temporary Peat Storage**

Temporary peat storage areas will be required throughout the construction period. The areas are illustrated on Figure 2 and were considered due to their locations with consideration given to topography, peat depth, distance from watercourses and topography.

<sup>8</sup> SNH Peatland Action Guidance on Dam Installation Techniques – Peat and Plastic Dams [online] Available at: <https://www.nature.scot/sites/default/files/2019-03/Guidance-Peatland-Action-installing-peat-dams.pdf> (Accessed on 05/08/2020)

**Table 3: Peat Re-use Volumes based on Construction Activity**

Development Component	Total Demand Estimate (m <sup>3</sup> )	Acrotelm Demand (m <sup>3</sup> )	Catotelm Demand (m <sup>3</sup> )	Estimated Reinstatement Thickness (max) where gradient permits (m)	Assumptions
Turbines, crane hardstands and associated earthworks/verges	<b>1,125</b>	<b>731</b>	<b>394</b>	<b>0.5</b>	Up to 0.50 m of peat utilised in the reinstatement of Turbine, crane hardstands and associated earthworks/verges.
Tracks and associated earthworks/verges.	<b>3,906</b>	<b>2,539</b>	<b>1,367</b>	<b>0.5</b>	Up to 0.50 m of peat utilised in the reinstatement of Tracks and associated earthworks/verges
Construction and substation compound and associated earthworks/verges	<b>848</b>	<b>552</b>	<b>296</b>	<b>0.5</b>	Up to 0.50 m of peat utilised in the reinstatement of Construction and substation compound and associated earthworks/verges
<b>SUB-TOTAL</b>	<b>5,879</b>	<b>3,822</b>	<b>2,057</b>	<b>N/A</b>	
Peat Bog Restoration	3,394	779	2,615	0.5	Ditch blocking and restoration of peat in hagged areas in accordance with post-consent Habitat Management Plan
<b>TOTAL</b>	<b>9,273</b>	<b>4,601</b>	<b>4,672</b>	N/A	

Table 3 presented as a summary of the assessment of peat reinstatement volumes. A detailed assessment is provided in Annex 2 of this PMP.

The following assumptions have been made in assessing peat re-use:

- Assumed that up to 0.50 m of peat will be utilised in the reinstatement of earth verges and associated construction earthwork areas for turbines, crane hardstands, tracks and substation and construction compound;
- Allowance of up to 2.5 m wide verges/earthwork batters either side of track and around the turbines has been assumed;
- Catotelmic peat would be reinstated first with acrotelmic peat/turves overlying.
- Much of the catotelmic peat would be used in the reinstatement of hagged peat and ditch blocking as detailed in Annex 2.

**Table 4: Peat Balance Calculations**

Peat Description	Total Peat Demand Estimate for Reinstatement (m <sup>3</sup> )	Total Peat Supply from Excavation (m <sup>3</sup> )	Surplus (+) or Deficit (-) (m <sup>3</sup> )
Acrotelm	4,601	4,601	0
Catotelm	4,672	4,672	0
<b>Total</b>	<b>9,273</b>	<b>9,273</b>	<b>0</b>

The results of the peat balance calculation shown in Table 4 demonstrates the total demand for reinstatement equates to the estimated excavations based on the assumptions provided in this section and the calculations indicate that all excavated peat will be re-used on site.

Where required other suitable Site won materials can be utilised in reinstatement works if required.

For further information on carbon calculation see the Supporting Statement (paragraph 1 of Section 3.3 The Development) which details method used

### 3.7 Handling and Storage of Peat

It will be necessary for the Principal Contractor to prescribe methods and timing involved in excavating, handling and storing peat for use in reinstatement. The Principal Contractor will be responsible for appointing a geotechnical representative who will monitor any potential stability risks. Furthermore, the Principal Contractor shall be assisted by the ECoW, as the construction phase progresses. Construction methods will be based on the following principles:

- The surface layer of peat (acrotelm) and vegetation will be stripped separately from the catotelmic peat. This will typically be an excavation depth of up to 0.5 m; Peat turves should be stored in wet conditions where possible (e.g. within waterlogged former excavations) or irrigated in order to prevent desiccation. Peat arising from excavations should only be placed in temporary areas that have a sufficient design to retain such peat in a wet state for use in subsequent habitat restoration.
- Acrotelmic material will be stored separately from catotelmic material;
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be re-used;
- Less humified catotelmic peat which maintains its structure upon excavation should be kept separate from any highly humified amorphous or wet catotelmic peat;
- Acrotelmic material will be replaced as intact as possible once construction progresses / as it is complete;
- To minimise handling and transportation of peat, acrotelmic and catotelmic will be replaced, as far as is reasonably practicable, in the locality from which it was removed. Acrotelmic material and turves is to be placed on the surface of reinstatement areas;
- Temporary storage of peat will be minimised, with restoration occurring in parallel with other works;
- Although considered unlikely, any temporary peat storage should be sited in areas with lower ecological value, low stability risk and at a suitable distance from water courses;
- Reinstatement will, in all instances, be undertaken at the earliest opportunity to minimise storage of turves and other materials;
- Managing the construction work as much as possible to avoid periods when peat materials are likely to be wetter i.e. high rainfall events; and

- Transport of peat on-site from excavation to temporary storage and restoration location should be minimised.

#### **4 CONCLUSION**

The following conclusions are drawn regarding the management of peat and excavated materials within the Site:

- As a result of the peat excavation and re-use estimations, the volume calculations demonstrate that all excavated peat can be re-used on-site;
- Excavated peat that will not be used for reinstatement of works associated with the Development will be used in the reinstatement of site infrastructure and in habitat management proposals, namely ditch blocking and reparation of damaged peat;
- The estimates of excavated peat provided in this PMP are likely to be higher than actually occur, as micro-siting during construction will allow for the avoidance of localised pockets of deeper peat;
- Sufficient methods have been defined to ensure that peat can be sensitively handled and stored on-site to allow for effective re-use; and
- No waste licence is required for the project in relation to the excavation of peat although the requirement for a waste licence cannot be discounted for the project as whole.

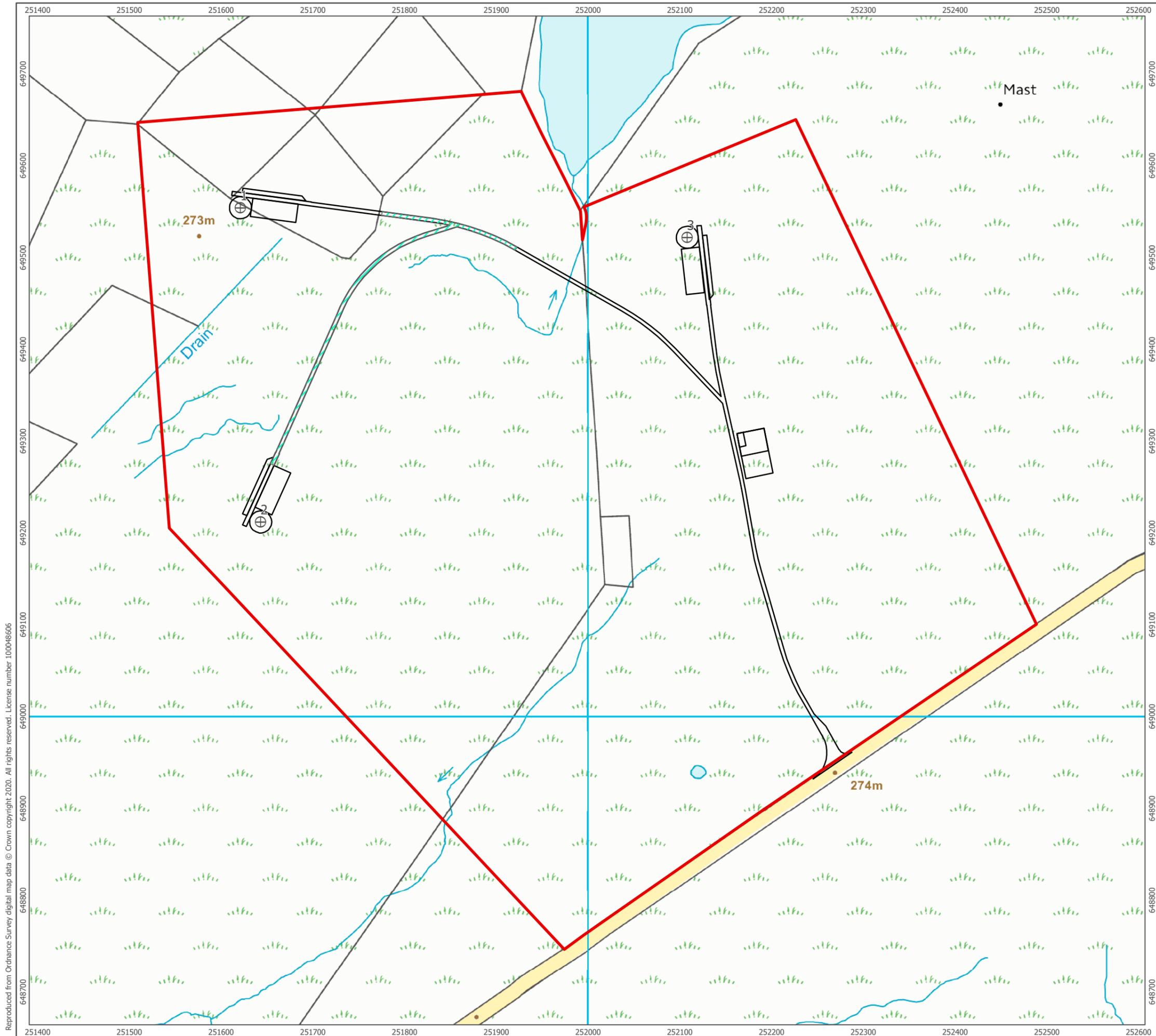
The PMP has been produced in accordance with SEPA Guidance on Peat Excavations and Management. It is anticipated and further ground investigation will be undertaken prior to the commencement of development and these findings will be incorporated within the next revision of the PMP, which will then be a live document during the construction phase.

**ANNEX 1 - FIGURES**

Figure 1: Site Layout Plan

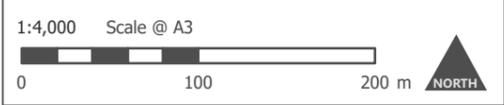
Figure 2: Recorded Peat Depths

Figure 3: Interpolated Peat Depths



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- Site Boundary
- + Proposed Turbine Locations
- Application Infrastructure Layout



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Checked By: DB	Date: 05/08/2020

**Site Layout Plan**  
Figure 1

**Moorshield Wind Turbines  
Peat Management Plan**



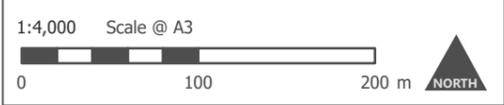
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- Site Boundary
- ⊕ Proposed Turbine Locations
- Temporary Peat Storage Area
- Previous Infrastructure Layout
- Application Infrastructure Layout

**Peat Probe Locations**

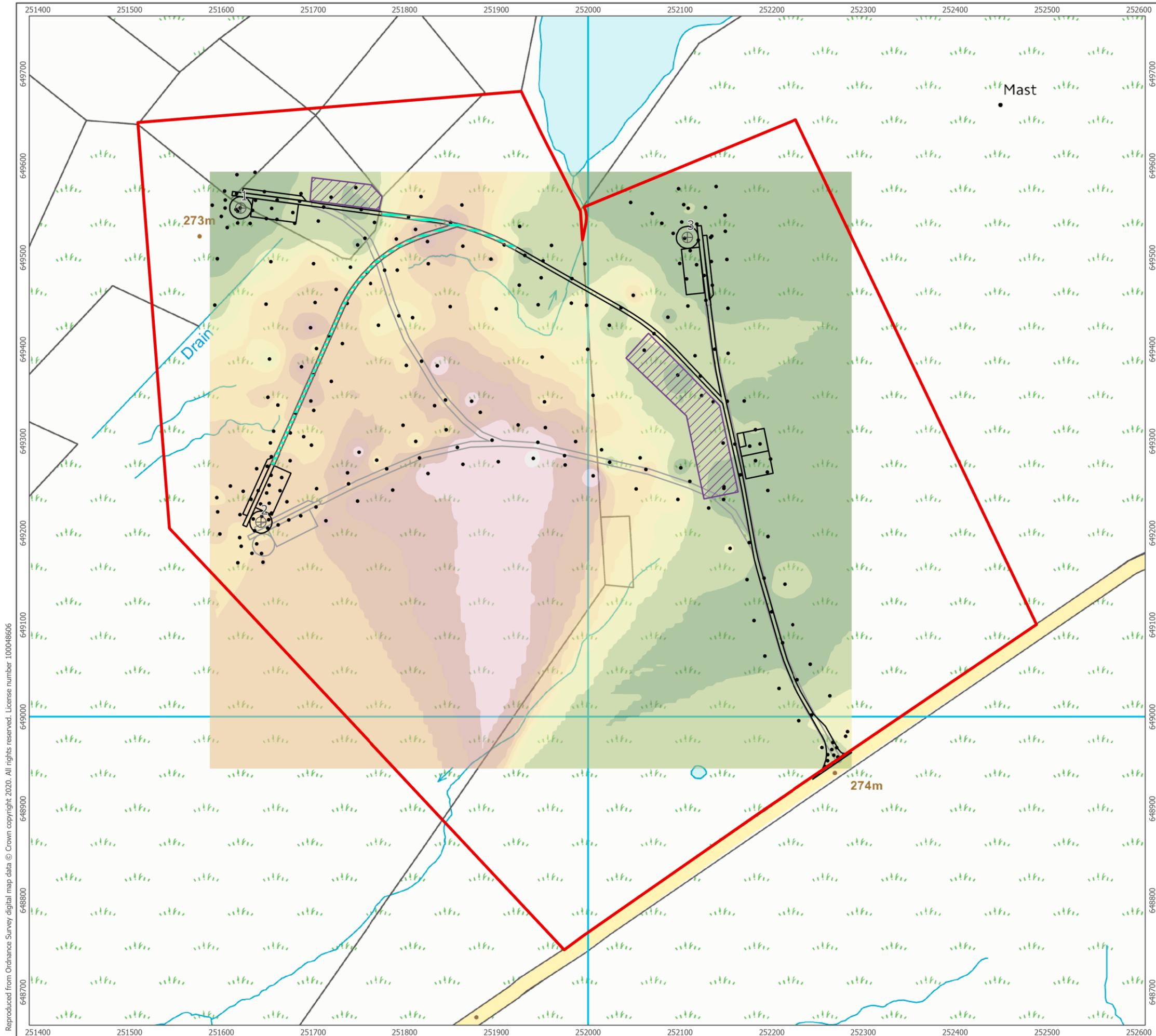
**Peat Depth (m)**

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.00
- 4.01 - 4.50
- 4.51 - 5.40



Produced By: BM	3520-REP-036
Checked By: DB	Date: 24/07/2020

**Recorded Peat Depths**  
Figure 2



- Site Boundary
  - ⊕ Proposed Turbine Locations
  - Peat Probe Locations
  - Previous Infrastructure Layout
  - Application Infrastructure Layout
  - Temporary Peat Storage Area
  - Proposed Floating Tracks
- Interpolated Peat Depths (m)
- 0.00 - 0.50
  - 0.51 - 1.00
  - 1.01 - 1.50
  - 1.51 - 2.00
  - 2.01 - 2.50
  - 2.51 - 3.00
  - 3.01 - 3.50
  - 3.51 - 4.00
  - 4.01 - 4.50
  - 4.51 - 5.00
  - 5.01 - 5.00



Produced By: BM	3520-REP-037
Checked By: DB	Date: 06/08/2020

**Interpolated Peat Depths**  
Figure 3

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## **ANNEX 2 - EARTHWORKS VOLUMES AND CALCULATIONS**

3520 - Moorshield - Peat Management Plan - Calculations and Estimations							Notes/Assumptions
Version 1							
<b>Peat Excavation Calculations and Estimates</b>							
Turbine No.	Ave. Peat Depth	Crane Hardstand/Foundation Area		Peat Excavation Estimation	Acrotelmic	Catotelmic	
1	0.31	1875.00		575	575	0	
2	2.59	1875.00		4859	938	3922	
3	0.34	1875.00		639	639	0	
<b>Turbine-Crane Hardstand Totals</b>				<b>6073</b>	<b>2151</b>	<b>3922</b>	
<b>Tracks</b>							
Tracks	Ave. Peat Depth	Width of Track	Distance of Track Over Peat Depth	Peat Excavation Estimation	Acrotelmic	Catotelmic	
Track to T1	1.40	5.00	450.00	3150	1125	2025	
Track to T2	2.60	5.00	300.00	3900	750	3150	
Track to T3	0.50	5.00	500.00	1250	1250	0	
<b>Track Totals</b>				<b>8300</b>	<b>3125</b>	<b>5175</b>	
<b>Construction Compound</b>							
Construction Compound	Ave. Peat Depth	Length	Width	Peat Excavation Estimation	Acrotelmic	Catotelmic	
Construction Compound	0.25	45.00	40.00	450	450	0	
<b>Construction Compound Totals</b>				<b>450</b>	<b>450</b>	<b>0</b>	
<b>SUB-TOTAL PEAT EXCAVATION</b>				<b>14823</b>	<b>5726</b>	<b>9097</b>	
<b>Floating Tracks</b>							
Floating Tracks	Average Peat Depth	Length	Width	Peat Volume Estimation	Acrotelmic	Catotelmic	
Track to T1	2.20	150.00	5.00	1650	375	1275	
Track to T2	2.60	300.00	5.00	3900	750	3150	
<b>Deduction Due to Floating Tracks</b>				<b>5550.00</b>	<b>1125.00</b>	<b>4425.00</b>	
<b>TOTAL PEAT EXCAVATION following FLOATING TRACKS</b>				<b>9273</b>	<b>4601</b>	<b>4672</b>	
<b>Peat Re-Use Calculations and Estimates</b>							
Infrastructure Element	Peat Depth Reinstated max depth	Area for Peat Reinstatement		Peat Re-Use Estimation	Acrotelmic	Catotelmic	
T1 - Earthworks	0.5	375.00		188	122	66	
T1 - Blade Laydown	0.5	375.00		188	122	66	
T2 - Earthworks	0.5	375.00		188	122	66	
T2 - Blade Laydown	0.5	375.00		188	122	66	
T3 - Earthworks	0.5	375.00		188	122	66	
T3 - Blade Laydown	0.5	375.00		188	122	66	
T1 Track Earthworks	0.5	2812.50		1406	914	492	
T2 Track Earthworks	0.5	1875.00		938	609	328	
T3 Track Earthworks	0.5	3125.00		1563	1016	547	
Construction Compound	0.5	1695.00		848	552	296	
<b>SUB-TOTAL REUSE</b>				<b>5879</b>	<b>3822</b>	<b>2057</b>	
<b>Peat Restoration</b>							
HMP - Ditch Blocking and Peat Hag Restoration Proposed				3395	779	2615	
<b>Peat Restoration Total</b>				<b>3394.51</b>	<b>779.35</b>	<b>2615.16</b>	
<b>TOTAL PEAT RE-USE</b>				<b>9273</b>	<b>4601</b>	<b>4672</b>	
<b>BALANCE (+/- Surplus/Deficit)</b>				<b>0</b>	<b>0</b>	<b>0</b>	

Floating Tracks assumed for 150m of track between T3 spur and T1  
 Floating Tracks assumed for entire Track length between T1 spur and T2

Assumed full reinstatement of blade laydown areas in addition to re-dressing verges and earhowkr batters along crane hardstanding edges up to 0.50m thick.  
 Allowance of up to 2.5m wide verges/earthwork batters at Turbine and Tracks.  
 Full construction compound Reinstatement of 0.50m thick with the deduction of the 15m x 7m substation within the compound area.

### **ANNEX 3 – TABULATED PEAT DEPTHS**

# 3520 - Moorshield Wind Turbines



## Peat Probe Locations and Depths

Easting	Northing	PeatDepth	Lat	Long
252167	649263	0	55.71418412	-4.354747848
251932	649502	0	55.71625767	-4.358610353
251621	649554	0.05	55.71662626	-4.363577098
252197	649246	0.1	55.71404002	-4.354263014
252102	649271	0.1	55.71423255	-4.355783621
252149	649248	0.1	55.71404656	-4.355024786
252188	649297	0.1	55.71449261	-4.354425096
252047	649560	0.1	55.71681023	-4.356808143
252119	649536	0.1	55.71662075	-4.355649085
252140	649577	0.1	55.71699433	-4.355337338
251632	649537	0.1	55.71647824	-4.363395433
251617	649569	0.1	55.71676513	-4.363647801
251605	649554	0.1	55.71662034	-4.363838512
251601	649544	0.1	55.71653738	-4.363899282
251607	649532	0.1	55.71643034	-4.363790206
252197	649196	0.2	55.71358978	-4.354233844
252243	649057	0.2	55.71235598	-4.353418493
252149	649250	0.2	55.71406215	-4.355024279
252081	649537	0.2	55.71661703	-4.356256548
252071	649548	0.2	55.71670973	-4.356428641
252150	649528	0.2	55.7165596	-4.355151749
252134	649522	0.2	55.71649447	-4.35540269
252136	649523	0.2	55.716508	-4.355383502
251617	649552	0.2	55.71660931	-4.36364854
251753	649552	0.2	55.71665109	-4.361479061
251648	649571	0.2	55.71679424	-4.363167245
251618	649590	0.2	55.71695029	-4.36365261
251638	649592	0.2	55.71697927	-4.363341564
252108	649476	0.2	55.71608159	-4.355794247
252136	649470	0.2	55.71602802	-4.355345234
252200	649280	0.2	55.71434871	-4.354233517
252171	649343	0.3	55.71490717	-4.354724948
252224	649100	0.3	55.71273595	-4.353748359
252119	649492	0.3	55.71622302	-4.355629718
252101	649493	0.3	55.71623	-4.355922889
252099	649575	0.3	55.71696	-4.355987521
252105	649557	0.3	55.71680681	-4.355887977
252106	649521	0.3	55.71647754	-4.35585267
252152	649498	0.3	55.71628478	-4.35510818
251749	649513	0.3	55.71630375	-4.361520744
251662	649562	0.3	55.71671607	-4.362942424
251638	649562	0.3	55.71670597	-4.363317315
251635	649551	0.3	55.71660663	-4.363361223
251604	649572	0.3	55.7167863	-4.36385723
251605	649562	0.3	55.71669854	-4.363839577
251591	649557	0.3	55.716644	-4.364062939

251597	649498	0.3	55.71612241	-4.363942768
252098	649372	0.3	55.71513831	-4.355891439
252088	649435	0.3	55.71570043	-4.356095341
251656	649553	0.3	55.71663269	-4.363032044
252177	649294	0.3	55.71446759	-4.35460213
252183	649278	0.3	55.71432736	-4.35449363
252196	649266	0.4	55.71421997	-4.354282247
252094	649526	0.4	55.71652223	-4.356053465
252121	649519	0.4	55.71646436	-4.355614631
252153	649444	0.4	55.71580778	-4.355060658
251619	649537	0.4	55.71647841	-4.363611788
252132	649227	0.5	55.71384865	-4.355276769
252148	649236	0.5	55.71393722	-4.35502377
252024	649277	0.5	55.71426395	-4.357018843
252137	649343	0.5	55.71488811	-4.355261191
252152	649343	0.5	55.71489887	-4.355017507
252129	649453	0.5	55.71587902	-4.355447962
252103	649538	0.5	55.716636	-4.355912398
252129	649554	0.5	55.71678602	-4.355509108
252150	649546	0.5	55.71671614	-4.355167527
252112	649507	0.5	55.71635852	-4.355749067
252135	649495	0.5	55.71625953	-4.355375994
251926	649470	0.5	55.71596473	-4.35868895
251997	649493	0.5	55.71619387	-4.357566213
251757	649521	0.5	55.71637135	-4.36139841
251712	649555	0.5	55.71666259	-4.362132101
251686	649561	0.5	55.71671146	-4.362551524
251661	649541	0.5	55.71652621	-4.36293452
251650	649542	0.5	55.71653125	-4.363117788
251768	649538	0.5	55.71652951	-4.361234407
251720	649565	0.5	55.71676124	-4.362008339
252124	649349	0.5	55.71494557	-4.355466058
252123	649371	0.5	55.7151367	-4.355498009
251983	649477	0.5	55.71604601	-4.357780793
251747	649576	0.5	55.7168638	-4.361586063
252117	649393	0.6	55.71533325	-4.355602822
252110	649447	0.6	55.71581654	-4.355756246
252272	648966	0.6	55.71154886	-4.352910659
252267	648964	0.6	55.71152848	-4.352993976
251681	649537	0.6	55.71649426	-4.362623495
251688	649569	0.6	55.71678665	-4.362532945
252062	649399	0.6	55.71537031	-4.356486267
252037	649445	0.6	55.7157774	-4.3569131
251961	649513	0.6	55.71636402	-4.358154543
251926	649534	0.6	55.7165392	-4.358716504
252127	649480	0.6	55.71612052	-4.35549085
252183	649312	0.6	55.71463031	-4.354513566
252139	649400	0.7	55.71540383	-4.355263953
252110	649553	0.7	55.7167731	-4.355808586
252262	648952	0.7	55.71141845	-4.353060474

252024	649426	0.7	55.71560265	-4.357105195
252215	649144	0.8	55.71312986	-4.353910627
252161	649297	0.8	55.71448247	-4.354861329
252153	649395	0.8	55.71536796	-4.355031469
251946	649448	0.8	55.71577939	-4.358349985
251594	649448	0.8	55.71566781	-4.363959514
252269	648958	0.8	55.71147436	-4.352957125
251950	649478	0.8	55.71604433	-4.358314255
251679	649549	0.8	55.71659854	-4.362662498
252259	648946	0.9	55.711362	-4.353106207
252112	649256	1	55.71410292	-4.355619007
252265	649022	1	55.71205318	-4.353060562
252148	649298	1	55.71448872	-4.355064367
251952	649496	1	55.71620967	-4.358291505
252268	648949	1	55.71139853	-4.352967541
252273	648956	1	55.71145821	-4.35288756
252280	648959	1	55.71148473	-4.35278111
251706	649539	1	55.71652421	-4.362216186
251653	649389	1	55.71515902	-4.362980793
251983	649450	1	55.71580607	-4.357775992
251741	649489	1	55.71608347	-4.361632606
252256	648966	1.1	55.71154536	-4.353166857
252016	649290	1.2	55.71438278	-4.357166659
252058	649282	1.2	55.71431705	-4.356494101
251655	649495	1.6	55.71611132	-4.363014073
252073	649417	1.6	55.7155356	-4.35632627
251795	649436	1.7	55.71562477	-4.360757038
251773	649426	1.7	55.7155259	-4.361104818
251779	649486	1.7	55.71606566	-4.361030065
252282	648978	1.8	55.71166312	-4.352763646
252000	649400	1.8	55.71535973	-4.357466658
252006	649350	1.8	55.714912	-4.35734644
251654	649298	1.8	55.71433941	-4.362915248
251810	649434	1.8	55.71561136	-4.360517742
251813	649299	1.9	55.71440264	-4.36038961
251759	649484	1.9	55.71604003	-4.361346865
252099	649236	2	55.71392228	-4.355815446
251623	649185	2	55.71331937	-4.363359747
251999	649448	2	55.71578995	-4.357512411
251699	649295	2	55.7143312	-4.362202664
251901	649444	2	55.71572586	-4.359074649
251909	649513	2	55.71635292	-4.358973866
251819	649566	2	55.71679723	-4.360444007
251662	649339	2	55.71471165	-4.362807432
251691	649305	2	55.71441139	-4.362342285
251637	649202	2.1	55.71347566	-4.363138498
251596	649238	2.1	55.71378642	-4.363811274
251651	649205	2.2	55.71350523	-4.362911011
251771	649279	2.2	55.71420664	-4.361055188
251951	649391	2.2	55.71526943	-4.358249932

251650	649449	2.2	55.71569438	-4.363072489
251704	649401	2.2	55.71527709	-4.362172894
251805	649544	2.2	55.71659317	-4.360646686
251676	649309	2.2	55.71444381	-4.362575616
251619	649167	2.3	55.71315679	-4.363408402
251953	649343	2.3	55.71483236	-4.358183664
251803	649382	2.3	55.71514249	-4.360598323
252053	649248	2.4	55.71401159	-4.356544503
251634	649178	2.4	55.71325372	-4.363169532
251655	649221	2.4	55.71365401	-4.362855615
251701	649493	2.4	55.71610599	-4.362273396
251687	649218	2.5	55.71363695	-4.362346532
251639	649188	2.5	55.71334807	-4.363092982
251636	649215	2.5	55.71359014	-4.363166814
251633	649236	2.5	55.71378214	-4.363218026
251846	649312	2.5	55.7145266	-4.359869077
251653	649252	2.5	55.71392554	-4.36291257
251641	649246	2.5	55.71386879	-4.363098168
251621	649195	2.5	55.71340381	-4.363391728
251793	649486	2.5	55.71607091	-4.360811329
251658	649311	2.5	55.71445513	-4.362866364
251645	649218	2.5	55.71361742	-4.363021706
251644	649231	2.5	55.71373921	-4.363048856
251672	649234	2.6	55.71376994	-4.362594568
251625	649245	2.6	55.71385748	-4.363357628
251599	649199	2.6	55.71343229	-4.363736405
251621	649220	2.6	55.71362808	-4.363399404
251764	649471	2.6	55.7159312	-4.361269074
251676	649278	2.6	55.71417238	-4.362562665
251639	649270	2.6	55.71408255	-4.363137742
251674	649214	2.7	55.7135919	-4.362551374
251663	649209	2.7	55.71354035	-4.362732439
251650	649243	2.7	55.71384867	-4.362950443
251652	649214	2.7	55.71358825	-4.36289986
252050	649459	2.7	55.71590323	-4.356708302
251792	649520	2.7	55.71637476	-4.360846131
251665	649246	2.7	55.71387561	-4.36271996
252064	649269	2.8	55.71420497	-4.35638731
251739	649253	2.8	55.71396561	-4.361537635
251704	649228	2.8	55.71372799	-4.362087451
251705	649248	2.8	55.71390758	-4.362088275
251846	649345	2.8	55.71481724	-4.359899404
251703	649451	2.8	55.71572679	-4.362223743
251652	649347	2.8	55.71478427	-4.362985687
251655	649283	2.8	55.71420496	-4.362890084
251655	649263	2.8	55.71402354	-4.362884513
251653	649232	2.8	55.71374932	-4.362899756
251597	649223	2.8	55.71364769	-4.363787538
251799	649317	2.8	55.71455634	-4.360619567
251863	649557	2.8	55.7167292	-4.359730278

251702	649333	2.8	55.71467184	-4.362183589
251667	649260	2.8	55.71400462	-4.362699196
251819	649387	2.9	55.71518846	-4.360337461
251851	649446	2.9	55.71573169	-4.359872077
251864	649512	2.9	55.71632728	-4.35968946
251827	649493	2.9	55.71614388	-4.360277152
251726	649465	2.9	55.71586182	-4.36186635
251733	649406	2.9	55.71533434	-4.361726681
251721	649365	2.9	55.7149615	-4.36189581
251781	649270	3	55.71412528	-4.360877144
251883	649331	3	55.71470841	-4.35928907
251651	649272	3	55.71410926	-4.362956035
251895	649498	3	55.71620993	-4.35919498
251738	649450	3	55.71572879	-4.361668068
251718	649414	3	55.71540602	-4.36196673
251701	649372	3	55.71502011	-4.362207842
251681	649330	3	55.71464059	-4.362500902
251611	649251	3	55.71390469	-4.363582918
251645	649177	3.1	55.7132558	-4.363003914
251646	649168	3.1	55.71317086	-4.362973058
251834	649338	3.1	55.71475847	-4.360084635
251813	649530	3.2	55.71647506	-4.360518836
251817	649281	3.4	55.71424244	-4.360315456
251976	649274	3.5	55.71422214	-4.357788464
251954	649314	3.5	55.71458055	-4.358152969
251987	649299	3.5	55.71445467	-4.357620573
251698	649343	3.5	55.71476292	-4.362239116
251788	649246	3.7	55.7139194	-4.360760516
251715	649213	3.7	55.71359685	-4.361907543
251925	649317	3.8	55.71459784	-4.358626134
251698	649423	3.8	55.7154791	-4.362287961
251688	649381	3.8	55.71509391	-4.362421989
251826	649517	3.9	55.71636041	-4.360304754
251749	649234	4	55.71379957	-4.36137084
251738	649265	4	55.714073	-4.36156133
251851	649538	4	55.71655349	-4.359913909
251975	649284	4.2	55.71431333	-4.357804381
251865	649275	4.3	55.7141947	-4.359559489
251751	649288	4.3	55.71427766	-4.361373764
251874	649343	4.4	55.71481426	-4.359445959
251858	649293	4.5	55.71435824	-4.359666016
251837	649382	4.8	55.71514941	-4.360061404
252006	649262	5	55.71412542	-4.35729707
251903	649277	5	55.71423184	-4.358948067
251896	649301	5	55.71443998	-4.359068976
251827	649265	5	55.71409299	-4.360158564
251946	649298	5.2	55.71443465	-4.358274383
251941	649281	5.4	55.71427587	-4.358343594