Peat Management Plan
Kergord Access Track
Stage 2: Post-Consent / Pre-Construction Phase
Revision 1

Viking Wind Farm
(Project Ref: LN000046)

Prepared By SLR Consulting Ltd

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1. INTRODUCTION

1.1 Site Description

1.1.1 In April 2012, Viking Energy Partnership (VEP) gained consent to build the 'Viking Energy Wind Farm', comprising 103 wind turbines across mainland Shetland. The 'Viking Wind Farm' relies on a number of access points from the local road network. One of these is the B9075, Sandwater Road, which will require improvements to allow access for construction plant and materials. The intention is to re-align the entire road to the north of the current alignment and at the Kergord junction. The Kergord Access Track will extend northwards from Kergord junction towards the proposed substation location, directly off the Sandwater Road. Figure 1 Kergord Track Alignment illustrates the original alignment submitted for the 2016/2018 planning applications.

1.1.2 The Kergord Access Track is effectively the link access track adjoining the western limb of Viking Energy Wind Farm. The Kergord Access Track allows access to the proposed Kergord substation as well as accessing the western limb of the main Viking Wind Farm.

1.1.3 The existing B9075 is a single track road with passing places and is operated and maintained by Shetland Island Council (SIC). For access to the proposed wind farm development and associated substation platform, SSE shall construct a new road, for a length of approximately 2.1km, parallel to the north of the existing B9075 (Sandwater Road). Following completion of wind farm construction the new road and all associated infrastructure shall be adopted by SIC. The new track (Kergord Access Track) to the proposed Kergord substation platform is also to be constructed as a typical wind farm access track. Only the section up to the intersection with the existing unclassified road on the Kergord Access Track is to be adopted by SIC.

1.1.4 The Kergord Access Track will extend north from the Sandwater Access Track. The Kergord Access Track has been designed to accommodate the delivery of HVDC convertor station and substation infrastructure and equipment as well as wind farm infrastructure, via Sandwater Access Track, without compromising the B9075 road which shall remain operational during the construction period.

1.2 Development Overview

1.2.1 A planning application (2016/268/PPF) was submitted in July 2016 for the Kergord Access Track which SEPA (PCS/148006, 1st August 2016) objected to proposals relating to peat management at the site. The total volume of peat excavation due to the proposed development was estimated at 86,500m^3. The proposed development was estimated to give rise to the permanent displacement of 76,200m^3 of peat and the temporary displacement of 10,300m^3 of peat.

1.2.2 The 2016 planning application was withdrawn; however, it was re-submitted in July 2018. The planning submission comprised a Supporting Statement (Arcus 2018) and accompanying Environmental Appraisal Report (EAR) (Jacobs 2016). The route alignment was submitted as per the 2016 application (Figure 1). SEPA responded to the July 2018 planning submission by letter dated 30th July 2018. In their letter SEPA objected on the basis that further information was required in relation to peat management and also requested that a condition is applied requiring the submission of a finalised PMP.

1.2.3 In response to SEPA's letter, VEP undertook further peat probing and engaged with design engineers (Tony Gee and Partners LLP (Tony Gee)) to further refine the alignment. Informed by design refinement and supplementary peat depth data, SLR completed a revised PMP (dated Sept 2018). The refined alignment, is presented in Figure 2: Kergord Track Realignment.

1.2.4 SEPA reviewed the Sept 2018 PMP and submitted further comments by letter dated 12th October. SEPA maintained their objections unless further refinements to the PMP were made. VEP again undertook further albeit limited peat probing and this document is the resultant refined PMP (Rev 1, SLR, Nov 2018) which takes into account SEPA's comments. Specific responses to the points raised on both of SEPA's letters are provided under separate cover (letter dated 23rd November 2018).

1.2.5 This level of refinement and design would normally occur post-consent and in response to a condition as suggested by SEPA in their initial letter. However, VEP has brought this action forward and consider that the detail now provided herein is sufficient to meet the requirements of a post-consent Stage 2 PMP as per the published guidance. Consequently, the document is considered to present sufficient information to meet SEPA's requirements for a finalised PMP.

1.2.6 The realignment provided in the PMP is the current optimised design and will be provided to Contractors to price for a design and build contract. Contractors will review the PMP and undertake their own risk assessment and design refinements. If necessary, a Stage 3 PMP shall be developed as per guidance requirements and in consultation with SEPA as is standard practice during wind farm construction.

A summary of the consultation responses with SEPA are provided in Table 1

Table 1: Summary of SEPA Consultation in relation to the survey and management of peat at Kergord Access Track

Table 1: Consultation			
Planning Office/Officer (SEPA)	**Consultation method**	**General Aspect**	**Consultation Comments**
Judith Montford	E-mail	**Planning Application 2016/268/PPF. Provision of a 2.09km access track and associated works, new junction and temporary construction compound**	Objection to Peat Management and a condition is applied requiring the submission of a finalised Peat Management Plan. The previous Peat Management Plan was completed in June 2016 by Jacobs.
Judith Montford	E-mail/letter PCS/160101, 30th July 2018	**Planning Application 2018/096/PPF. Provision of a 2.09km access track and associated works, new junction and temporary**	Objection to Peat Management and a condition is applied requiring the submission of a finalised Peat Management Plan. This is not significantly different from previous objection and requirements to address this are similar.

Table 1: Consultation			
Planning Office/Officer (SEPA)	**Consultation method**	**General Aspect**	**Consultation Comments**
		construction compound	
Zoe Griffin Senior Planning Officer, Aberdeen	E-mail Consultation	Submitted proposed peat probing plan, prior to undertaking the works, this addressed the Kergord Track, Sandwater Track and the main wind farm.	SEPA commented on plan outlining peat probing plan for Viking Wind Farm, SLR took on comments addressing issues where relevant. SEPA indicated all peat surveys should be carried out in accordance with Government guidance which can be found here: http://www.gov.scot/Resource/0051/00517174.pdf SEPA indicated the probing grid distances appear to be appropriate along the access roads, the proposed detailed probing for the proposed turbine bases, borrow pits and other supporting infrastructure appears not to comply with the 10m by 10m grid required in the guidance. SLR responded to Zoe Griffin on 24/7/2018. We are currently working through the site and are undertaking detailed grids along the tracks and at the turbines. As for the borrow pits we do not have a specific detailed design for the borrow pits as yet and as we are trying to avoid excavating in peaty areas for borrow pits. The grid is still on a larger grid, we are tackling search areas to help refine the designs and potential areas. There is a degree of uniformity on the peat so interpolating across areas is acceptable, and if we get into areas where the peat is significantly variable we will increase the frequency. Our grid is also complimenting previous data and we are happy we will have a very comprehensive understanding of the extent of peat on site.
Zoe Griffin	Letter PCS/161548, 12th Oct 2018	Response on September 2018 Peat Management Plan (SLR)	SEPA reiterated their objection unless modifications to the peat management plan could be made. Additional peat probing was undertaken on site in October 2018 and modifications to the PMP are contained herein.

1.3 Peat Management Plan - Guidance & Context

1.3.1 Developments on peat soils and / or in peatland environments may in some cases generate waste excavated materials if no suitable reuses options are available on site. In such circumstances, excavated peat may constitute a waste and, consequently, regulatory controls apply to its management. In February 2010, the Scottish Environment Protection Agency (SEPA) produced the "*SEPA Regulatory Position Statement – Developments on Peat*" to help ensure a sustainable and consistent approach to the management of peat.

1.3.2 Guidance was subsequently published to ensure the consistent application of the principles contained within the SEPA position statement: '*Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste'*, Scottish Renewables and SEPA, Version 1, January 2012.

1.3.3 The guidance identifies three main stages in the development process and describes what data should be gathered and assessed at each to inform a site-specific Peat Management Plan (PMP):

- **Stage 1**: Environmental Impact Assessment (EIA);
- **Stage 2:** Post-consent / pre-construction; and
- **Stage 3:** Construction.

1.3.4 As part of the Viking Wind Farm Environmental Statement (ES, 2009) and the Addendum (Addendum ES, 2010), the following documents were prepared and submitted in accordance with the requirements of Stage 1, as part of the planning application:

- Peat Stability Assessment, Technical Appendix 14.1 to the ES;
- Estimated Peat Extraction Volume and Potential Reuse Options, Technical Appendix 14.4 to the ES;
- Estimated Peat Extraction and Reuse Volumes, Appendix A14.4 to the Addendum ES;
- Outline Site Environmental Management Plan (SEMP[1], Technical Appendix A14.6 to the Addendum ES), including Technical Schedule TS7, Excavated Materials and Reinstatement Plan.

[1] Now called a Construction Environmental Management Plan (CEMP)

1.3.5 The data and information informing the above documents demonstrated to SEPA and other relevant parties that: (i) the extent and characteristics of peat at the study site were investigated; (ii) excavations in peat were minimised wherever possible through design iterations and adoption of appropriate design hierarchy[2]; and (iii) excavation and subsequent management of peat, including an estimation of quantities, was considered as part of the EIA.

1.3.6 This PMP has been prepared in accordance with the requirements of **Stage 2** and further refines the preliminary data prepared at Stage 1. The refinements to the PMP take into consideration further and more detailed investigation undertaken in July/August and October 2018 to inform detailed design. Peat management will be monitored during construction (**Stage 3**) to ensure that excavated peat volumes continue to be minimised wherever possible through micro-siting and construction method refinements.

1.3.7 Where significant changes to the PMP are identified during construction (for example if unexpected ground conditions are encountered or changes to consented design are required), the PMP will be updated in consultation with SEPA where required.

1.3.8 Design decisions, proposed construction practices and peat management standards for this site are aligned with current good practice guidance (e.g. Good Practice During Windfarm Construction[3]' and 'Floating Roads on Peat[4], refer to Section 8) relating to the range of environmental and engineering constraints associated with developments on peatlands, such as ecological considerations, topography, construction issues, carbon accounting etc.

1.4 Peat Management Plan – Scope & Objectives

1.4.1 This PMP provides further information to that previously submitted for the Viking Wind Farm and previous planning application for the Kergord Access Track (submitted but later withdrawn in 2016). All of the peat depth data collected has been included in the PMP; the existing data was validated by checking depths and interpretation. The previous data was suitable to be reused in the assessment.

1.4.2 This PMP is applicable to the works associated with the construction of track infrastructure for the wind farm known as Kergord Access Track, herein known as the "Works". The aspects associated with the Works are illustrated in Appendix 1: Site Layout & Peat Depth Plan.

1.4.3 The Works shall entail the following aspects of the development:

- construction of new access track (2.1km);
- construction of bridge over Burn of Weisdale;
- construction of temporary and permanent drainage;

[2] Design hierarchy as detailed within the SR/SEPA guidance: prevent excavation, reduce excavation volumes and reuse excavated peat in a manner to which it is suited.

[3] *Good Practice During Windfarm Construction*, Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, Version 3, September 2015.

[4] *Floating Roads on Peat*, Forestry Civil Engineering and Scottish Natural Heritage, August 2010.

- construction of temporary construction compounds; and
- cable laying parallel to proposed track with up to 11 cables present.

1.4.4 The objectives of this PMP are as follows:

- to provide a description of the peat encountered during intrusive ground investigation to date;
- detail relevant works activities that are likely to generate peat, and demonstrate a sustainable approach to peat management via the guiding principles of reduce and reuse;
- consider the anticipated volumes of peat that will be excavated on site and estimated quantities required for reuse; and
- establish a sustainable approach to peat management during the works.

1.4.5 Following the completion of targeted site investigation prior to the commencement of the Works; a Stage 3 PMP will be prepared if necessary to consider the management of peat in relation to all aspects of the development.

1.5 Available Information

1.5.1 The following sources of information have been consulted in the development of this PMP:

i. Kergord Access Track Supporting Statement, Arcus, April 2018.

ii. Kergord Access Track, Peat Slide Hazard Risk Assessment, Jacobs, June 2016.

iii. Kergord Access Track, Peat Management Plan, Jacobs, June 2016.

iv. Kergord Access Track, Environmental Appraisal Report, Jacobs, June 2016.

v. Habitat Management Plan 2016, Consultation Draft Version 1, RPS Group 2016

vi. Peat Probe Map, September 2013 – SSE Renewables Ltd.

vii. Kergord Cable Route Factual Report (GLRP 0003), May 2013. URS Corporation.

viii. Kergord Substation Factual Report (GLRP 0003), May 2013. URS Corporation.

ix. Sandwater Kergord Peat Work October 2013, Von Post logs. Raeburn Drilling Ltd.

x. Viking Wind Farm, Peat Stability Assessment Report, Technical Appendix 14.1, Mouchel Ltd, March 2009.

xi. Viking Wind Farm, Estimated Peat Extraction and Reuse Volumes, Technical Appendix 14.4, Albion Environmental Ltd, September 2010.

xii. Viking Wind Farm, Addendum Peat Management Plan, Mouchel Ltd, September 2010.

2 DESIGN CONSIDERATIONS FOR REDUCING PEAT EXCAVATIONS

2.1.1 The Kergord Access Track has been designed to minimise disturbance of peat whilst accommodating engineering requirements to satisfy the specification for the track design. The track has been modified to tie-in to the new unclassified road which will be adopted by SIC. The track will bridge the Burn of Weisdale and continue to the proposed Substation location, to the north of Upper Kergord.

2.1.2 The current design for the track is shown on the attached Kergord Access Location Plan (Figure 2), the detailed design produced by the project design engineer (Tony Gee) is included in Appendix A. Peat probing was initially undertaken as part of the ES, with further work on the track and cable design route undertaken in 2013 and in 2016. These data and recent probing data were used to inform the design refinements undertaken in 2018. However, SEPA identified an area after the crossing of the Drosswall Burn that required further probing, this was undertaken and the revised calculations incorporated into the modelling. Additional probing was undertaken in October 2018 to define the deep area of peat allowing accurate modelling of peat depths across this area.

2.1.3 To determine the peat volume generated, peat volumetric calculations have utilised CAD drawings (Appendix A) submitted by the project design engineer. These drawings allow modelling of the anticipated excavation along the route and derive the cut volume of peat based on peat probing data. The track alignment extends to an overall length of 2,100m. The total excavated volume of peat is presented in Table 2. The detailed calculations of peat volumes associated with each of the excavation and reuse activities are presented in Table 6.

2.1.4 The peat volume was calculated from the 5m DTM produced from LiDAR data and an interpolated surface derived from the peat probes. The interpolation method used was of a spline, constrained to a maximum of 70m from the peat probe locations. Both the DTM and the peat depth interpolation were resampled to a resolution of 1m, to account for the irregular shape of the cut areas. The lower surface of the peat was calculated from the DTM minus the peat depth interpolation. The volume of peat was calculated by comparing the DTM to the calculated height of the lower surface of the peat, using the Cut and Fill tool of ArcGIS.

2.2 Excavated Track Option

2.2.1 Table 2 outlines the volume of excavated peat if the route is fully excavated in its entirety. At this stage, based on the current engineering assessment using best practice guidance, the design parameters do not allow for floated track construction due to cross gradients along parts of the route.

2.2.2 The peat volumes have been calculated utilising the excavated areas identified along the modified track and modelling the cut volume of peat based on peat probing data. The areas where cut peat has been modelled, i.e. excavated are indicated in Figure 3. The total excavated peat volume along the route was estimated to give rise to the temporary displacement of 51,500m^3 of peat. The temporarily displaced peat is estimated to comprise approximately 32,960m^3 of acrotelmic peat and 18,540m^3 of catotelmic peat (Figure 3 – Excavated Track – Peat Volumes).

2.2.3 This current route for the Kergord Road has been modified from the proposed route previously submitted and the design optimised, by micrositing and minimising peat excavation as determined by further probing. Consequently, the overall peat excavation has reduced from 86,500m^3 (estimate from 2016) to the current figure of 51,500m^3. This is a significant reduction (~40%) in the volume of peat excavated. The peat reuse model considers this option as a 'worst case' or conservative model with the proviso that the road layout cannot be modified to accommodate a proportion of floating track.

Table 2: Total Excavation of the Kergord Road

Chainage	Estimated Peat Depth (Average along corridor)	Construction Method	Peat Volumes Excavated m^3	Acrotelmic / Catotelmic	Comments
0-2090	1.50m	Founded	51500m^3	**32960m^3 /18540m^3**	From B9075, built to proposed Kergord sub station
TOTAL PEAT EXCAVATED			**51500m^3**	**32960m^3 /18540m^3**	

*The peat calculations have utilised the drawings submitted by the project design engineer. The track alignment extends to an overall length of 2,090m.

2.3 Floating Track Option

2.3.1 The realistic likelihood however is that once the construction contract is awarded a more detailed design assessment will be undertaken by the Contractor and a proportion of the road will be floated. Where determined technically feasible by the Contractor, a floated track design shall be adopted as the preferred approach.

2.3.2 The option to float sections of the track is currently being reviewed and Table 3 below indicates the potential volume of peat extraction, if floated track is considered a viable solution over the deeper peat areas.

2.3.3 Table 3: Combination of floating and excavated along the Kergord Road

Chainage	Estimated Peat Depth	Construction Method	Peat Volumes Excavated m^3	Acrotelmic / Catotelmic	Comments
0-350	0.8	Excavated	4400	4400/0	From A9075, built to proposed Kergord sub station
350-550	2.2	Floated	0		Deep Peat
550-740	2.8	Floated	0		Deep Peat
740-850	2.8	Floated	0		Deep Peat
850-950	1.4	Excavated	3670	3670/0	Shallow Peat
950-1100	2.9	Floated	0		Deep Peat
1100-2090	1.2	Excavated	19150	17150/2000	Shallow Peat
TOTAL PEAT EXCAVATED			**27220m^3**	**25220m^3 / 2000 m^3**	

*The peat calculations have utilised the drawings submitted by Tony Gee Engineers. The track alignment extends to an overall length of 2,100m. The extent of floating track which may be utilised would be verified at detail design stage. These sections are only indicative.

2.3.4 The peat volumes for the second scenario, including a proportion of floated track, have been calculated by modelling the cut volume of peat based on probing data in excess of 1.0m depth. The areas where cut peat has been modelled, i.e. excavated, are indicated in Table 3, and areas where floating track is proposed has no excavated peat. The total excavated peat volume along the route was estimated to give rise to the temporary displacement of 27,220m^3 of peat. The temporarily displaced peat is estimated to comprise approximately 25,220m^3 of acrotelmic peat and 2,000m^3 of catotelmic peat. The much higher representation of acrotelmic peat is a consequence of floating roads over deeper peat areas, and excavating shallower acrotelmic peat (Figure 4 - Excavated/Floating Track - Peat Volumes).

2.4 Comparison of Excavated Track v Floated Track

2.4.1 In conclusion, if the 100% excavated scenario is used, there is an overall reduction of 40% peat excavated from the originally submitted design (2016). If the floated option is used the overall reduction is around 70% from the original layout. Both options show considerable intent by the developer to reduce peat extraction while still being realistic with regard to constructing tracks and associated infrastructure on this project.

2.4.2 The reuse calculations are discussed in Section 6 and will be based on the fully excavated scenario as it is the current acceptable engineering option at this stage and gives VEP a baseline to work against. The engineering constraints require the ability to construct where the cross fall along the track alignment is less than 5%, with a vertical alignment gradient of 5%. The current alignment exceeds these thresholds in a number of areas, but would be subject to further site investigation to determine alternative construction techniques. The engineering constraints also have to be considered in conjunction with the requirements to deliver abnormal loads to the substation locality; therefore the final track design cannot be specified definitively yet.

2.4.3 The floating option has also been modelled to determine the better environmental solution. No commitment can be made at this time regarding floating sections of the track. Once additional site visits, ground investigation and detailed Contractor design has been undertaken, every effort will be made to float track where safe and appropriate.

2.4.4 The consideration of peat and peatland habitats has featured prominently throughout the evolution of the development and has influenced the design accordingly. The design has sought to avoid areas of peat on site as far as reasonably practical. However, where this is considered impractical, the track has been located on the shallowest possible peat deposits within the confining limits of other environmental constraints and engineering feasibilities. Furthermore, as far as reasonably practicable, the track alignment has endeavoured to avoid peatland habitats of notable ecological interest, such as wet flushes and potential groundwater dependent terrestrial ecosystems (GWDTEs), which are often correlated with pockets of deeper peat.

2.4.5 The following design considerations and decisions have been taken during the post-consent refinement phase as a result of further survey, stakeholder discussion and information from intrusive ground investigations to minimise disturbance and avoid unnecessary excavation of peat. Some of these (e.g. micro-siting) will be reviewed on an on-going basis during the construction phase in order to further reduce peat excavation and disturbance wherever possible.

2.4.6 To minimise disturbance and avoid unnecessary excavation of peat at this site, a number of design considerations and decisions were taken during the project refinement phase. Aspects of the design were influenced as a result of further survey, stakeholder discussion and information from intrusive ground investigations.

- **Access Track Length Reduction** – Following identification of a number of environmental constraints on the site a review of the access track layout has been undertaken to avoid constraints and optimise where practicable, this has not resulted in any significant reduction in the access track length from the consented layout, but has reduced the excavated peat volume from 86,500m^3 of peat to 51,500m^3 of peat.

  If the floating/excavated road option is considered acceptable from an engineering consideration, the volume of peat could be reduced by a further 28,000m^3, to less than 27,220m^3.

- **Cabling design** – At the time of writing the cabling installation method is still to be confirmed however where ground conditions allow, cable laying in peatland habitats will adopt a shallow open cut to reduce excavation of peat. Furthermore, in relation to floating tracks, cable will be laid in reinstated verges to avoid excavation of undisturbed peat.

- **Micro-siting and footprint reduction** – The planning consent allows for limited spatial deviation for the consented wind farm design (i.e. micro-siting), therefore, within the confines of the planning consent, design review, aimed at minimising peat excavation and disturbance, shall continue into the construction phase.

3 PEAT CONDITIONS

3.1 Peatland Landscape and Habitats

3.1.1 The vast majority of the survey area and wider landscape is covered by blanket bog; the exceptions being the steeper, dryer eastern slopes of Scalla Field and Whaa Field, the shallower substrates bordering the Burn of Weisdale, and the few acid and base rich flushes dotted through the area (RPS, 2016).

3.1.2 All of the blanket mire within the survey area and the surrounding landscape has been modified to some extent through historical crofting activities. The majority appears to show signs of historic peat cutting, with alternating ridges, or banks, of dryer bog vegetation interspersed with much wetter bog vegetation. It is possible that some of these areas have recovered from previous erosion. At the north of the survey area in the valley of Kergord this alternate dry/wet complex of bog may be due to differences in hydrology caused by the more variable depth of peat overlying the bedrock

3.1.3 The Upper Kergord area was subject to intensive agricultural improvement in the 1950s and 1960s. This converted a large area of blanket bog into pasture for sheep grazing. A considerable amount of drainage work appears to have been undertaken with lime and fertiliser added and, in places, surface seeding. Agricultural improvement is also evident along the Burn of Weisdale. It is also apparent that some drains have been cut into the blanket bog vegetation in places, although these do not appear to be recent.

3.1.4 In broad terms of the habitats present, the vast majority of the survey area is generally actively peat forming and as such should be classed as blanket bog, currently showing very little sign of erosion. By Shetland standards, this can be described as relatively intact to moderately degraded blanket bog. A series of base rich flushes at the southern end of the survey site are present; these are highly likely to be ground water dependent and in a Shetland context of moderate to high conservation interest. A series of M6 flushes were identified and are also likely to be ground water dependent but are ubiquitous in Shetland and thus of less conservation interest.

3.2 Peat Depth and Extent

3.2.1 Numerous phases of peat probing have been undertaken on the site, the first round of peat probing at the ES stage (Mouchel) to determine peat depth across the site. During the ES stage, a total of 40 (40 of which recorded peat) probes were carried out along the proposed Kergord Access Track alignment for approximately 1.6km at a spacing of 50m intervals

3.2.2 In addition, the access track and cable route were subject to further investigation in 2013 (Raeburn) of 135 peat probes for a cumulative total of 175 peat probes for the entire site[4]. Further probing was undertaken as part of the wind farm access tracks by RPS and later by SLR Consulting Ltd, with a site walkover and further probing carried out in July 2018 and October 2018. The current number of probes used in the analysis is 218 no. probes.

3.2.3 Site work undertaken by Jacobs in 2013 identified relic peat scars and peat pipes but based on their assessment of potential Peat Stability did not consider these as significant and risks would be mitigated during construction.

3.3 Interpretation

3.3.1 Based on the accumulated peat probing survey results, peat depths at the site are consistent with those recorded at the ES stage and further investigation stages, i.e. predominately found to be an average depth of 1.5m over the entire length but significantly deeper between chainage lengths 350-550, 740-850 and 950-1100, where the maximum values extend to depths up to 3.8m, 3.6m and 4.0m respectively. Peat was generally thinner in the other areas as demonstrated in the peat contour plan (Figure 5– Peat Contour Plan).

3.3.2 No peat coring was undertaken during the recent site visit; however work undertaken previously identified the peat as typically fibrous to around 1m with an increase in humification and water content as the peat became more catotelmic below 1.5m.

3.3.3 The percentage depth distribution for the site as a whole is illustrated in Table 4.

Table 4: Accumulated Peat Probes Depths

Depth	No. Probes	%Total
0-0.25	17	7.80%
0.25-0.5	18	8.26%
0.5-0.75	32	14.68%
0.75-1	16	7.34%
1-1.25	23	10.55%
1.25-1.5	9	4.13%
1.5-1.75	21	9.63%
1.75-2	12	5.50%
2-2.25	12	5.50%
2.25-2.5	11	5.05%
2.5-2.75	14	6.42%
2.75-3	7	3.21%
3-3.25	14	6.42%
3.25-3.5	6	2.75%
3.5-3.75	2	0.92%
3.75-4	4	1.83%
Total	218	100.00%

3.3.4 Estimated volumes of peat and mineral soils to be reused at the site are detailed in Tables 5 & 6. These volumes have been calculated assuming excavation of peat for the following infrastructure elements, inclusive of the design refinements outlined in Section 2.

- A total of 2.10km of access tracks, allowing for an 11m track width. (8m running width plus 2 x 1.5m verge). The excavated peat volumes have been calculated utilising the proposed design drawings for the track.
- A total of 2.10km of cable trench, allowing for a 12m trench.

3.4 Peatland Landscape

3.4.1 The geomorphological characteristics of the access track route site are typically moderately undulating topography utilised primarily for rough grazing of sheep. The terrain to the west of the track comprises moderately steep, free-draining slopes with the majority of the track on a moderately sloping central plateau, which has been subjected to land improvement for farming activities. The land subsequently falls to the East towards the Burn of Weisdale. This central plateau has significant peat accumulations and has been subject to peat extraction in the past. Blanket peat covers a considerable extent of the area with exception of the free-draining, steeper ground. Significant drainage of the area between the track and at the Upper Kergord farm access track is clearly visible, probably as part of overall farming improvements.

3.4.2 In a Scotland-wide context, soil erosion is prevalent in the uplands, typically driven by a combination of climate, topography, and grazing pressure.

3.4.3 There is no evidence of extensive peat erosion (hagging), some evidence of historical small scale peat movements was recorded in the Peat Stability Assessment although it was concluded that the implementation of suitable mitigation measures would adequately control peat slide risk at the site.

3.5 Classification of Excavated Material

3.5.1 The findings of the 2013 Soil augers indicate that the majority of peat present can be described as acrotelmic (lower humification (H_0-H_5) and moisture content) over first 1-1.5m with more humified and wetter peat (H_6- H_{10}) at depths in excess of this, based in accordance with the Von Post Scale of Humification (Ekono 1981).

3.5.2 Following analysis and review of the trial pits/ soil augers/ peat probe logs and consulting the Von Post Scale, peat has been classified into one of three reuse suitability categories (i) Green, (ii) Yellow or (iii) Red (Table 5). The method of peat classification into these categories is determined by allocating a proportion of the Von Post Scale of Humification and Moisture Content descriptions with suitability for reuse description. The three categories are defined below:

Table 5 Reuse suitability characteristics

Category	Von Post Scale of Humification and moisture Content	Description
Green	H1:B1-4, H2:B1-B4, H3:B1-B3, H4:B1-B3, H5:B1-B2, H6:B1-2	This category represents fibrous to pseudo-fibrous material. The Low humification numbers are representative of undecomposed peat with fibrous structure ideal for reinstatement of upper peat layers. The latter humification numbers represent a Moderately to Moderately-Highly content of amorphous material, although the moisture content remains low. This category of material is considered suitable for all types of reinstatement as the peat structure is likely to remain unchanged during excavation, storage and handling.
Yellow	H1:B5, H2:B5, H3:B4-B5, H4:B4-B5, H5:B3-B4, H6:B3-B4, H7:B1-B3, H8:B1-B2	This category represents fibrous material with higher moisture content and further decomposed highly amorphous materials with Low moisture. This category of material is considered suitable for all types of reinstatement if handled, stored and managed strictly in accordance with the principles outlined in Section 4. Due to the diversity in this range and variable nature, the least fibrous material shall be used in the reinstatement of lower peat layers, complementing natural peat structure.
Red	H5:B5, H6:B5, H7:B4-B5, H8:B3-B5, H9:B1-B5, H10:B1-5	This category represents Very Highly to Completely decomposed amorphous peat with all moisture contents and the middle-scale of humification with High and Very High moisture content. This category is considered the most challenging for excavation, storage and handling on site and generally only suitable for reinstatement in limited areas due to its amorphous nature.

3.5.3 Table 6 (below) provides a summary of the Works peat data classified according to the above descriptions. The data analysis indicates that the peat to be excavated is likely to be classified as 64% 'Green', 24% 'Yellow' and 12% 'Red'.

An analysis of ground investigation data and likely peat classification for each of the separate infrastructure elements is summarised in Table 6.

Table 6: Peat Classifications for Main Infrastructure Elements

Infrastructure Peat Data	Peat Characteristics		
	Green %	Yellow %	Red %
Kergord Access Track (Cut Construction)	64	24	12
Kergord Access Tracks (Cut and Floating Construction)*	80	10	10
Cable Routes	100	0	0

4 PEAT MANAGEMENT - GOOD PRACTICE PRINCIPLES

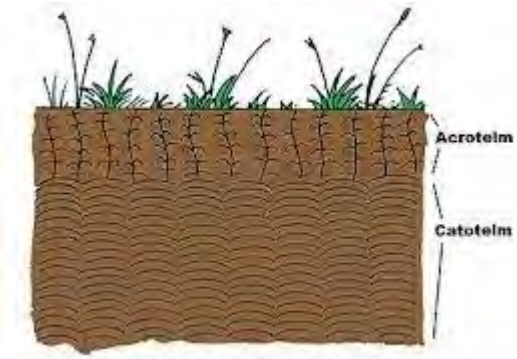
4.1 Environmental Management Plan

4.1.1 An outline Construction Environmental Management Plan (CEMP) was submitted as an appendix to the Environmental Appraisal Report. This CEMP shall be submitted to the planning authority for discharge of relevant pre-commencement planning conditions in accordance with commitments made in the planning submissions. The CEMP will include strict, good practice requirements in relation to the excavation, storage and reuse of peat during the construction phase of the project.

4.2 Peat Excavation

4.2.1 Excavated peat should be excavated as turves, including the acrotelm (surface vegetation) and a layer of adjoining catotelm (more humified peat) typically up to 500mm thick in total, or as blocks of catotelm; the acrotelm should not be separated from its underlying peat;

- the turves should be as large as possible to minimise desiccation during storage;
- contamination of excavated peat with substrate materials should be avoided; and
- consider timing of excavation activities to avoid very wet weather and multiple handling to minimise the likelihood of excavated peat losing structural integrity.



Hydrological Layers in Bogland Habitat

4.2.2 If possible, extract intact full depth acrotelm layers from the top surface of the peat deposit. This technique will maintain connectivity between the surface vegetation and the partially decomposed upper layers of the catotelm.

4.3 Peat Storage & Handling

4.3.1 Temporary storage locations will be appropriately located and designed to avoid environmental constraints (e.g. sensitive peatland habitats, watercourses, etc) and, thus, minimise ecological impact, prevent risks from material instability and avoid sediment-laden run-off discharging directly into watercourses.

4.3.2 The precise location of temporary peat stockpiles will be determined at a site-level following consideration and assessment of suitable areas by the ECoW and Contractor to ensure locations are optimal in terms of environment, construction practicality and safety.

4.3.3 The following good practice shall be adopted in relation to peat storage and handling:

- movement of turves should be kept to a minimum once excavated, and therefore it is preferable to transport peat planned for translocation and reinstatement to its destination at the time of excavation;
- if HGVs that are used for transporting non-peat material are also to be used for peat materials, measures should be taken to minimise cross-contamination of peat soils with other materials
- stockpiling of peat should be in large volumes to minimise exposure to wind and sun (and desiccation), but with due consideration for slope stability and other environmental (e.g. habitats) constraints;
- excavated peat and topsoils should be stored to a maximum of 1m thickness and peat turves shall not be stacked to preserve the living vegetation;
- stores of non-turf (catotelm) peat should be bladed off to reduce the surface area and desiccation of the stored peat;
- monitor areas of steep peat and peat storage areas during periods of very wet weather, or during snowmelt, to identify early signs of peat instability;
- peat should be stored in a linear bund along the cut track route at sufficient distance from the cut face to prevent overburden induced failure;
- local gullies, diffuse drainage lines (or very wet ground) and locally steep slopes should be avoided for peat storage;
- where necessary, drying of stored peat should be avoided by irrigation;
- as far as reasonably practicable, restoration should be carried out concurrently with construction rather than at its conclusion. The timing of activities such as the restoration of the B9075 may preclude this, however, good management of the site will ensure the peat is not allowed to degrade over time.

4.3.4 Following refinement of the wind farm peat model, a detailed storage and handling plan shall be prepared by the Contractor as will be specified within the CEMP:

- best estimate excavation volume at each infrastructure location (including peat volumes split into area / volume of ‘actrotelm’ or ‘turf’, and volume of catotelm);
- volume to be stored locally and volume to be transferred directly on excavation to restoration areas elsewhere in order to minimise handling;

- location and size of storage area relative to natural peat morphology / drainage features; and
- Irrigation requirements and methods to minimise desiccation of excavated peat during short term storage.

4.3.5 These parameters are best determined post-consent in light of detailed ground investigation and in conjunction with the appointed civil works contractor and the ECoW.

4.4 Reinstatement

4.4.1 In accordance with reinstatement good practice, consideration will be given to the landform surrounding the area of the Works. Principally, this will involve the avoidance of the creation of uniformed construction batters and straight-lined infrastructure edges. Shallow construction batters will be favoured to ensure a subtle transition from construction slopes to existing land.

4.4.2 Reinstatement of vegetation will be focused on natural regeneration utilising peat or other vegetated turves or soils stripped and stored with their relevant seed bank. To encourage stabilisation and early establishment of vegetation cover, peat turves or other topsoil and vegetation turves in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.

4.4.3 Where there are insufficient turves for top dressing, i.e. where bare peat prevails as a consequence of construction, seeding shall be undertaken to encourage vegetation re-establishment. The site ECoW shall monitor the success of reinstatement and vegetation reestablishment. Where the site ECoW determines requirement for additional reinstatement effort, the Contractor shall submit proposals for re-seeding, including specification for seed mixes, application methods and monitoring requirements, to the ECoW for review and acceptance.

4.4.4 Finally, to prevent scour and run-off and facilitate vegetation re-establishment, any down-slope embankments will be graded such that the slope angles are not too steep and there is a gradual transition with the surrounding / existing ground profile.

5 CONSTRUCTION OF PROJECT INFRASTRUCTURE – GOOD PRACTICE PRINCIPLES

5.1 Excavated Access Track Construction

5.1.1 In comparison to infrastructure specific to wind turbines, there is considerably more guidance available to support access track design in peatlands. Guidance is generally focused on floating tracks and excavated tracks, and is summarised below.

5.1.2 Excavated tracks require complete excavation of peat to a competent substrate. Excavated tracks are generally undertaken where peat depths are less than 1m. This peat would require storage ahead of reuse, generally local to the site of excavation or elsewhere on site where required. Good practice guidance relates mainly to drainage in association with excavated tracks:

- trackside ditches should capture surface water (within the acrotelm) before it reaches the road;
- interceptor drains should be shallow and flat bottomed (and preferably entirely within the acrotelm to limit drawdown of the water table);
- any stripped peat turves should be placed back in the invert and sides of the ditch to assist regeneration; and
- culverts and cross drains should be installed under excavated tracks to maintain subsurface drainage pathways (such as natural soil pipes or flushes). Discharge from constructed drainage should allow for as much diffuse dispersion of clean (silt free) water as possible while minimising disturbance to existing peatland as far as possible. Silt mitigation measures will be incorporated into all constructed drainage as per the requirements of the CEMP.

5.1.3 Although excavation is normally undertaken in peat of minor thickness (< 1.0m), there is a possibility of minor slippage from the cut face of the peat mass. Accordingly:

- free faces should be inspected for evidence of instability (cracking, bulging, excessive discharge of water or sudden cessation in discharge); and
- If peat is used along verges it can be used on appropriate slopes along open peat faces creating a finished surface which can be gently compacted and tapered to running level to prevent slippage.
- where significant depths of peat are to be stored adjacent to an excavation, stability analysis should be conducted to determine Factor of Safety (FoS) and an acceptable FoS adopted for loaded areas.

5.1.4 As with floating tracks, monitoring should be scheduled post-construction to ensure that hydrological pathways and track integrity have been suitably maintained.

5.2 Floating Access Track Construction

5.2.1 Over deeper peat (typically >1.0m), floating tracks are used to remove the requirement for peat excavation and limit disruption of hydrological pathways. The success of construction requires careful planning to take account of the unique characteristics of peat soils. Specific guidance[5] is available on design, the duration and timing of construction, the sequence of construction and the reuse of peat on the shoulders of the floating access track.

5.2.2 The following issues should be considered during detailed design of floating access tracks:

- adopting conservative values for peat geotechnical properties during detailed design (post-consent);
- applying a maximum depth rule whereby an individual layer of geogrid and aggregate should not normally exceed 450mm without another layer of geogrid being added;
- on gently sloping ground and where the access track runs transverse to the prevailing slope, accommodating natural hydrological pathways such as flushes and peat pipes through installation of a permanent conduit within or underneath the track and allowing for as much diffuse discharge (while minimising disturbance to existing peatland) on the downslope as possible;
- ensuring transitions between floating tracks and excavated tracks (or other forms of track not subject to long term settlement) are staged in order to minimise likelihood of track failure at the boundary between construction types;
- scheduling access track construction to accommodate for, and reduce, peat settlement characteristics; and
- reuse of existing roads (with upgrading if required), where possible.

5.2.3 The critical factor in successful construction of floating access tracks is the timescale of construction, and the following good practice guidance is provided:

- the settlement characteristics of peat; should be accommodated by appropriate scheduling of access track construction, as follows:
- prior to construction works, the setting out the centreline of the proposed access track to identify any ground instability concerns or particularly wet zones;
- identifying ‘stop’ rules, i.e. weather dependent criteria for cessation of access track construction based on local meteorological data; and
- maximising the interval between material deliveries over newly constructed access tracks that are still observed to be within the primary consolidation phase.

[5] Floating roads on peat (SNH, FCS; August 2010);

5.2.4 The sequence of construction is normally stipulated in guidance provided by the supplier of the geotextile or geogrid layer, and suppliers are often involved in the detailed access track design. Good practice in relation to the sequence of access track construction is as follows:

- retaining rather than stripping the vegetation layer (i.e. the acrotelm, providing tensile strength), and laying the first geotextile/geogrid directly on the peat surface;
- adding the first rock layer;
- adding the second geotextile/geogrid, and add overlying graded rockfill as a running surface;
- heavy plant and Heavy Goods Vehicles (HGV) using the access tracks during the construction period should be trafficked slowly in the centre of the track to minimise dynamic loading from cornering, breaking and accelerating;
- ensuring wheel loads should remain at least 0.5m from the edge of the geogrid, markers should be laid out, monitored and maintained on the access track surface to clearly emphasise these boundaries; and;
- initial 'toolbox' talks and subsequent feedback to construction and maintenance workers and drivers to emphasise the importance of the implementing the above measures.

5.3 Cable Corridors

5.3.1 Cable corridors either require peat excavation specifically for this purpose, or they can be constructed within landscaping of shoulders adjacent to floating tracks. Guidance is as follows:

- where there is sufficient room at side of track and the habitat classification does not prohibit it;
- the cable corridors have the potential to be up to 12m wide to accommodate up to 11 cables extending to the Kergord Substation.
- utilise peat shoulders for cable lays where possible to minimise peat excavations specifically for this purpose, in this case, peat shoulders should be 1.0m to 1.5m thick;
- minimise time between cable laying and peat reinstatement, preferably avoiding excavation until the electrical contractor has cables on-site ready for installation; and;
- avoid incorporating substrate materials in the excavation, to minimise contamination of the peat to be reinstated. Replace excavated materials sequentially.

6 PEAT MANAGEMENT – EXCAVATION ACTIVITIES & PROPOSED REUSE

6.1 Peat Excavation Activities associated with Construction

6.1.1 The following activities require excavation, including stripping of vegetation turves and excavation of underlying soils, including peat, down to formation level (e.g. excavation down to a stratum with suitable engineering properties to meet required design criteria.

- 'Cut' track construction (in areas of peat <1m deep or where floating track construction is not physically possible);
- Excavation of cable trenches for underground cabling (laid in previously reinstated material at road edge);
- Temporary construction compounds and laydown areas (to be finalised).

6.1.2 Furthermore, the updated CEMP will include a requirement for details relating to excavated materials to be recorded by the Contractor in a Materials Excavation Register.

6.2 Peat Reuse in Trackside Reinstatement

6.2.1 During and upon completion of the Works, there will be a requirement for the reinstatement of construction disturbed areas, infrastructure edges and embankments, including:

- verge reinstatement and landscaping to cut access tracks (to compliment surrounding topography, reduce visual impacts, establish vegetation and reduce erosion etc);
- verge reinstatement and landscaping to floating access tracks (to compliment surrounding topography, reduce visual impacts, establish vegetation and reduce erosion etc);
- reinstatement around watercourse crossing structures;
- reinstatement of temporary construction compounds and laydown areas; and reinstatement of cable trenches.

6.2.2 A key opportunity to reuse peat is to employ it in reinstatement of constructed access tracks. Wedge-shaped reinstatement at the margins of a floating access track (which is elevated above the peat surface) is termed 'shoulders'. The reuse of peat in this manner allows for the avoidance of patently engineered embankments. Instead reinstated land can transition subtly, complimenting local surface profiles and wider landforms. The trackside reinstatement shall consider the following:

- peat excavated from elsewhere along the track construction route will be reused to generate shoulders adjacent to the floating track sections;
- peat shoulders shall taper from just below the track sides (to prevent water draining onto the track surface) and join the surrounding peat surface, keeping as natural a profile as possible to tie-in with existing slope profiles; and
- limit the width of peat shoulders to avoid unnecessary smothering of intact vegetation adjacent to the floating track.

6.2.3 Peat excavated during cable trenching operations will be re-used for trench backfilling, alongside excess peat from the track excavation. At the track side where cables are installed, dependant on the adjacent track level, peat and peat turves shall be reused to profile land to compliment surrounding topography and ensure existing drainage regimes are maintained.

6.3 Peatland Restoration as a consequence of Construction Activities

6.3.1 Following construction of the Kergord Access Track, there will be a surplus of peat which will be used for wider peatland restoration. The primary area will be the restoration of the existing Sandwater Road (B9075) and up to 4 areas (Table 8) have been identified temporary storage until the Wind Farm is constructed and restoration of the road can be undertaken.

6.3.2 Further to this requirement, a number of areas have been identified in the vicinity of the Kergord Track and Sandwater Road where peatland would benefit from restorative efforts.

6.3.3 Restoration relates to all construction disturbed areas (not just HMP restoration) and therefore this is something that will be carried out to restore any construction disturbed areas along the route.

6.3.4 In addition, restoration using excavated peat may also be carried out for HMP purposes and in these instances detailed surveys will be undertaken prior to construction commencing. Potential restoration areas are identified within the existing HMP for the wider wind farm site, however other areas may also be identified during the works and the methods used for restoration of these additional areas will be agreed in advance with the ECoW and Habitat Management Plan Officer.

6.3.5 The Habitat Management Plan (HMP) for the consented wind farm (which encompassed Kergord access track) sets out proposed measures for habitat restoration and enhancement and is provided as Technical Appendix 8.9: Habitat Management Plan and Technical Appendix 8.10: Habitat Management Plan Figures. Proposed measures include the restoration of peatland habitat throughout the area. Candidate and potentially suitable areas for blanket bog restoration are identified in the HMP and include up to c.260ha of restoration. There would be sufficient area to utilise peat generated on site for habitat improvement. Candidate areas along the Sandwater Road have been identified as well as restoration of the existing B9075 on completion of the project.

6.3.6 Whilst the HMP identifies that excavated peat could be reused in proximity to the development's infrastructure for the purposes of peatland restoration, careful consideration will need to be given to the nature of the peat excavated and its suitability for peat restoration purposes, the methods of excavation, transportation, and reuse to satisfy SEPA that this is a legitimate use for peat.

6.3.7 Peatland restoration work on site will operate as part of the construction process, and although not directly part of the HMP, it will be integrated to ensure peatland related obligations are met. At this stage it is proposed that the works will be implemented under the project's CEMP, and aim to minimise the excavation, movement and storage of peat. Construction will generate blanket bog turfs and volumes of peat, a significant proportion of which have the potential to be used for additional peatland restoration at locations in proximity to wind farm and access track construction. This restoration work will therefore contribute to the HMP's blanket bog objectives.

6.3.8 The progression of this restoration work will be complex and will require significant forward planning. Peat management during construction also maximises its contribution to the delivery of the wider blanket bog restoration. It is also important that information on peat volumes, peat storage and peat slide risk are also shared across the construction and restoration teams so that overall peat protection, blanket bog restoration, pollution prevention and health and safety requirements are met. To this end therefore, the wider environment team (ECoW, Habitat Management Plan Officer, Contractor's Environmental representative and Geotechnical Clerk of Works in particular) will be aware of the HMP and its activities and objectives, so that 'on site' handling of blanket bog vegetation and peat during construction and reinstatement can be orchestrated to best overall use where required.

6.3.9 Based on the peat characteristics described in Section 4, it is anticipated that the peat excavated on site will be of a suitable composition for reuse in all of the applications listed above. However, a small volume of wet, amorphous (e.g. conveying characteristics consistent with the Red category as described in Section 3) peat is expected to be encountered. Peat of this nature shall be placed in appropriate locations such as the base of a borrow pits, or in eroded haggy areas where it can be dressed with a sequence of semi-fibrous and fibrous peat (e.g. peat representative of the Yellow and Green class outlined in Section 3).

6.3.10 Suitable areas for reuse of catotelmic peat are present, albeit limited to areas such as borrow pits and / or restoration areas identified in the wider HMP. Peat of this type will be used in restoration where it poses no risk of run-off or peat slide and the areas and restoration methods will be agreed on site with the ECoW, Habitat Management Plan Officer and other relevant stakeholders onsite.

7 ESTIMATION OF EXCAVATION AND REUSE VOLUMES

7.1 General

7.1.1 Summary peat excavation and reuse volumes for the site are provided in Table 7 & 8 below.

Table 7: Summary of Peat Excavation and Reuse Volumes				
		Assumed Characteristic		
Volume Comparison	**Total**	(m^3)	(m^3)	(m^3)
Volume of peat excavated (m^3)	51,500	32,960	12,360	6,180
Volume of reinstated peat for infrastructure(m^3)	51,500	32,960	12,360	0
Volume of reinstated peat for habitat restoration(m^3)				6,180
Difference	**0**	**0**	**0**	**0**

Table 8: Summary of Peat Excavation and Reuse Volumes by Infrastructure		
Infrastructure	**Estimated Total Peat Excavation Volume (m^3)**	**Estimated Total Peat Final Reinstatement Volume (m^3)**
New Access Track (Cut Construction)	51,500	6,300
Cable Trenching (as cable trenches are adjacent to access tracks a proportion of the reuse also relates to track reinstatement, i.e. reuse to infill trench and profile access track embankments above cables).	22,152	33,352
Temporary Storage for use in reinstating the B9075, to be stored in 4 possible areas adjacent to or close to Sandwater and Kergord Access Track. • Area 1 west of A970 • Area 2 west of Lamba Scord • Area 3 to the west of the Access Track • Area 4 to the north of the Access Track, near substation location	0	28,400 (4 x 7,200m^2 (~2x60mx60m)
Habitat Management, in 2 locations • West of Burn of Pettawater and • West of Lamba Scord	0	6,000 (2 x 3,000m^2 (~1x60mx50m)
Temporary Compounds, would create no surplus peat as any peat excavated would be reinstated following construction. Assume 50m x 50m.	(2,500)	(2,500)

Total	**76,572 m^3**	**76,552 m^3**

8 RESULTS

8.1.1 All excavated material is considered suitable for site reuse. The current volume estimates indicate that there is no significant surplus or deficit of peat on site. This balanced volume estimate is considered acceptable at this stage.

8.1.2 The generation of 'waste' (according to legal definition of waste) peat during construction and a deficit of peat found during construction is considered unlikely due to the following factors:

- The excavated volume estimates are based on conservative input parameters and further design refinements will be possible during construction to further reduce the volume of excavated peat, and;
- The nature of the peat is such that it is considered suitable for reuse as a material for both engineering and environmental purposes.

9 CONCLUSIONS

9.1.1 This PMP (Stage 2) presents a pre-construction assessment of the expected peat extraction and reuse volumes associated with the Works phase of the construction of Kergord Access Track.

9.1.2 Through a process of continued design refinement (focused on minimising peat excavation volumes) and adoption of best practice working method, the development is expected to achieve an overall peat balance, i.e. the volume (and character) of excavated peat compliments requirements for reuse and reinstatement. Thus, all excavated material will be required for reuse as part of the works and no surplus peat is anticipated.

9.1.3 The site supports peat of moderately decomposed peat with a very distinct plant structure that is considered suitable for reuse during reinstatement work, e.g. dressing of infrastructure edges, restoration and borrow pit restoration. Good practice standards, which will be outlined in the updated CEMP, relating to excavation, handling and storage of peat, shall ensure against any compromise to the structural integrity of the peat and its associated suitability for reuse.

10 REFERENCES

Legislation relevant to the management of peat includes the following:

- The UK Climate Change Act 2008 (c 27);
- Environmental Protection Act 1990 (as amended);
- Landfill (Scotland) Regulations 2003 (as amended);
- The Waste Management Licensing (Scotland) Regulations 2011; and
- Scottish Planning Policy (2014).
- There are a number of guidance documents appropriate to the activities planned on site which have been used to guide this assessment, as follows:
- Guidance on Developments on Peatland (SNH, SEPA 2017);
- Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste (SR, SEPA, January 2012);
- SEPA Regulatory Position Statement – Developments on Peat (SEPA, February 2010);
- Good practice during wind farm construction (SR, SNH, SEPA, FCS, HES; September 2015);
- Floating roads on peat (SNH, FCS; August 2010);
- Constructed tracks in the Scottish Uplands (SNH, September 2015); and
- Restoration techniques using peat spoil from construction works (SEPA 2011).
- Viking Wind Farm Addendum Environmental Statement, Site Environmental Management Plan (SEMP), Technical Schedule No.7, Excavated Materials & Reinstatement Plan, 2010
- Viking Wind Farm Addendum Environmental Statement, Technical Appendix A14.4, Estimated Peat Extraction Volume and Potential Reuse Options, 2010

Figures

Figure 2 : Kergord Track Alignment (Re-aligned Track 2018)

Figure 3 : Excavated Track - Peat Volumes

Figure 4 : Excavated/Floating Track - Peat Volumes

Figure 5: Peat Contour Plan along proposed Kergord Access Track alignment

Appendix

Appendix A: Kergord Track Design Drawings (Tony Gee Engineers)

Appendix B: Excavated and Floated Track Cross Sections (Tony Gee Engineers)

Appendix C: Schematic Restoration Profiles on Floated Track and over cable corridors

DO NOT SCALE FROM THIS DRAWING

NOTES

1. FOR PLAN AND PROFILE DRAWINGS REFER TO: S118021-TG-HML-KA-DR-CH-0002 TO 0008.

KA-WX01
KA-WX02
KA-WX03
KA-WX04
KA-WX05
KA-WX06
SITE BOUNDARY
EXISTING UNCLASSIFIED ROAD
PROPOSED BURN OF WEISDALE CROSSING
REFER TO DRAWINGS: S118021-TG-SBR-WB-DR-C-3050 & 3051.
TIE-IN AT EXISTING UNCLASSIFIED ROAD (EXTENTS OF ADOPTION)
TIE-IN AT NEW KERGORD ACCESS TRACK JUNCTION (EXTENTS OF ADOPTION)
INDICATIVE CONSTRUCTION COMPOUND EXTENTS
PROPOSED SANDWATER ROAD DESIGN
REFER TO DRAWINGS: S118021-TG-HML-SR-DR-C-0001 TO 0008.
TIE-IN AT SUBSTATION ACCESS TRACK (SUBSTATION DESIGNED BY OTHERS)
KERGORD ACCESS TRACK
BURN OF WEISDALE CROSSING

50m 0 50m 100m 150m 200m 250m
SCALE 1:2500

4000m 0m 4000m 8000m 12000m 16000m 20000m
SCALE 1:20000

LEGEND:
- CUT
- FILL
- SITE BOUNDARY
- WATER CROSSING LOCATION

RESIDUAL HAZARD	SUGGESTED CONTROL MEASURE

SIGNIFICANT RESIDUAL HAZARDS

NOTE: The above hazards do not include every hazard or assumption, but identify significant residual construction hazards that are not likely to be obvious to a competent contractor and those that could be difficult to manage effectively. Refer also to the designer's risk documentation.

REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P05	EMcG	RCB	KJJ	20.11.18	KERGORD BOUNDARY AMENDED
P04	EMcG	RCB	KJJ	15.11.18	KERGORD BOUNDARY AMENDED
P03	KM	RCB	KJJ	21.09.18	TENDER ISSUE
P02	EMcG	RCB	KJJ	17.08.18	WEISDALE TIE-IN AMENDED
P01	EMcG	RCB	KJJ	13.06.18	FIRST ISSUE

CODE	DRAWING STATUS
D2	FOR TENDER

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KERGORD ACCESS LOCATION PLAN

SHEET 1 OF 1

DRAWING. No.
S118021-TG-HML-KA-DR-CH-0001

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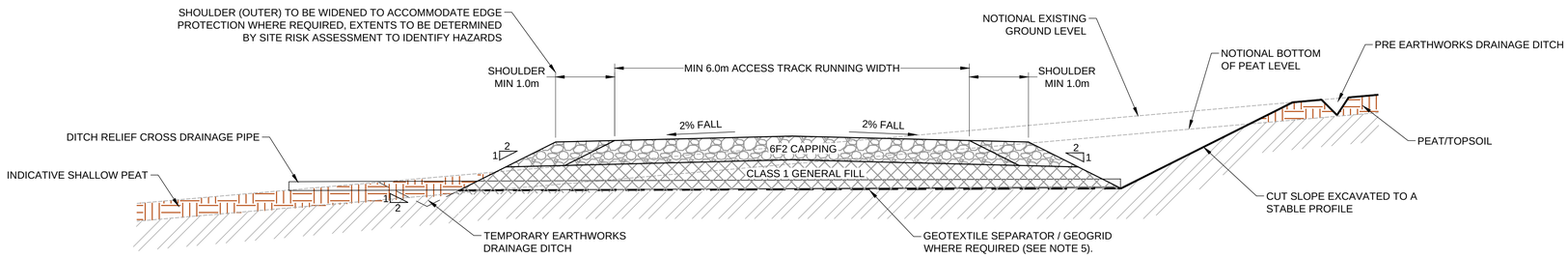
SCALE : AS SHOWN	ORIGINAL SIZE : A1	P05



NEW ACCESS TRACK CONSTRUCTION FOUNDED ON GENTLY SLOPING TOPOGRAPHY

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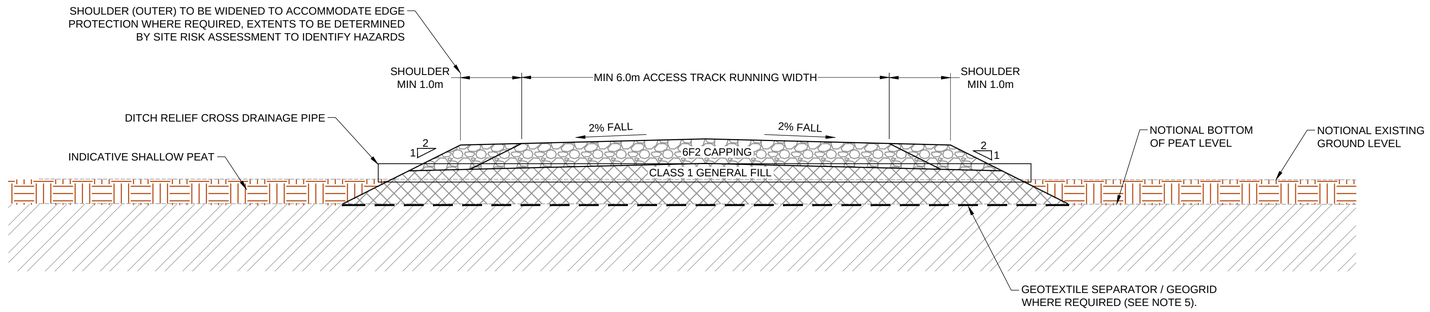

NEW ACCESS TRACK CONSTRUCTION FOUNDED ON LEVEL TOPOGRAPHY

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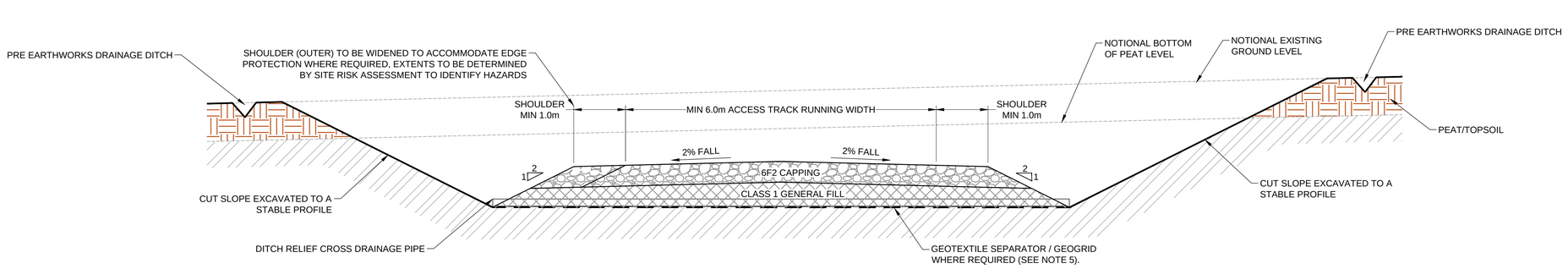
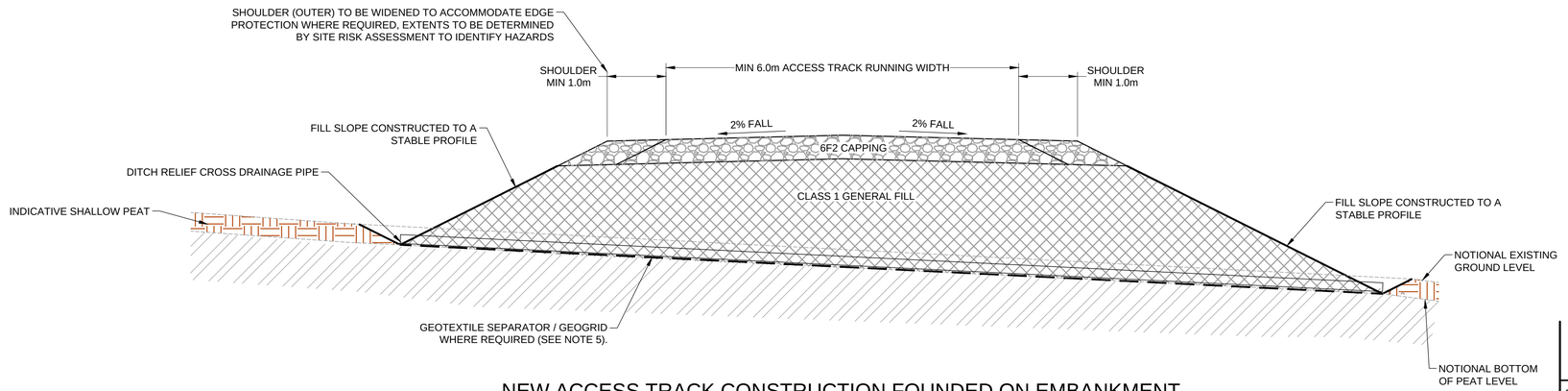


NEW ACCESS TRACK CONSTRUCTION FOUNDED IN CUT

SCALE 1:50



NEW ACCESS TRACK CONSTRUCTION FOUNDED ON EMBANKMENT

SCALE 1:50

1m 0 1m 2m 3m 4m 5m

SCALE 1:50

RESIDUAL HAZARD	SUGGESTED CONTROL MEASURE

SIGNIFICANT RESIDUAL HAZARDS

NOTE: The above hazards do not include every hazard or assumption, but identify significant residual construction hazards that are not likely to be obvious to a competent contractor and those that could be difficult to manage effectively. Refer also to the designer's risk documentation.

DO NOT SCALE FROM THIS DRAWING

NOTES

1. TYPICAL DETAILS TO READ IN CONJUNCTION WITH THE PLAN & PROFILE DRAWINGS.
2. UNLESS SPECIFICALLY SHOWN AN OBSERVATIONAL APPROACH IS TO BE ADOPTED FOR EXPOSED CUTTING FACES, IF PERSISTENT SEEPAGES OR FLOWS ARE OBSERVED DRAINAGE SHALL BE INSTALLED.
3. FOUNDED EMBANKMENT GENERALLY TO BE CONSTRUCTED WITH 1 IN 2 SIDE SLOPES AND CUTTINGS WITH 1 IN 2 UNLESS OTHERWISE AGREED.
4. ACCESS TRACK FORMATION TO BE CONTINUOUSLY ASSESSED DURING CONSTRUCTION BY A COMPETENT ENGINEER. ANY UNACCEPTABLE MATERIAL INCLUDING VEGETATION AND VEGETABLE MATTER TO BE REMOVED AND SIDES BENCHED. TO BE BACKFILLED WITH CLASS 1 OR CLASS 2 FILL TAKING DUE COGNISANCE OF SITE SPECIFIC CONDITIONS. CLASS 6A MATERIAL TO BE PLACED BELOW STANDING WATER. A CBR OF >2.5% IS REQUIRED AT ACCESS TRACK FORMATION.
5. A GEOTEXTILE SEPERATOR TO BE USED AT INTERFACE BETWEEN FORMATION AND ACCESS TRACK CONSTRUCTION WHERE PLACEMENT AND COMPACTION OF THE MATERIAL IS LIKELY TO CAUSE MIXING OF THE FORMATION MATERIALS AND THE NEW TRACK CONSTRUCTION.
6. PRE-EARTHWORKS DITCHES AND DISCHARGES TO BE INSTALLED PRIOR TO CONSTRUCTION OF ACCESS TRACKS TO DIVERT CLEAN WATER AROUND THE WORKS IN THE TEMPORARY AND PERMANENT CONDITION IN ACCORDANCE WITH THE SUDS DESIGN (BY OTHERS).
7. CLASS 1 GENERAL FILL MINIMUM LAYER THICKNESS IN ACCORDANCE WITH S.H.W.
8. ALL PIPES SHALL BE TO CLAUSE 501 OF THE MCHW - EXCAVATED IN ACCORDANCE WITH CLAUSE 502; BEDDED, LAID AND SURROUNDED IN ACCORDANCE WITH CLAUSE 503; AND BACKFILLED IN ACCORDANCE WITH CLAUSE 505. LAID IN NATURAL GROUND OR BED OF WATERCOURSE WHERE APPLICABLE. AIM FOR BED CONTINUUM, FOR FLORA AND FAUNA. INLETS TO BE PROVIDED WITH EROSION CONTROL. OUTFALLS SHOULD BE SO CONSTRUCTED AS TO ELIMINATE POSSIBLE EROSION. DITCH RELIEF CROSS DRAINAGE PIPES TO BE SIZED AND SPACED IN ACCORDANCE WITH THE SUDS DESIGN (BY OTHERS).
9. FOR DETAILS OF UNSURFACED FLOATING TRACKS REFER TO DRAWING S118021-TG-HGT-XX-DR-CH-0002.

REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P01	EMcG	RCB	KJJ	13.06.18	FIRST ISSUE

CODE	DRAWING STATUS
S3	FOR APPROVAL

Tony Gee and Partners LLP
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Consulting Civil, Structural and Geotechnical Engineers

ON BEHALF OF

viking energy
Harnessing Shetland's natural resources

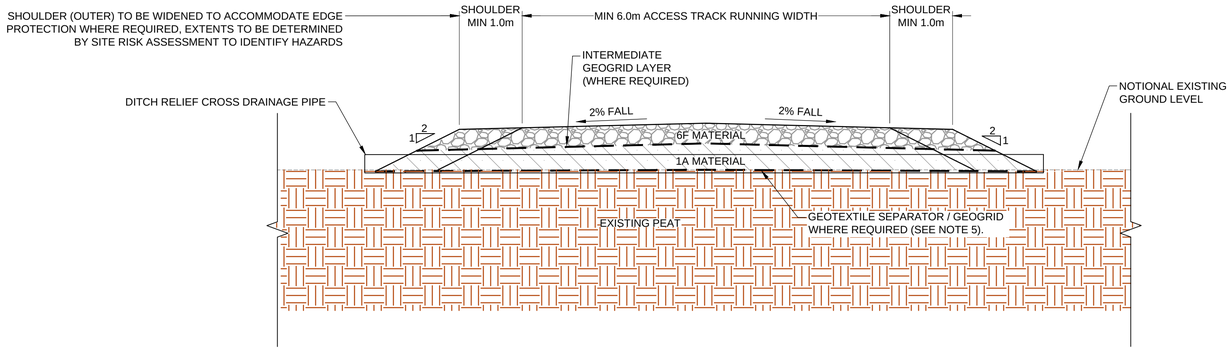
VIKING WIND FARM SANDWATER ROAD & KERGORD ACCESS TRACK

TYPICAL UNSURFACED FOUNDED TRACK CROSS SECTIONS

SHEET 1 OF 1

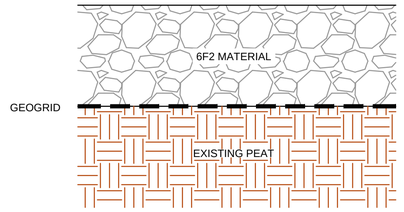
DRAWING. No.
S118021-TG-HGT-XX-DR-CH-0001

DRAWN : EMcG	DESIGNED : KMcG	REVISION
SCALE : 1:50	ORIGINAL SIZE : A1	P01



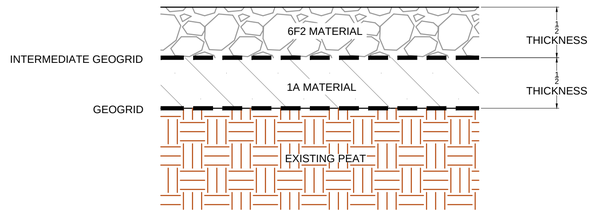
NEW FLOATING ACCESS TRACK ON LEVEL TOPOGRAPHY (<5%)

SCALE 1:50



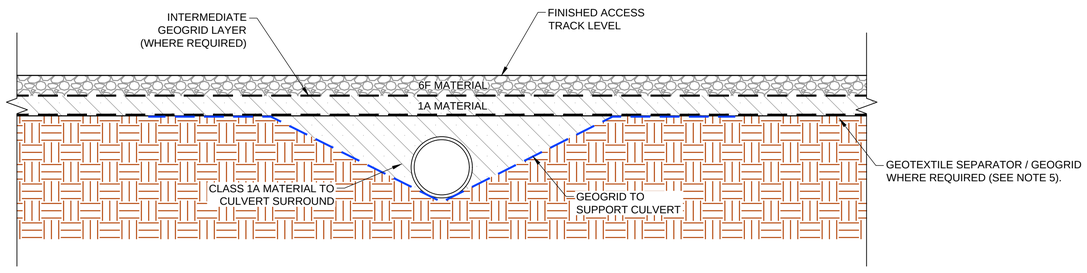
TYPICAL SECTION SINGLE-LAYERED GEOGRID

SCALE N.T.S.



TYPICAL SECTION DOUBLE-LAYERED GEOGRID

SCALE N.T.S.



CULVERT THROUGH FLOATING TRACK SECTION

SCALE 1:50

1m 0 1m 2m 3m 4m 5m

SCALE 1:50

RESIDUAL HAZARD	SUGGESTED CONTROL MEASURE

SIGNIFICANT RESIDUAL HAZARDS

NOTE: The above hazards do not include every hazard or assumption, but identify significant residual construction hazards that are not likely to be obvious to a competent contractor and those that could be difficult to manage effectively. Refer also to the designer's risk documentation.

DO NOT SCALE FROM THIS DRAWING

NOTES

1. TYPICAL DETAILS TO READ IN CONJUNCTION WITH THE PLAN & PROFILE DRAWINGS.
2. UNLESS SPECIFICALLY SHOWN AN OBSERVATIONAL APPROACH IS TO BE ADOPTED FOR EXPOSED CUTTING FACES, IF PERSISTENT SEEPAGES OR FLOWS ARE OBSERVED DRAINAGE SHALL BE INSTALLED.
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5. A GEOTEXTILE SEPARATOR TO BE USED AT INTERFACE BETWEEN FORMATION AND ACCESS TRACK CONSTRUCTION.
6. PRE-EARTHWORKS DITCHES AND DISCHARGES TO BE INSTALLED PRIOR TO CONSTRUCTION OF ACCESS TRACKS TO DIVERT CLEAN WATER AROUND THE WORKS IN THE TEMPORARY AND PERMANENT CONDITION.
7. FOR DETAILS OF FOUNDED ACCESS TRACKS REFER TO DRAWING S118021-TG-HGT-XX-DR-C-0001.

REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P01	EMcG	RCB	KJ	13.06.18	FIRST ISSUE

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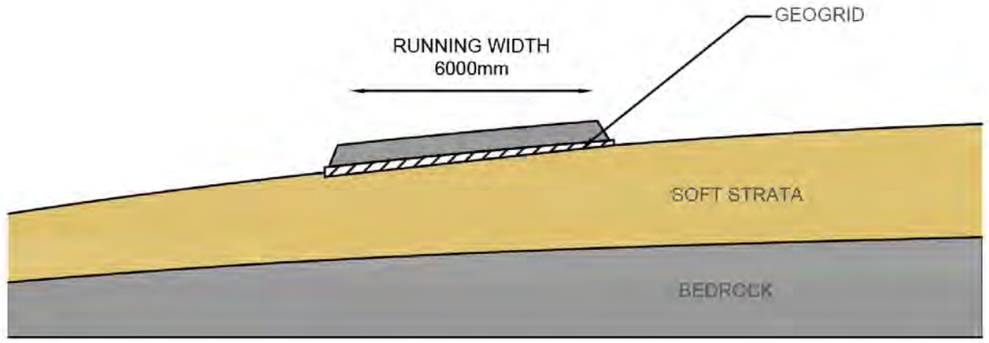
VIKING WIND FARM SANDWATER ROAD & KERGORD ACCESS TRACK

TYPICAL UNSURFACED FLOATED TRACK CROSS SECTIONS

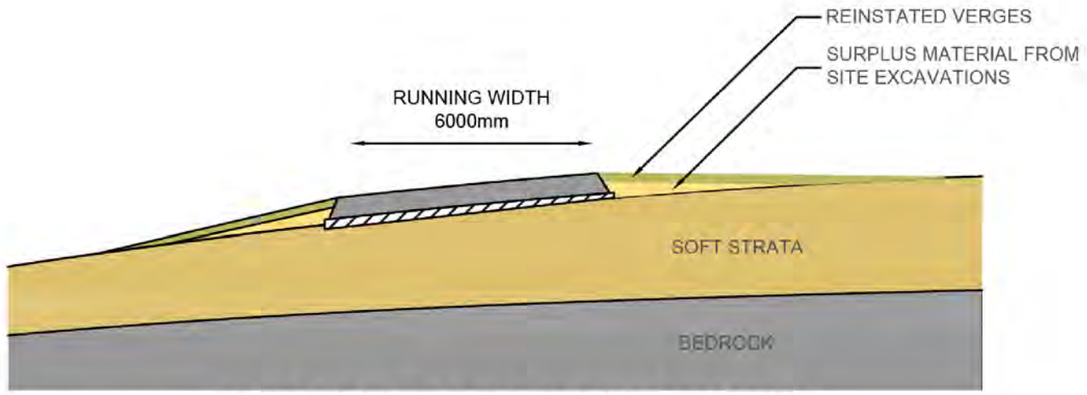
SHEET 1 OF 1

DRAWING. No.		
S118021-TG-HGT-XX-DR-CH-0002		
DRAWN : EMcG	DESIGNED : KMcG	REVISION P01
SCALE : 1:50	ORIGINAL SIZE : A1	



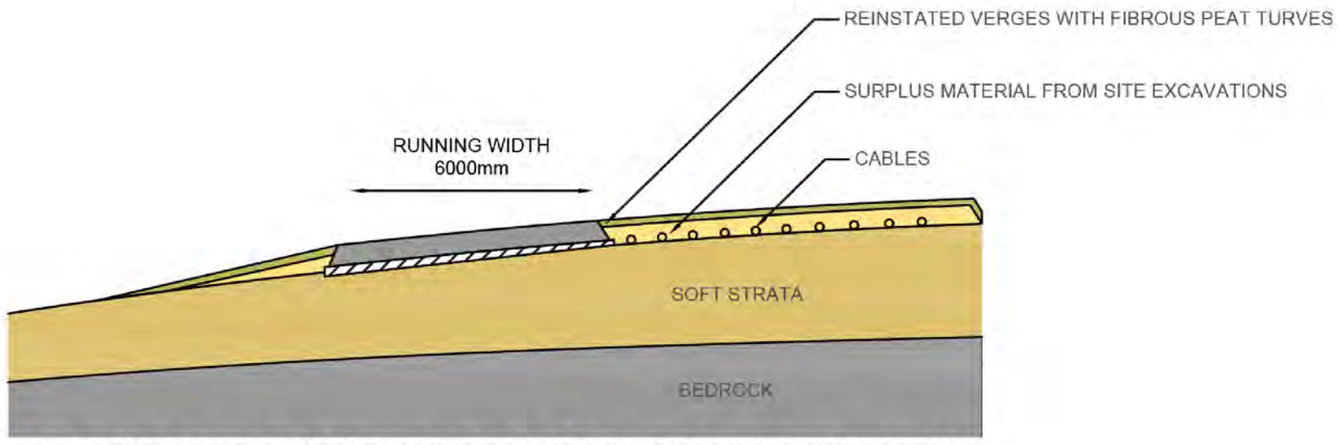
FLOATING TRACK, BASIC CONSTRUCTION

N.T.S



FLOATING TRACK REINSTATEMENT

N.T.S.



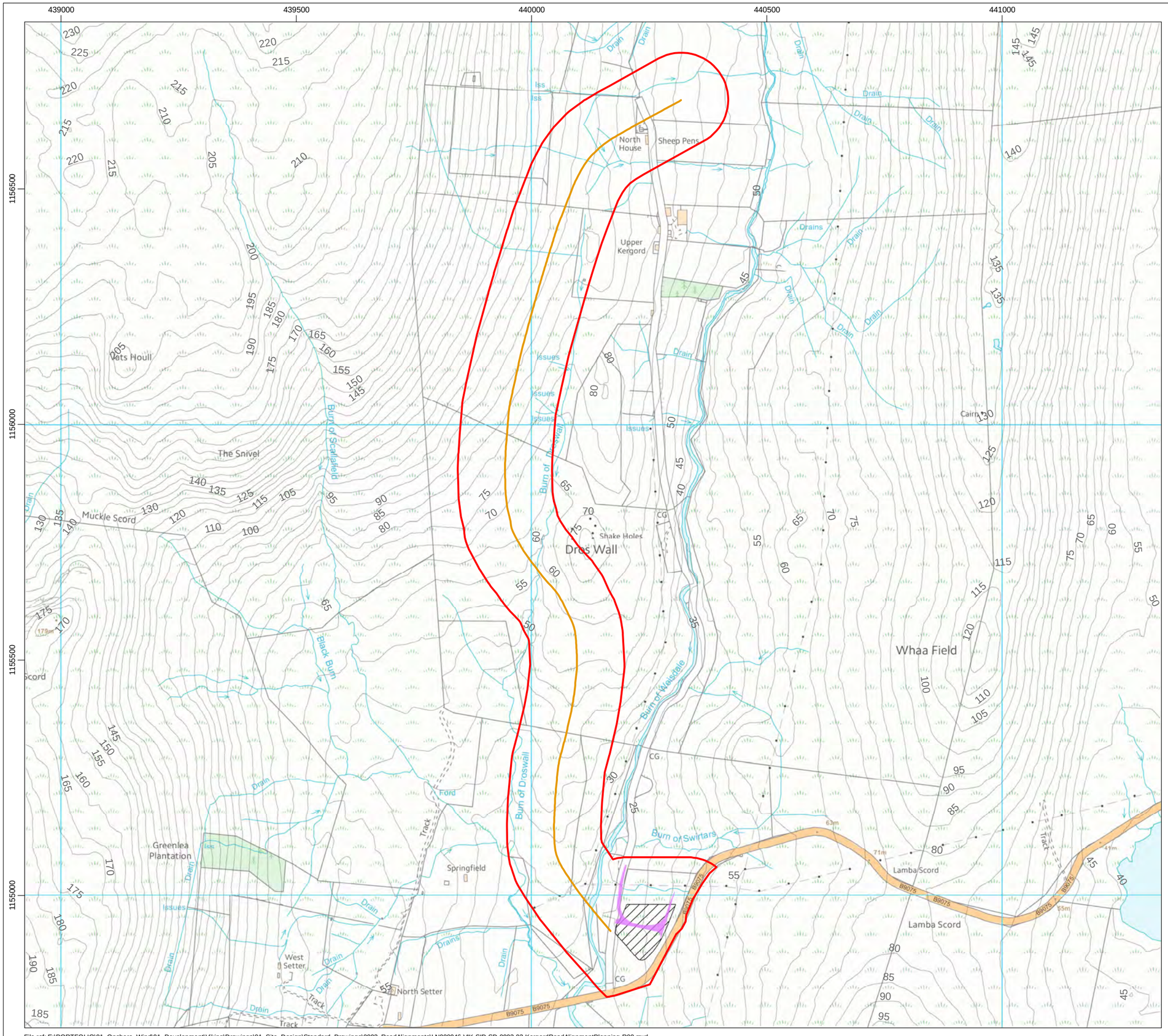
FLOATING TRACK WITH CABLE CORRIDOR (10-16m WIDE)

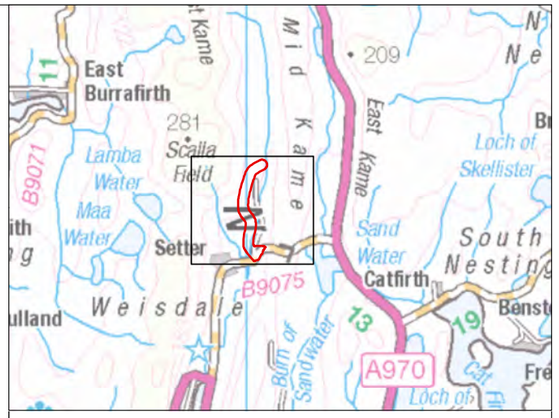
N.T.S.

Key

Appendix C
Schematic Restoration Profiles on Floated Track and over cable corridors

Viking Wind Farm
Kergord Access Track





Legend

- Kergord Site Boundary
- Proposed Upper Kergord Track (planning application submission)
- Proposed Kergord and Sandwater Junction
- Proposed Indicative Compound

0 112.5 225 450 m

N

Project Name

VIKING WIND FARM

Drawing Title

FIGURE 1 KERGORD TRACK ALIGNMENT

Rev	Date	Remarks	Drwn	Chkd
R0	19/09/2018	Updated layout and template	TD	DH
R1	22/11/2018	Updated for peat management plan, Rev1, Nov 2018	TD	JM

Drawing Number

LN000046-VIK-SID-SD-0003-03

Scale	Plot Size	Datum	Projection
1:8,000	A3	OSGB36	BNG

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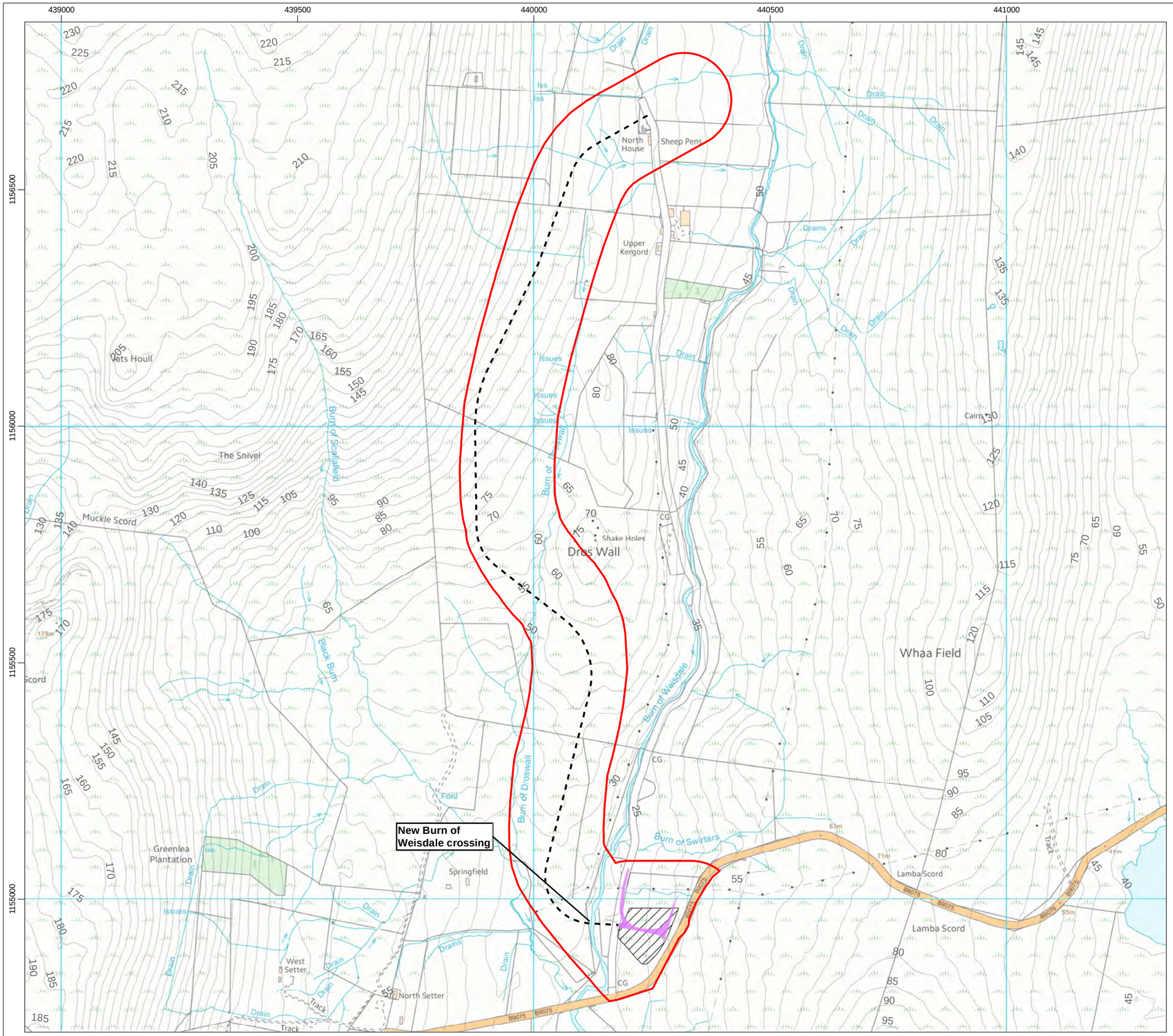

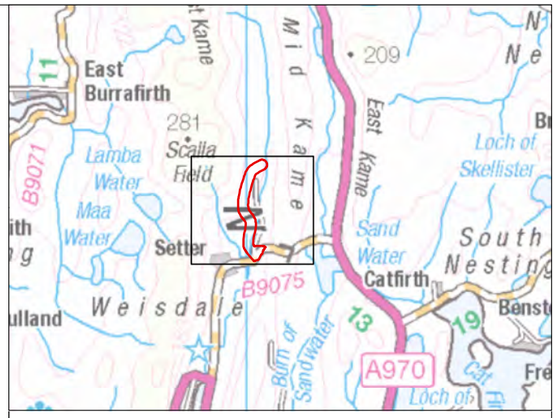

Legend

- Kergord Site Boundary
- Proposed Upper Kergord Track (2018 revised/microsited design post planning submission)
- Proposed Kergord and Sandwater Junction
- Proposed Indicative Compound

0 112.5 225 450 m

N

Project Name

VIKING WIND FARM

Drawing Title

FIGURE 2 KERGORD TRACK ALIGNMENT

Rev	Date	Remarks	Drwn	Chkd
R0	19/09/2018	Updated layout and template	TD	DH
R1	22/11/2018	Updated for peat management plan, Rev1, Nov 2018	TD	JM

Drawing Number

LN000046-VIK-SID-SD-0003-02

Scale	Plot Size	Datum	Projection
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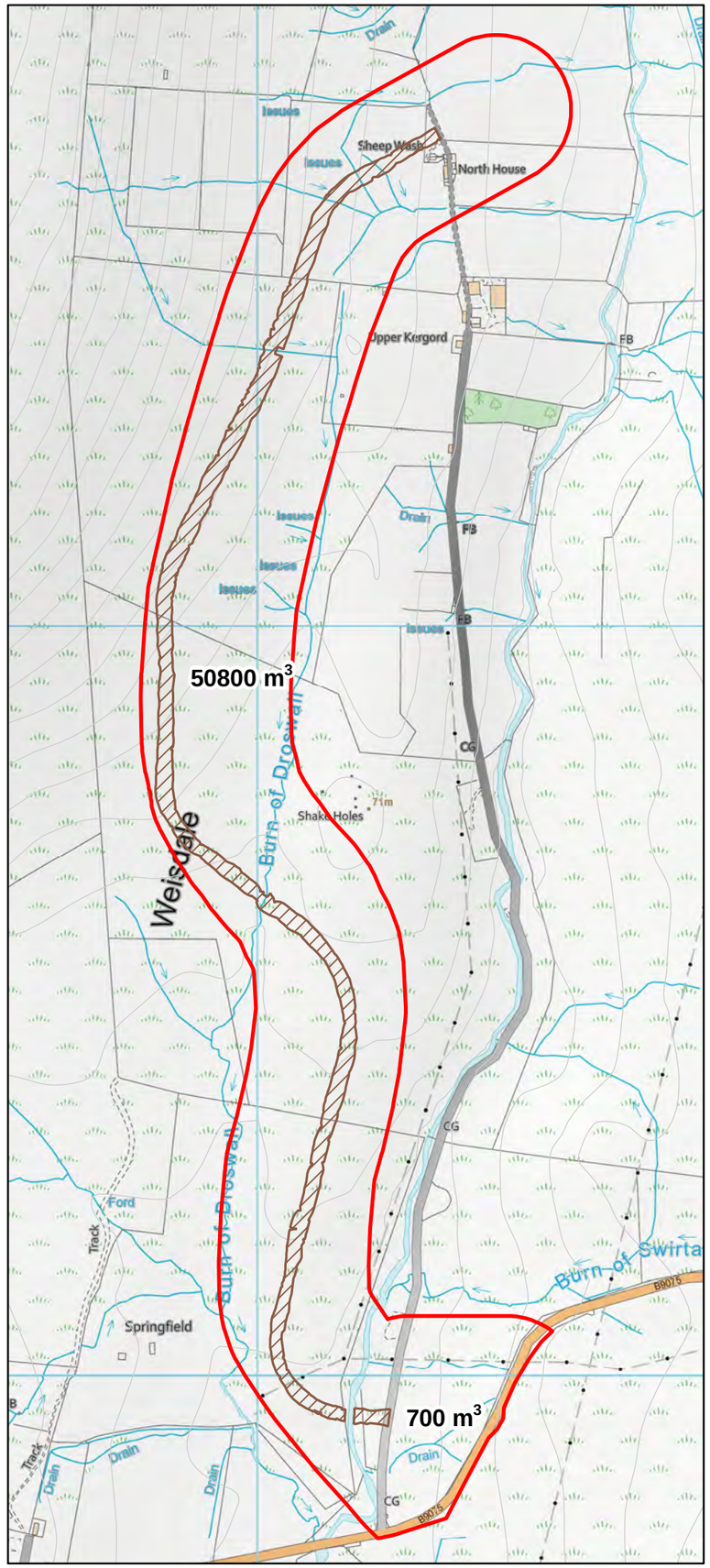


Key

- Kergord Access Track Site Boundary
- Cut Area (Road, Verge & Cut)

Scale 1:7,500 @ A3

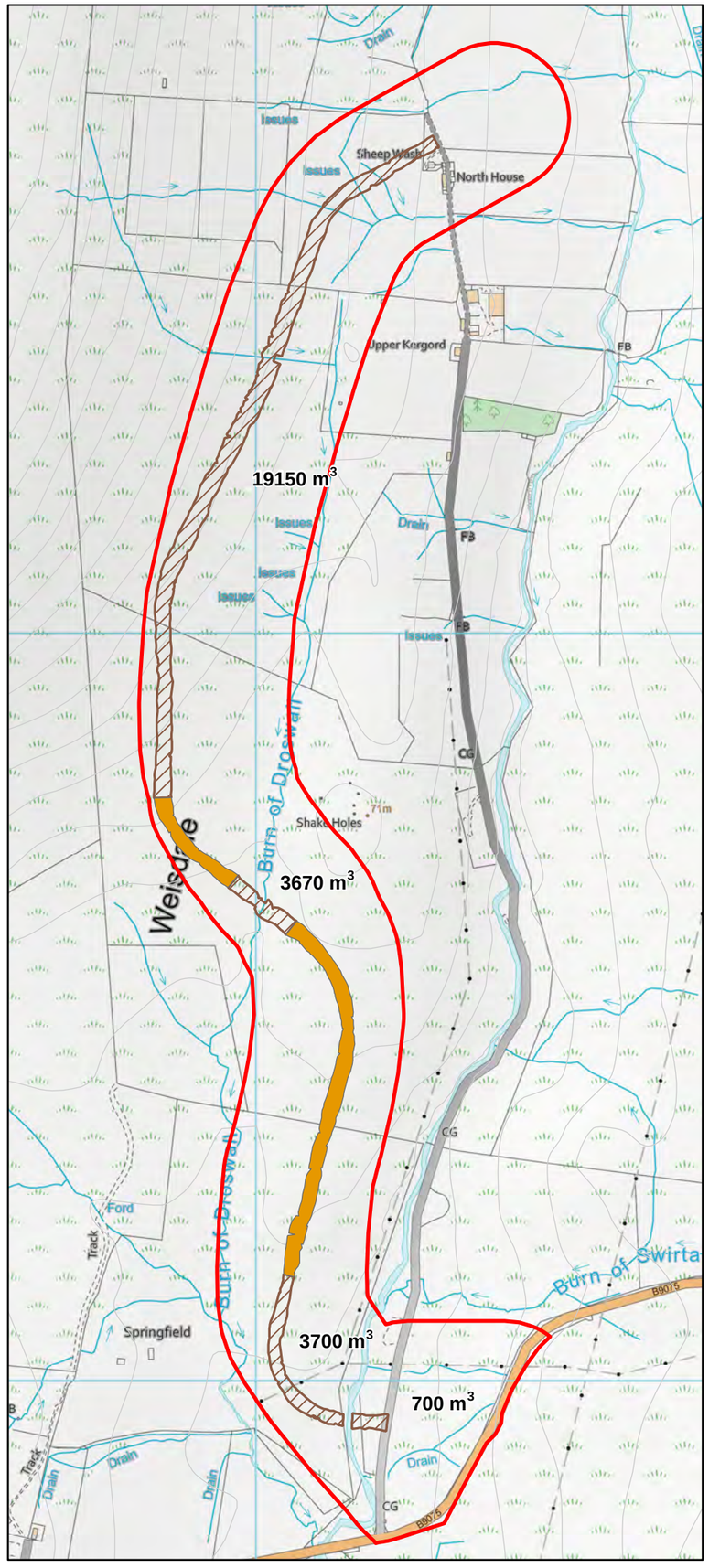
0 0.2 0.4 Km

N

Figure 3

Excavated Peat Volumes

Viking Wind Farm
Kergord Access Track



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SLR

Key

- Kergord Access Track Site Boundary
- Cut Area (Road, Verge & Cut)
- Potential Floated Road

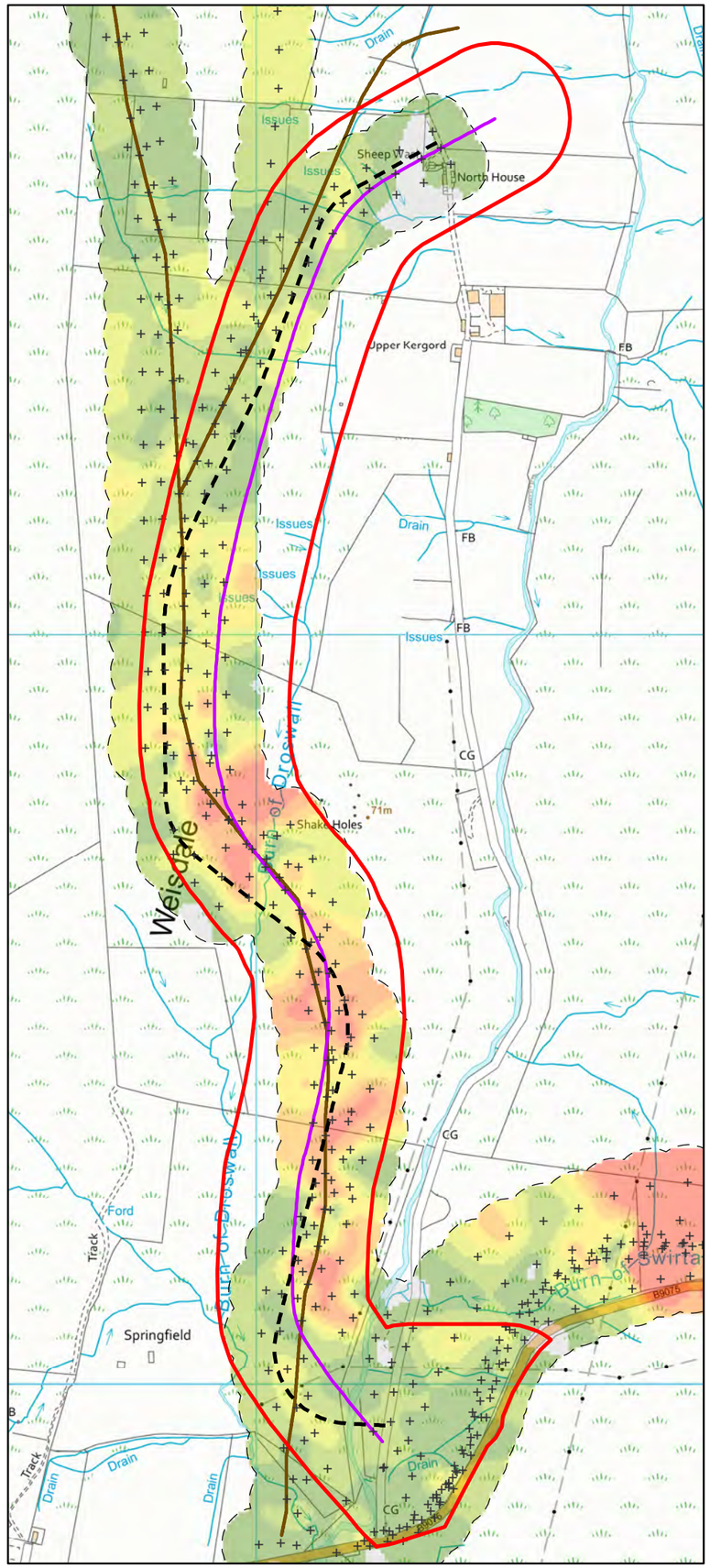
Scale 1:7,500 @ A3

0 0.2 0.4 Km

N

Figure 4
Potential Excavated / Floating Peat Volumes

Viking Wind Farm
Kergord Access Track



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SLR

Key

- Kergord Access Track Site Boundary
- Proposed Upper Kergord Track (planning application submission)
- Proposed Upper Kergord Track (2018 revised / microsited design post planning submission)
- Consented Wind Farm (2010)
- \+ Peat Probe Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

Scale 1:7,500 @ A3

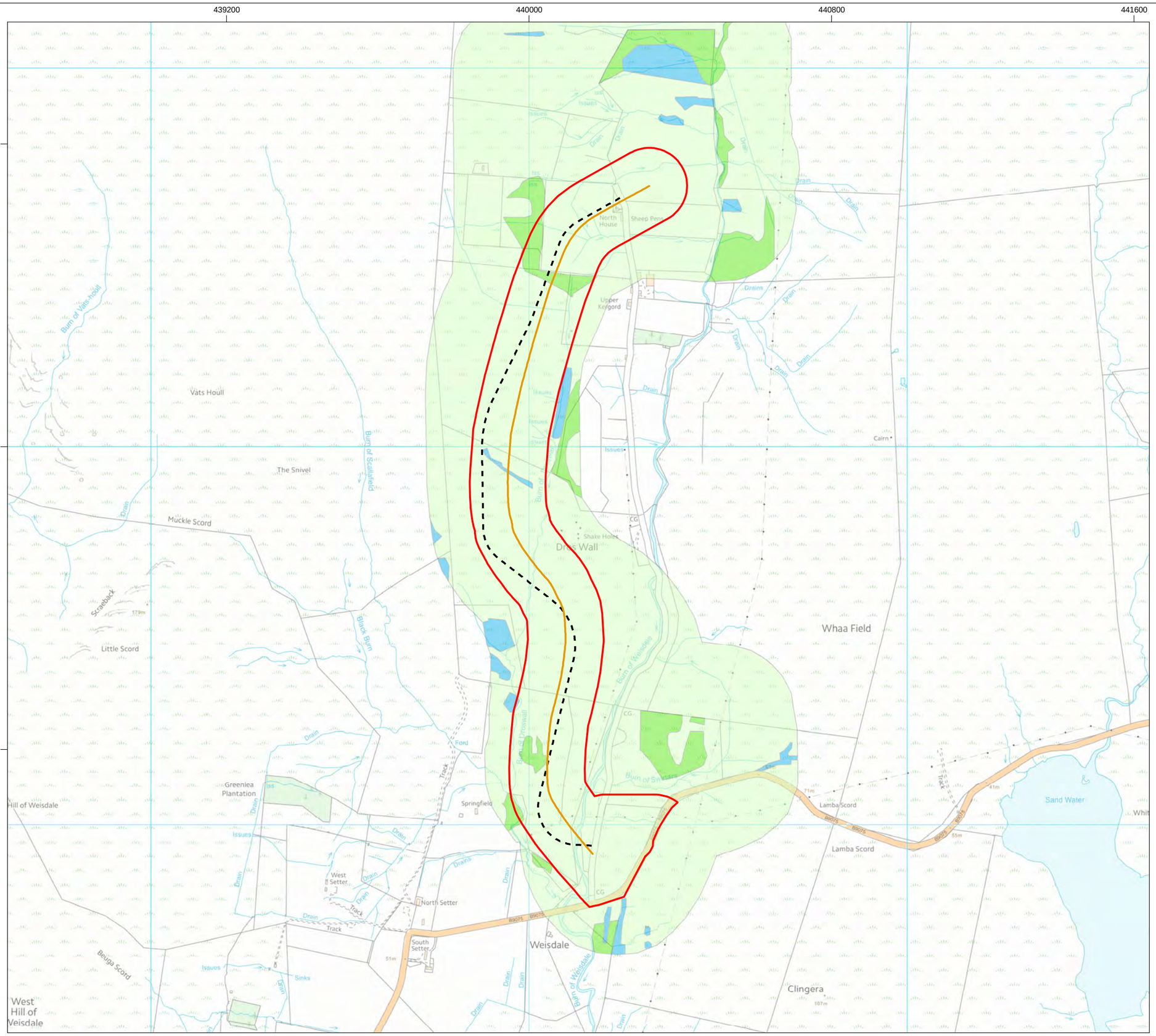
0 0.2 0.4 Km

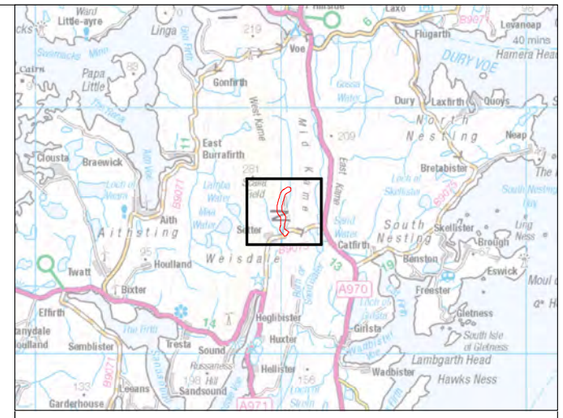
N

Figure 5

Peat Contour Plan

Viking Wind Farm
Kergord Access Track





Legend

- Kergord Site Boundary
- Proposed Upper Kergord Track (2018 revised/microsited design post planning submission)
- Proposed Upper Kergord Track (planning application submission)

Groundwater Dependent Terrestrial Ecosystem (GWDTE)

Potential GWDTE

- Highly Dependent
- Moderately Dependent
- No Dependency

0 150 300 600 m

N

Project Name

VIKING

Drawing Title

KERGORD REFINED ALIGNMENT 2018 GWDTES

Rev	Date	Remarks	Drwn	Chkd
R0	22/11/2018	First issue	TD	JM

Drawing Number

LN0000046-VIK-ENV-SK-0015

Scale	Plot Size	Datum	Projection
1:10,000	A3	OSGB36	BNG

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