

EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme EIA Report

Appendix 12.2: Peat Management Plan

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Technical Appendix 12.2: Peat Management Plan

Earba Pump Storage Scheme

Earba Storage Limited

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Basis of Report

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1.0 Introduction

1.1 General

SLR Consulting Ltd (SLR) was commissioned by Earba Limited (the Applicant) to undertake a Stage 1 Outline Peat Management Plan (PMP) at the proposed Earba Pumped Storage Scheme (hereafter referred to as the “Proposed Development”). The location of the Proposed Development is shown in **Figure 12.1.1** within the site red line boundary (hereafter referred to as “The Site”).

The Proposed Development would be situated within Ardverikie Estate “the Estate” to the south of Loch Laggan approximately mid-way between Newtonmore and Spean Bridge and approximately 13km west of Dalwhinnie in the Scottish Highlands.

The function of the Proposed Development would be to create a large-scale long duration electricity storage scheme with up to 1800MW generation capacity to store and release energy to or from the electricity transmission system, to help balance supply and demand for power at a national scale. The Proposed Development would operate by transferring water between a lower reservoir, Lochan na h-Earba (Loch Earba) and an upper reservoir, Loch a’ Bhealaich Leamhain (Loch Leamhain). The maximum water level of these existing lochs would be raised by constructing dams to increase their natural storage capacity. The reservoirs would be connected by an underground waterway system including up to three headrace tunnels.

Full details Proposed Development are provided in **Chapter 2: The Proposed Development** of the EIA Report.

1.2 Site Description

The Site comprises predominantly wet heath, with some smaller areas of blanket bog, dry heath, mire, woodland and scrub. There is a small area of scheduled ancient woodland along the shore of Loch Earba. The Estate is used for highland sports, outdoor recreation, commercial forestry, hydroelectric generation (there are two existing reservoir storage hydro schemes), holiday accommodation and as a film location.

The Site is within the River Spean catchment upstream of Loch Laggan. Lochan na h-Earba drains to Loch Laggan via the Allt Labhrach and Loch a’ Bhealaich Leamhain via the Allt Loch a’ Bhealaich Leamhain, the Allt Cam and the River Pattack. The catchment is already heavily modified by the operation of the existing Ardverikie and Lochaber Hydro Schemes.

The layout of the Proposed Development is detailed on **Figure 12.2.2**.

1.3 Objectives

The Stage 1 PMP outlines the overall approach of minimising disruption to peatland, and it aims to ensure that all further opportunities to minimise peat disturbance and extraction would be taken during detailed design (Stage 2 PMP) and construction (Stage 3 PMP) of the development.

The PMP provides details on the approximate predicted volumes of peat as defined in 1.4.3 that would be excavated during construction of the permanent infrastructure, the characteristics of the peat that would be excavated, and the principles of how and where this excavated peat would be stored, managed and reused for restoration.

Soils which are temporarily removed and stored within working corridors are not assessed in the PMP as they would be replaced, from where they were removed, on completion of the adjacent permanent construction works. The principles presented in Section 4.0, regarding



the safeguarding of peat, their storage and placement, apply equally to both peat and soils from the working corridors and those removed from the footprint of permanent infrastructure.

The PMP has been developed to demonstrate that peat management and quantification has been afforded significant consideration during the construction phase of the Proposed Development. It aims to propose mitigation measures where technically feasible that would minimise any impacts and includes the areas proposed for re-use in long-term habitat restoration and management plans as outlined below.

The PMP seeks to identify appropriate proposals to re-use the excavated peat that can be accommodated within the Proposed Development and associated **Outline Biodiversity Enhancement and Management Plan (OBEMP)** provided in **Chapter 8, Appendix 8.6 of the EIA**, without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

1.4 Legislation and Guidance

The PMP has been compiled in accordance with the following legislation and best practice guidance:

- National Planning Framework for Scotland 4 (NPF4) (Scottish Government, February 2023);
- SEPA Regulatory Position Statement - Developments on Peat (Scottish Environment Protection Agency, 2010);
- Good Practice during Windfarm Construction, 4th Edition (Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW, 2019);
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, January 2017);
- Floating Roads on Peat - Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with reference to Wind Farm Developments in Scotland (Forestry Commission Scotland & Scottish Natural Heritage, 2010);
- The Waste Management Licensing (Scotland) Regulations 2011; and
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017).

1.4.1 Requirements of National Planning Policy 4

The intent of Policy 5 (Soils) of National Planning Policy 4 (NPF4)¹ is “*to protect carbon rich soils, restore peatlands and minimise the disturbance of soils from development*”.

The Policy states [5(a)] that development proposals should only be supported if they are designed and constructed:

- in accordance with the mitigation hierarchy by first avoiding and then minimising the amount of disturbance to soils on undeveloped land; and

¹ Scottish Government (2023). <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2022/11/national-planning-framework-4-revised-draft/documents/national-planning-framework-4-revised-draft/national-planning-framework-4-revised-draft/govscot%3Adocument/national-planning-framework-4-revised-draft.pdf>



- in a manner that protects soils from damage including from compaction and erosion, and that minimises soils sealing.

Further [5(c)] confirms that development proposals on peatland, carbon rich soils, and priority peatland will only be supported if they are:

- essential infrastructure and there is a specific locational need and no other suitable site;
- the generation of energy from renewable sources that optimises the contribution of the area to greenhouse gas emissions reductions targets;
- small-scale development directly linked to a rural business, farm or croft;
- supporting a fragile community in a rural or island area; or
- restoration of peatland habitats.

And [5(d)] confirms that where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required to identify:

- the baseline depth, habitat condition quality and stability of carbon rich soils;
- the likely effects of the development on peatland, including on soil disturbance; and
- the likely net effects of the development on climate emissions and loss of carbon.

Policy 5 also confirms that the site specific (above) assessment [5(d)] “*should inform careful project design and ensure, in accordance with relevant guidance and the mitigation hierarchy, that adverse impacts are first avoided and then minimised through best practice. A peat management plan will be required to demonstrate that this approach has been followed, alongside other appropriate plans required for restoring and/ or enhancing the site into a functioning peatland system capable of achieving carbon sequestration*”.

This stage 1 PMP considers the protection and safeguarding of peat and seeks to fulfil the requirements of Policy 5(d) with further detail on peatland habitat and peatland restoration provided in **Chapter 8, Appendix 8.6: OBEMP**.

1.4.2 Mitigation Hierarchy

SEPA^{2,3} has published guidance regarding the mitigation hierarchy for developments on peat which is summarised below:

- Prevention – avoiding generating excess peat during construction (e.g., by avoiding peat areas or by using construction methods that do not require excavation such as floating tracks);
- Re-use – use of peat produced on-site in restoration or landscaping, provided that its use is fully justified and suitable;
- Recycling / Recovery / Treatment – modify peat produced on-site for use as fuel, or as a compost / soil conditioner, or dewater peat to improve its mechanical properties in support to re-use; and
- Storage – storage of peat up to a depth of 2 m is not classified as a waste and does not require authorisation from SEPA, however care must be taken to ensure that it does not cause environmental pollution.

² Scottish Environment Protection Agency. 2010. Regulatory Position Statement – Developments on Peat.

³ Scottish Renewables, Scottish Environment Protection Agency. 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste.



The site design has been an iterative process and has evolved following review of peat depth, condition and ecological data. Key elements of the Proposed Development including dams, track, site compounds and borrow pits have been moved and adjusted to avoid impacting areas of peatland where possible. Details of the design iterations to avoid areas of peatland in accordance with the mitigation hierarchy are provided in **Chapter 3: Consideration of Alternatives and Design Evolution** of the EIA report.

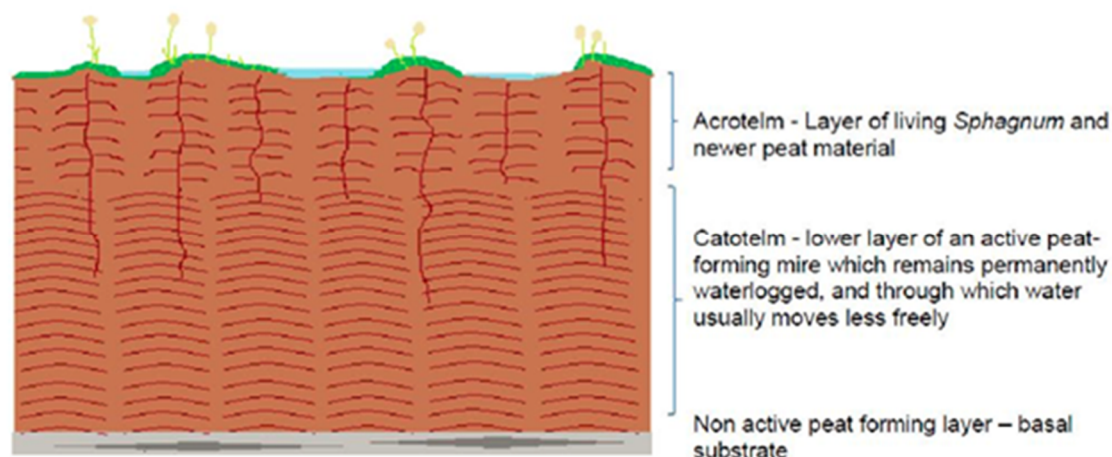
1.4.3 Definition of Peat

Peat is defined as a material consisting of the partially decomposed remains of plant material and organic matter preserved over a period in a waterlogged environment resulting in anaerobic conditions, with a depth > 0.5m. Where the organic material is <0.5m depth then this is not defined as peat. This definition is supported by the following text presented in the following guidance;

- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland Section 3.3 which states that *“Peat soil is an organic soil which contains more than 60 percent of organic matter and exceeds 50cm in thickness.”*
- Scottish Government. Scotland’s Soils. Soil Survey of Scotland *“Peaty soils have an organic layer at the surface which is less than 50 cm thick”*
- The Macaulay Land Use Research Institute define shallow peat as having *“a prescribed depth of organic matter of 50 – 100 cm”*

Peat can be classed as two principal types, the acrotelm layer, and the catotelm layer as shown on **Plate 1-1**.

Plate 1-1: Drawing of two layered Structure of Active Bog Peatlands above Non-Active Peat



The acrotelm layer is found in the upper layer of peat where conditions are relatively dry and comprises living vegetation and partially decomposed plant material which are typically <0.5m in thickness. Hydraulic conductivity in this layer tends to be higher in relation to distance from the water table. The thickness of the acrotelm layer varies depending on topography such as steepness of slope, peat hags, and hummocks. In particular, the acrotelm layer can be affected during periods of drought or as a consequence of drainage. Fibrous in texture, the acrotelm layer has some tensile strength and is generally considered to be stable for storage and re-use.



The catotelm layer is found under the acrotelm layer and comprises decayed plant material and organisms and is denser and with a very low hydraulic conductivity. The catotelm layer sits below the water table resulting in permanent anaerobic conditions. The catotelm layer can be amorphous and may have lower tensile strength making it less suitable for storage and re-use.



2.0 Site Work

2.1 Peat Depth Survey

Peat depth surveys have been undertaken across four of phases by SLR and are detailed within **Technical Appendix 12.1 Peat Landslide Hazard Risk Assessment (PLHRA)**.

The surveys carried out followed best practice guidance for developments on peatland^{4,5}. Phase 1 peat probing resulted in initial low resolution probing on an approximate 100m grid in areas of mapped peatland and potential areas of peatland proposed for development and included accessible areas of inundation. This data allowed initial assessment of the extents of peatland within the main areas of the Site which was used in preliminary site layout designs. Multiple phases of higher density probing saw detailed probing undertaken across the Proposed Development in areas of infrastructure and peat typically >0.5m, focussing on access tracks at 50m intervals and infrastructure typically at a density of 10m x 10m with some extensive infrastructure areas (Dams, Permanent Compounds and Borrow Pits) on 20 x 20m density. Phase 1 probing was typically not undertaken on a 100m grid in areas of exposed bedrock and steep slopes outwith areas of proposed infrastructure. The density of peat probing undertaken is considered appropriate to confirm the extents of peatland within the area of the Proposed Development.

The thickness of the peat was assessed using a graduated peat probe, approximately 6mm diameter and capable of probing depths of up to 10m. This was pushed vertically into the peat to refusal and the depth recorded, together with a unique location number and the co-ordinates from a handheld Global Positioning System instrument (GPS). The accuracy of the GPS was quoted as $\pm 2\text{m}$, which was considered sufficiently accurate for this survey. All data was uploaded into a GIS database for incorporation into various drawings and analysis assessments.

Where the peat probing met refusal on a hard substrate, the 'feel' of the refusal can provide an insight into the nature of the substrate. The following criteria were used to assess material:

- Solid and abrupt refusal – rock;
- Solid but less abrupt refusal with grinding or crunching sound – sand or gravel or weathered rock;
- Rapid and firm refusal – clay; or
- Gradual refusal – dense peat or soft clay.

SLR made an assessment of the substrate and recorded this at each probe hole.

The relative stiffness of the peat was also assessed from the resistance to penetration of the probe and to the effort required to extract the probes (retrieval of the probe was often impossible for one person). In all instances, refusal was met on obstructions allowing identification of subsurface geology.

⁴ Scottish Renewables & SEPA (2012) 'Developments on Peatland Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste'.

⁵ Scottish Natural Heritage (SNH), SEPA, Scottish Government & James Hutton Institute. (2014) 'Peat Survey Guidance; Developments on Peatland: Site Surveys'.



2.2 Peat Depth Results

The results from all probing exercises listed above in Section 2.1 are detailed in the following sections and the peat depths identified on-site are shown in **Figure 12.2.3** and **Figure 12.2.4** for peat >0.5m.

The peat was found to vary across the Proposed Development in terms of thickness and coverage. It is evident from review of the relevant figures and data that the peat is generally limited to flatter lying topographic areas. There were localised areas of peatland (Blanket Bog), defined by topography and undulating bedrock. The extensive areas of blanket bog and deeper peat was generally encountered in flatter, lower gradient areas of the Proposed Development.

A total of 6,431 peat probes were undertaken across all survey phases, with the results summarised in Table A below.

Table A: Peat Probing Results

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat)	229	3.6
0.01 – 0.49 (peaty soil/ soft mineral soils)	4,065	63.2
0.50 – 0.99	1,218	18.9
1.00 – 1.49	606	9.4
1.50 – 1.99	225	3.5
2.00 – 2.49	59	0.9
2.50 – 2.99	12	0.2
3.00 – 3.49	11	0.2
3.50 – 3.99	1	0.0
> 4.0	5	0.1

2.3 Peat Condition

Peat core locations were selected to specifically target areas where peat depths had previously been recorded that exceeded 1m, close to the final design evolution. Peat samples were collected by SLR in June and August 2023, using a peat auger and used to inform interpretations of the peat condition and underlying substrate. Peat is described using BS5930⁶ and the von Post classification⁷.

Based on interpretations from probing and peat core samples, the peat within the Proposed Development is predominantly fibrous and pseudo-fibrous, with H values of H3-H4 in the acrotelm and values of H3-H7 in the underlying catotelm. No amorphous layers were encountered during the peat coring. Peat Core logs and photographs are presented within Annex B.

The Peat Condition plan is provided in **Chapter 8, Appendix 8.6: OBEMP**.

⁶ BS 5930:2015+A1:2020, Code of practice for ground investigations

⁷ Von Post, L. and Grunland, E., (1926), 'Sodra Sveriges torvillganger 1' Sverges Geol. Unders. Avh., C335, 1-127.



Table B below provides details of infrastructure and confirms if this infrastructure location is located on areas of peat. The definition of peat is detailed in Section 1.4.3 as defined by a recorded thickness of >0.5m, review of the peat core samples and supported by a review of NVC mapping and site observations during the peat probing and ecological survey works. Infrastructure not located on peat are recorded to be underlain by organic or soft mineral soils <0.5m.



Table B: Infrastructure Located on Peat (>0.5m)

Infrastructure	Peat Depths Recorded >0.5m within infrastructure footprint	Average Peat/Soil Depth (m) within infrastructure footprint	Ecological indicators within infrastructure footprint	Located on Areas of Peat
Dam D1 – Shuas	Yes	0.69	Blanket Bog	Yes
Dam D2 – Leamhain	Yes	0.61	Blanket Bog	Yes
Dam D3 – Shios	Yes	0.34	Blanket Bog	Yes
Borrow Pit BP1 (Located within Site Compound 01)	Yes	0.33	Blanket Bog adjacent	Yes
Borrow Pit BP3 - Inundation Area	No	0.16	-	No
Borrow Pit BP4 - Inundation Area	No	0.15	-	No
Borrow Pit BP5A - Inundation Area	Yes	0.59	Blanket Bog	Yes
Borrow Pit BP5B - Inundation Area	Yes	0.20	Blanket Bog adjacent	No
Aqueducts - Construction Width: 15m	Yes	0.49	Blanket Bog	Yes
Footpath - Construction Width: 1m – (Floated on peatland)	Yes - limited extents.	0.35	Blanket Bog	Yes
Adit	No	0.28	-	No
Intake – Upper Control Works	Yes	0.07	Blanket Bog	Yes
Intake Earthworks	Yes	0.29	Blanket Bog	Yes
Intake Structure	Yes - limited extents.	0.10	Blanket Bog	Yes
Promontories	Yes - limited extents likely lacustrine soft soils.	0.27	-	No
Powerhouse	Yes - limited extents likely lacustrine soft soils.	0.25	-	No
Powerhouse Earthworks	Yes - limited extents likely lacustrine soft soils.	0.24	-	No
Shios Valve House and Fish Pool	No	0.00	-	No
Surge Shaft	No	0.10	-	No
Leamhain Upper Gate House	No	0.01	-	No
Leamhain Lower Valve House	Yes	0.63	Blanket Bog	Yes
SC1	Yes - limited extents.	0.16	-	Yes
SC2A	No	0.24	Blanket Bog adjacent	No
SC2B	Yes - limited extents.	0.32	Blanket Bog adjacent	Yes
SC3	Yes - limited extents likely lacustrine soft soils.	0.22	-	No
SC5	No	0.16	-	No



Infrastructure	Peat Depths Recorded >0.5m within infrastructure footprint	Average Peat/Soil Depth (m) within infrastructure footprint	Ecological indicators within infrastructure footprint	Located on Areas of Peat
SC6A	No	0.25	-	No
SC6B - Inundation Area	No	0.17	-	No
SC7	No	0	-	No
SC8 - Inundation Area	No	0	-	No
Access Tracks	Yes - Within sections of the track.	0.38	Blanket Bog	Yes

The infrastructure in Table B which has confirmed to be located on areas of peat will include excavation of peat and the peat generated from these excavations will be required to be managed and appropriately mitigated during the construction phase.

The following Sections of the report provide details on the potential impacts to peat during construction and provide details of mitigation, management and re-use of excavated peat.



3.0 Potential Impacts on Peat During Construction

The initial construction phase will include soil and peat stripping and excavation activities associated with constructing the foundations for infrastructure such as dams, powerhouse building platform, access tracks, permanent compounds, temporary construction compounds and borrow pits.

There are four main types of impact on peat which can occur during construction. These are:

- Loss of structural integrity and peat strength, due to stripping off or damaging the surface vegetation turf, excavation, handling and transporting peat (particularly wet, subsurface peat);
- Erosion and gulying, caused by exposure and desiccation of bare peat surfaces primarily caused by water erosion, due to surface runoff after rainfall;
- Contamination, caused by leaks, spillages or inappropriate laydown of materials; and
- Peat slide, caused by laying wet peat on top of wet peat, laying other heavy materials (including excavated mineral soil or other construction materials) on top of wet peat or by inappropriate stockpiling, such as attempting to create stockpiles of peat that are too high, without bunding, engineering or geotechnical support.

A range of methods and control measures are described below which are designed to prevent these impacts from occurring.



4.0 Peat Management

The Proposed Development design required to take account of a number of environmental and technical constraints. The design sought to avoid areas of known or potential deep peat where possible, taking into account other environmental and technical factors such as ecology, ornithology, archaeology, hydrology, topography and existing infrastructure.

The Proposed Development has largely avoided areas where peat is >1m and efforts have been made through the iterative design process to minimise the footprint of site infrastructure requiring excavation on peat >0.5m as far as practicable as detailed within **Chapter 3: Consideration of Alternatives and Design Evolution.**

Where peat >0.5m is present in areas of infrastructure is to be excavated, re-used, reinstated for landscaping and for peatland restoration with the intention that its supported habitat continues to be viable where possible, the following good practice outlined in the sections below applies. It is proposed that these principals will be developed further as part of a Stage 2 PMP assessment in agreement with SEPA following detailed site design.

Excavated peat from permanent infrastructure within the inundation area would be re-used where possible outwith the inundation area.

Excavated peat from temporary infrastructure, working corridors and earthworks areas would be temporarily stored and then reinstated. This applies to locations both within and outwith the inundation area.

4.1 Excavation

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, though the practicalities of handling should be considered;
- contamination of excavated peat with substrate materials to be avoided at all times; and
- consider timing of excavation activities to avoid very wet weather and avoid multiple handling to minimise the likelihood of excavated peat losing structural integrity.

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

4.2 Storage

The following good practice applies to the storage of peat:

- stripped materials should be carefully separated to keep peat and other soils apart;
- to minimise handling and haulage distances, excavated material should be stored local to the site of excavation or end point of restoration;
- peat turves should be stored in wet conditions or irrigated in order to prevent desiccation (once dried, peat would not rewet);
- stockpiling of peat should be in large volumes to minimise exposure to wind and sun (and desiccation), but with due consideration for slope stability, but should not exceed 1 m in height to maintain stability of stockpile;



- stockpiles should be isolated from watercourses or drains with appropriate bunding to minimise pollution risks;
- excavated peat and topsoil stored separately, should be stored to a maximum of 1 m thickness;
- stores of non-turf (catotelm) peat should be bladed off to reduce the surface area and desiccation of the stored peat; and
- peat storage areas should be monitoring during periods of very wet weather, or during snowmelt, to identify early signs of peat instability.

4.3 Temporary Storage

Any peat to be removed during construction would require a temporary storage area near to the construction works/area of re-use. Where peat cannot be transferred immediately to an appropriate restoration area, short-term storage would be required. In this case, the following good practice applies:

- peat should be stored around the infrastructure perimeter 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; and
- drying of stored peat should be avoided by irrigation or by seeding (although this is unlikely to be significant for peat materials stored less than 2 months).

For longer term storage requirements (e.g. at dams, borrow pits and compounds), the following good practice applies:

- where practicable, peat generated from excavations should be transported directly to its allocated restoration location, to minimise the volume being stockpiled with the possibility of drying out;
- stores of catotelmic peat should be bladed off to reduce their surface area and minimise desiccation;
- where transport cannot be undertaken immediately, stored peat should be irrigated to limit drying and stored on a geotextile mat to promote stability; and
- monitoring of large areas of peat storage during wet weather or snowmelt should be undertaken to identify any early signs of peat instability.

4.4 Transport

The following good practice applies to transport:

- 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; and
- if Heavy Goods Vehicles (HGVs)/dump trucks 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 with other materials.



4.5 Handling

Following refinement of the excavated peat model, a detailed storage and handling plan should be prepared as a detailed PMP forming part of the detailed Construction and Environmental Management Plan (CEMP), including:

- best estimate excavation volume at each infrastructure location (including peat volumes split into area/volume of 'acrotelm' or 'turf', and volume of catotelm);
- volume to be stored locally and volume to be transferred directly on excavation to restoration areas elsewhere (e.g. disused quarries, borrow pits or peatland habitat restoration areas) in order to minimise handling;
- location and size of storage area relative to infrastructure foundations/areas and natural peat morphology / drainage features; and
- irrigation requirements and methods to minimise desiccation of excavated peat during short term storage.

These parameters are best determined post-consent in light of detailed ground investigation with the final design areas for each element of infrastructure.

4.6 Restoration

During restoration, the following best practice should be followed:

- carefully evaluate potential restoration sites, such as borrow pits for their suitability, and agree that these sites are appropriate with the Environmental Clerk of Works (ECoW), landowners and relevant consultees;
- undertake restoration and revegetation or reseeding work as soon as possible;
- where required, consider exclusion of livestock from areas of the Proposed Development undergoing restoration, to minimise impacts on revegetation; and
- as far as reasonably practicable, restoration should be carried out concurrently with construction rather than at its conclusion.

4.7 Monitoring and Inspection

There would be frequent, routine and regular inspections of peat in all stockpiles and temporary storage areas as part of the PMP audit process. Inspections would assess in situ peat physical conditions, integrity of containment and temporary drainage conditions, and they would seek to confirm that stockpile design and management was adequate to prevent erosion and peat slide. These inspections would take place weekly during stockpile creation and storage.

Should any problems be observed during regular visual inspections of peat stockpiles, this would invoke implementation of an appropriate corrective action which would be recorded and monitored for effectiveness. Types of corrective actions would include, but would not necessarily be limited to; modification of temporary drainage, additional or modified bunding, incorporating of sediment fencing if required, light re-grading to correct any areas of surface erosion, etc.

Regular, frequent inspections of peat conditions during construction and restoration phases of work would be carried out by the Geotechnical Engineer and ECoW as follows:

- peat surface, peat profile and peat consistency conditions would be carried out as part of ground investigations prior to the start of construction. This information would



provide detailed information on the baseline conditions for each part of the infrastructure footprint;

- restored peat conditions would be inspected immediately after restoration to ensure that the methods detailed in the PMP had been correctly implemented and to inform any corrective actions should they be required; and
- the physical condition of peats would be retained as carefully as possible both at the peat storage and the peat restoration stages. This is particularly important for vegetation establishment.

4.8 Specific Mitigation

There are a number of ways in which detailed design and construction activities can be specified to minimise impacts on peatlands. The following section outlines briefly the likely mitigation required to minimise impact, based on the re-use of peat specific to key elements of the Proposed Development.

4.8.1 Access Tracks

There is much guidance^{8,9} available to support access track design in upland areas including peatlands. Guidance is generally focused on floating tracks and excavated tracks and is summarised below.

Based on the avoidance of significant areas of deep peat during design iterations the access tracks are typically present on more localised areas of peat <1.0m. Based on the site gradients it is anticipated that all tracks would be excavated tracks which would require verge re-instatement and landscaping. The on-site footpaths would be floated in areas of peat.

Excavated tracks require complete excavation of any peat (where present) to a competent substrate. Excavated tracks would generally be undertaken where peat depths are less than 1m. The excavated peat would require storage ahead of re-use elsewhere within the Proposed Development. 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 prevent erosion to the peat and wash out that could occur; 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 would be incorporated into all constructed drainage as per the requirements of the CEMP.

⁸ Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland, AEECoW (2019)., Good Practice During Wind Farm Construction. 4th Edition.

⁹ Scottish Natural Heritage, Forestry Commission (August 2010)., Floating Roads on Peat



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
- 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.

Regular routine monitoring should be scheduled post-construction to ensure that hydrological pathways and track integrity have been suitably maintained.

4.8.2 Compound Areas

All compounds are considered temporary and peat would be used for restoration following completion of the construction phase.

In relation to compound areas, these would be used for storage and maintenance activities associated with the construction phase of the Proposed Development. Therefore, the following good practice guidance applies to restoration of compound areas outwith the inundation areas:

- peat stripped from compound areas would not be stored higher than 1 m and could require to be seeded in the short term to prevent drying out, if stored for long residence times;
- stripped turves are used for final restoration, however where turves are insufficient or vegetation regeneration requires reseeded, temporary fencing may be considered around compound areas undergoing restoration in order to prevent grazing; and
- the choice of seed mix for reseeded should be appropriate to the ecological and hydrological conditions of the restored compound location and surrounding habitats and should be advised by the ECoW.

4.8.3 Permanent Structures

Structures which require permanent excavations prior to construction include; the 3No. dams, powerhouse areas and upper and lower control works with a number of smaller items of ancillary infrastructure. The primary mitigation measure for all permanent structures has been to locate the relevant infrastructure to avoid the areas of deepest peat, thereby reducing excavated volumes of peat. All permanent excavations should follow the procedures detailed in Sections 4.1 to 4.7.

All Dams are located in close proximity to areas of peatland and localised re-use of acrotelmic peat is proposed on the downstream faces, the following good practice guidance applies to re-use of peat for restoration of these areas:

- stripped turves are used for final restoration, however where turves are insufficient or vegetation regeneration requires reseeded, temporary fencing may be considered around areas undergoing restoration in order to prevent grazing; and
- the choice of seed mix for reseeded should be appropriate to the ecological and hydrological conditions of the restored compound location and surrounding habitats and should be advised by the ECoW.



4.8.4 Borrow Pits

Peat is proposed for re-use within BP1 (at site compound SC01) outwith the inundation area for the purpose of restoration provided the method of re-use is consistent with the environmental reinstatement objectives of the Proposed Development and presents no residual risks from pollution of the environment or harm to human health. Key issues for borrow pit restoration are:

- prevention of desiccation and carbon losses from peat used in the restoration;
- development of complete vegetation cover through emplacement of peat turves or seeding with an appropriate species; and
- fencing where required, to exclude grazing stock and to encourage vegetation establishment.

4.8.5 Peatland Restoration Areas

Peatland restoration areas have been proposed within **Chapter 8, Appendix 8.6: OBEMP** to within the Proposed Development area. These locations are provided within the plan within Appendix C and have been selected in consultation with NatureScot. The following good practice applies in relation to the use of excavated peat in peatland areas:

- All works to be undertaken in accordance with current best practice on Peatland Restoration¹⁰;
- Disturbance to natural drainage systems / flow paths may increase potential for peat instability. Therefore, the restoration works should be undertaken to ensure no adverse loading is placed on areas of marginal peat stability with the restoration works ensuring that the natural topographic gradients and flows are re-instated to mitigate against potential increases in pore water pressure and increase in loadings;
- If any areas of peat instability are identified during the restoration works or monitoring phase then re-assessment of the area and proposed restoration works should be undertaken under the direction of an environmental advisor and geotechnical engineer (as necessary);
- Raise Health and Safety awareness of the peat environment at the proposed restoration areas by incorporating in the site induction. Include peat slide risk assessment information (e.g., peat instability indicators, best practice and emergency procedures) in toolbox talks with relevant operatives e.g., plant drivers; and
- Monitor areas of placed peat on regular basis to identify early any change in conditions.

¹⁰ <https://www.nature.scot/doc/peatland-action-technical-compendium>



5.0 Peat Balance Assessment

The excavated materials data from Annex A indicates that the areas of infrastructure within the Proposed Development have avoided areas of deeper peat where possible through design. The main site compounds SC1 and SC2 have been moved to avoid areas of peatland and Dam 1 at Shuas has been moved northeast to avoid a localised area of peat. However, due to the large extents of the remaining dams and their location main infrastructure determined by topography (Dams 2 and 3) and hydrology, it is not possible to avoid all areas of peat.

5.1 Excavated Volumes

Peat excavation volumes associated with the construction of the Proposed Development have been calculated using the results from the peat depth surveys and interpolation using the GIS package ArcGIS. Peat excavation volumes are detailed in Table C and Annex A and based on the following assumptions:

- Interpolation of peat depth was undertaken using the Inverse Distance Weighting (IDW) interpolation method.
- The excavated volumes do not include organo-mineral soils <0.5m and these will be included in the materials management plan for the development.
- An estimated acrotelm depth of 0.3m across all infrastructure where peat (>0.5m) is present based on peat depth survey results.
- An estimated catotelm thickness of the average depth of peat minus the acrotelm (0.3m) across all infrastructure where peat (>0.5m) is present based on peat depth survey results.
- An assumption that the peat probe depths are representative of the actual depth of peat (validated by the peat coring).

5.2 Reuse Volumes

The volume of peat to be reused around the Proposed Development is detailed in Table C and Annex A and based on the following assumptions:

- In appropriate locations around the infrastructure perimeter such as track verges, the edges of permanent structures a 2m wide strip either side of the track at a thickness of about 0.5m where the infrastructure is located outwith the inundation area.
- At each of the three dams, 300mm of peat to be placed on the downstream face with an additional 20m strip placed on the downward stream toe.
- Reinstatement of temporary compound areas (SC1, SC2A, SC2B and SC6B) with an average peat depth of 1m to ensure integration with the adjacent habitat areas where possible which comprise blanket bog.
- Peatland restoration areas.

5.3 Net Peat Balance

Table C provides an estimate of peat volumes to be excavated and reused during the construction of the infrastructure identified in Table B as being located within an area of peat >0.5m.



Table C: Peat Balance Assessment

Infrastructure	Volume of Acrotelm Excavated (m ³)	Volume of Catotelm Excavated (m ³)	Volume of Peat Excavated (m ³)	Volume of Acrotelm Reused (m ³)	Volume of Catotelm Reused (m ³)	Volume of Peat Reused (m ³)
Temporary Access Track	951	2294	3245	690	1609	2299
Upgraded Access Track	944	1889	2833	708	1652	2361
Permanent Access Track	12817	21303	34120	23441	54969	78137
Dams 1-3	45988	95786	141774	72590	0	72590
Borrow Pits – BP1 and BP5A	18140	27014	45154	7785	18165	25950
Intake Earthworks	7149	0	7149	-	-	0
Proposed Leamhain Lower Valve House	72	80	152	15	35	50
Work Areas – SC1, SC2A, SC2B, SC6A & SC6B	22021	799	22820	28971	67600	96571
Aqueduct	2700	1710	4410	720	1680	2400
Peatland Restoration Areas	-	-	0	10635	24815	35450
Total	110782	150875	261657	145555	170253	315808

The total volume of peat predicted to be excavated of 261,657 m³, does not exceed the intended total peat reuse volume of 315,808 m³, therefore no excess peat is required to be disposed off-site for the Proposed Development.



6.0 Waste Classification

This section of the Stage 1 PMP includes the method for dealing with peat which could potentially be classified as waste (only if the above volumes estimate significant quantities of catotelmic peat, which cannot be re-used).

Table D outlines where those materials that are likely to be generated on-site, fall within the Waste Management Licensing (Scotland) Regulations 2011.

Based on the results presented in Table D, it has been concluded that all of the materials to be excavated on-site would fall within the non-waste classification as the peat would be re-used on-site. Based on a detailed probing exercise and visual inspection of the peat, it is predominantly found to be fibrous and fairly dry within the top metre before becoming slightly more pseudo-fibrous with depth.

The majority of the excavated peat is therefore entirely re-useable as it is predominantly fibrous and easily re-used on-site. Areas of extensive deep peat have been avoided by design, where possible.



Table D: Excavated Materials – Assessment of Suitability

Excavated Material	Indicative Volume on Site by % of total excavated soils	Is there a suitable use for material	Is the Material required for use on Site	Material Classified as Waste	Re-use Potential	Re-use on Site
Turf (Surface layer of vegetation and fibrous matt) and Acrotelmic Peat	40	Yes	Yes	Not classified as waste	Yes	Outwith the inundation area only. Would be re-used in reinstatement of access track verges, cut and fill verges, road verges, side slopes and check drains. Peripheral embankments of infrastructure and restoration of borrow pit and temporary compounds. Peatland Restoration.
Catotelmic peat	55	Yes	Yes	Not classified as waste	Yes	Outwith the inundation area only. Would be re-used in reinstatement of access track verges, cut and fill verges, road verges, side slopes and check drains. Peripheral embankments of infrastructure and restoration of borrow pits and temporary compounds. Peatland Restoration.
Amorphous Catotelmic Peat (amorphous material unable to stand unsupported when stockpiled >1m)	<5 Very limited as it has been avoided by design.	Potentially	Potentially *	Potentially if not required as justifiable restoration of peatland habitat management works	Limited	If peat does not require treatment prior to re-use it can be used on-site providing adequate justification and method statements are provided and approved by SEPA. If it is unsuitable for use without treatment then it may be regarded as a waste. However every attempt to avoid this type of peat has been incorporated into the design.

*Such uses for this type of material are limited, however there may be justification for use in the base of borrow pits to maintain waterlogged conditions and prevent desiccation of restored area and in some habitat management works such as gully or ditch blocking where saturated peat is required to mimic mire type habitats and encourage establishment of sphagnum.



7.0 Conclusion

This Stage 1 PMP presents a pre-construction assessment of the estimated peat excavation and reuse volumes associated with the works phase of the construction of the Proposed Development. The PMP also provides the guiding principles which would be applied during the construction of the Proposed Development.

Through a process of continued design refinement (focused on minimising peat excavation volumes) and adoption of best practice working methods, the development is expected to achieve an overall peat balance. Thus, all excavated material would be required for reuse as part of the works and no surplus peat is anticipated.

The figures detailed within this report are to be considered indicative, at this stage. The total peat volumes are based on a series of assumptions for the layout of the Proposed Development and the results of multiple phases of peat probing. Such parameters can still vary over small scale areas and therefore topographic changes in the bedrock profile could impact the total accuracy of the volume calculations.

The various calculations presented here would be updated and expanded upon as part of detailed design works, taking account of pre-construction site investigations and micro-siting, to confirm actual quantities of arising peat. The Applicant would achieve an actual balance between arising peat and reinstatement by prioritising the areas for reinstatement, following advice from the project ECoW and Geotechnical Engineer. It is anticipated that a detailed, construction phase PMP would be developed, which would be maintained and updated in conjunction with a Geotechnical Risk Register. The implementation of the detailed PMP would ensure a robust commitment to excavating, storing and reinstating peat in a manner that follows best practice and ensures the protection of peat throughout the construction and post-construction phases.





Figures

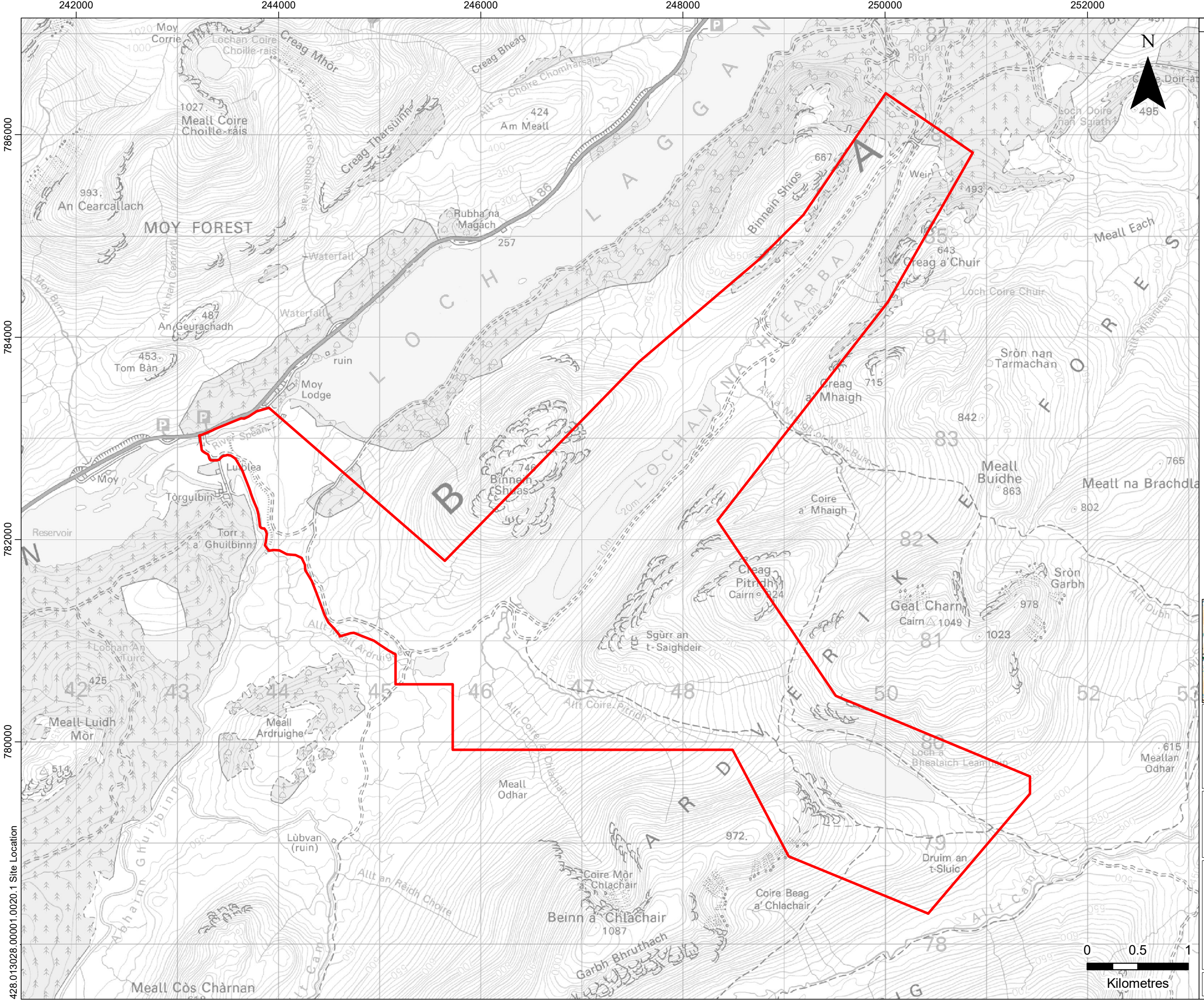
Technical Appendix 12.2: Peat Management Plan

Earba Pump Storage Scheme

Earba Storage Limited

SLR Project No.: 428.013028.00001

21 February 2024



LEGEND

Site Boundary

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EARBA

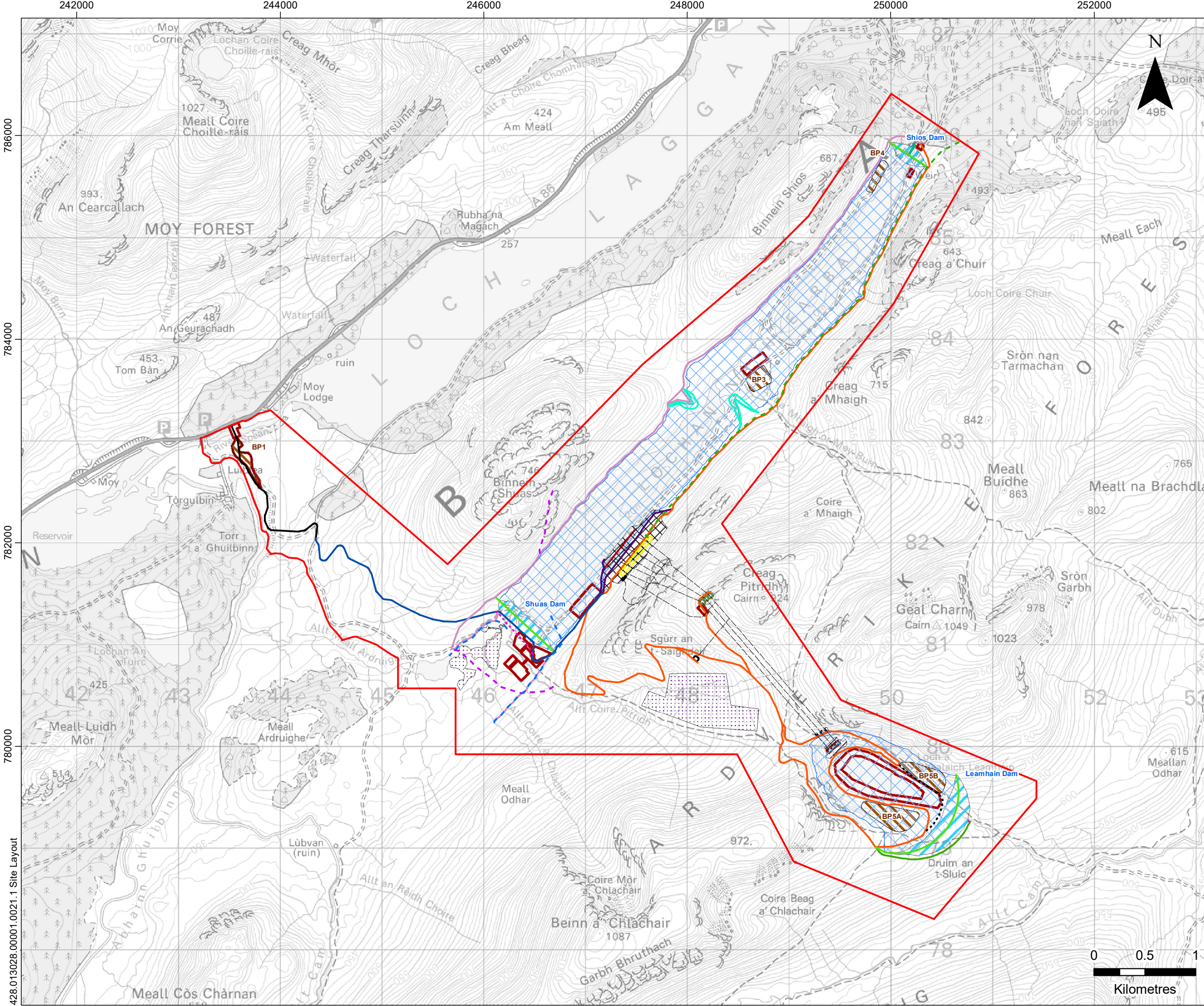
PEAT MANAGEMENT PLAN (PMP)

SITE LOCATION

FIGURE 12.2.1

Scale 1:35,000 @ A3

Date FEBRUARY 2024



LEGEND

Site Boudary

Tunnel

Aqueduct

Grid Connection

Proposed Footpath - 1m Width

Temporary Track - Construction Width: 6 m / Operational Width: 4 m

Temporary Track - Construction Width: 8 m / Operational Width: 6 m

Proposed Track - Construction Width: 3 m / Operational Width: 3 m

Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m

Proposed Track - Construction Width: 5 m / Operational Width: 4 m

Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m

Proposed Track - Construction Width: 6 m / Operational Width: 4 m

Proposed Track - Construction Width: 8 m / Operational Width: 6 m

Proposed Track - Construction Width: 10 m / Operational Width: 4 m

Existing Track - Upgraded to 8m Construction Width / 6m Operational Width

Powerhouse

Peninsula

Inundation Area

Adit

Surge

Intake

Intake Structure

Borrow Pit

Proposed Shias Valve House and Fish Pool

Proposed Leamhain Upper Gate House

Proposed Leamhain Lower Valve House

Site Compounds

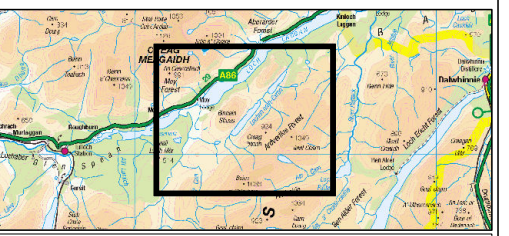
Dam

Valve House Earthworks

Intake Earthworks

Powerhouse Earthworks

Peat Restoration Area



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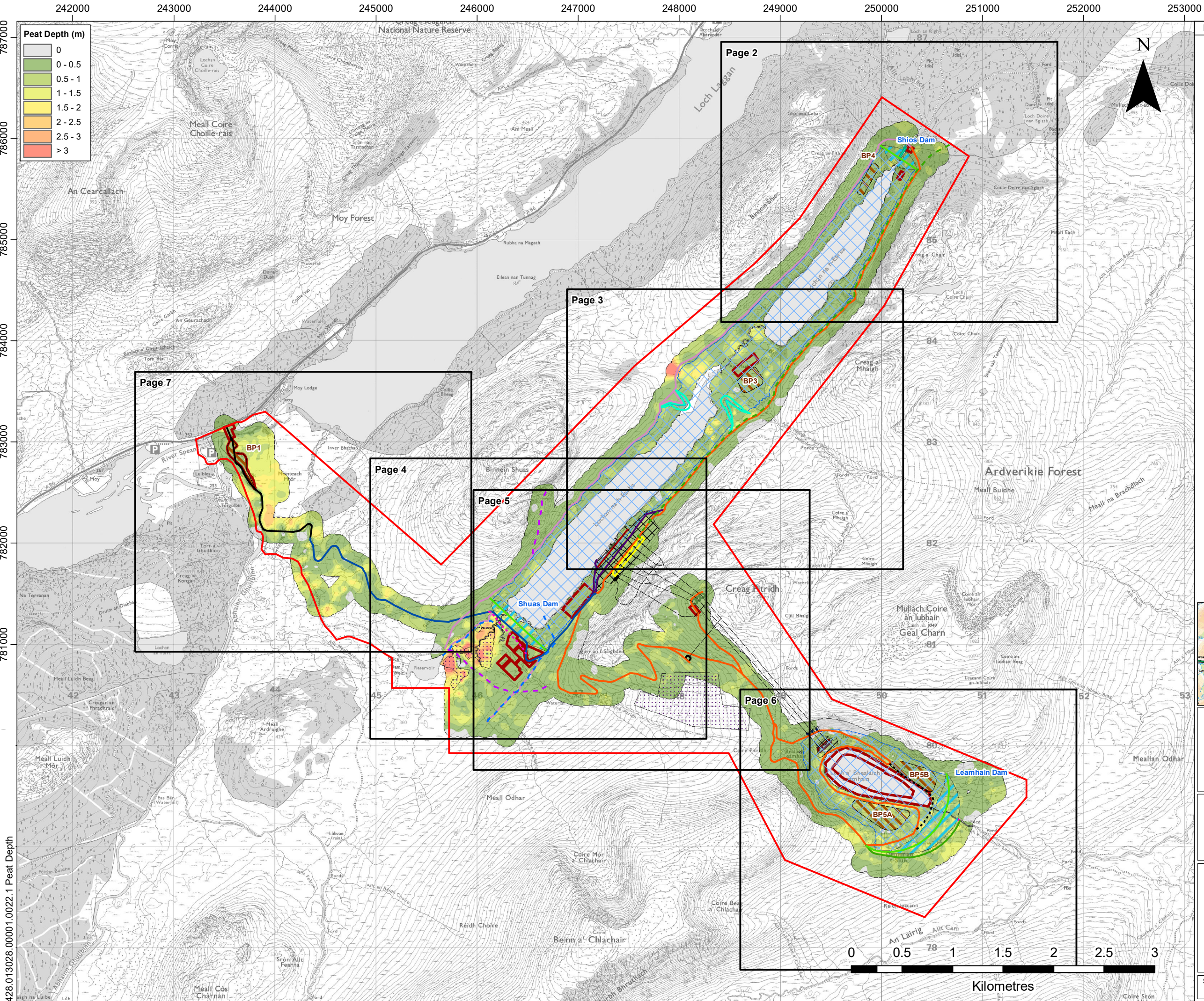
PEAT MANAGEMENT PLAN (PMP)

SITE LAYOUT

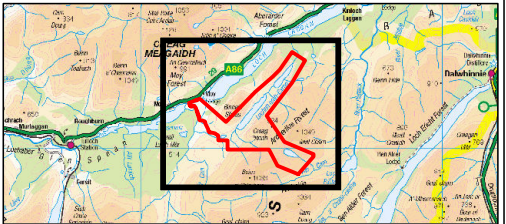
FIGURE 12.2.2

Scale1:35,000 @ A3

DateFEBRUARY 2024



- LEGEND**
- Site Boundary
 - Tunnel
 - Aqueduct
 - Grid Connection
 - Proposed Footpath - 1m Width
 - Temporary Track - Construction Width: 6 m / Operational Width: 4 m
 - Temporary Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 3 m / Operational Width: 3 m
 - Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 5 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 10 m / Operational Width: 4 m
 - Existing Track - Upgraded to 8m Construction Width / 6m Operational Width
 - Powerhouse
 - Peninsula
 - Inundation Area
 - Adit
 - Surge
 - Intake
 - Intake Structure
 - Borrow Pit
 - Proposed Shias Valve House and Fish Pool
 - Proposed Leamhain Upper Gate House
 - Proposed Leamhain Lower Valve House
 - Site Compounds
 - Dam
 - Valve House Earthworks
 - Intake Earthworks
 - Powerhouse Earthworks
 - Peat Restoration Area



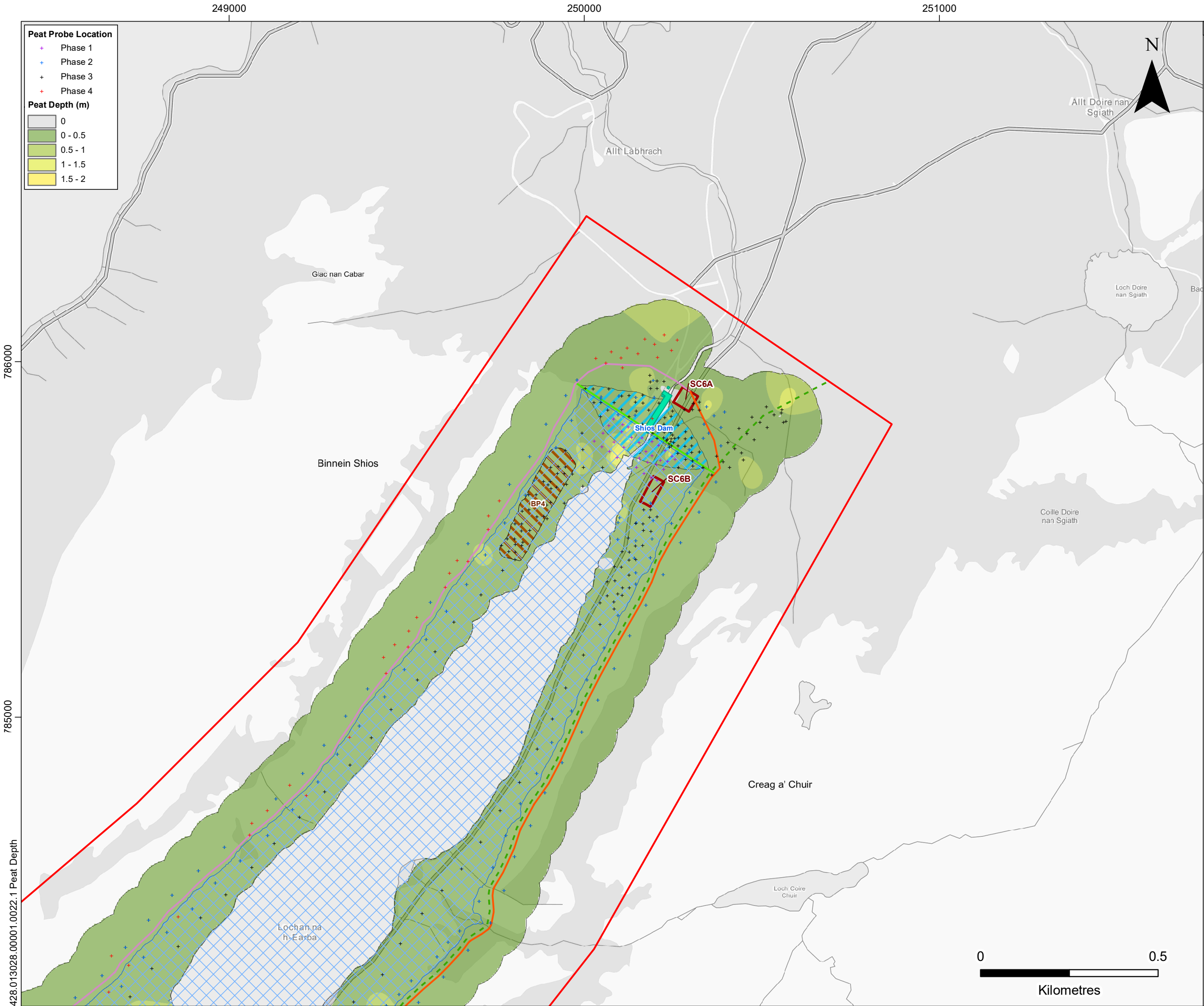
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PEAT MANAGEMENT PLAN
(PMP)
PEAT DEPTH

FIGURE 12.2.3 - OVERVIEW

Scale 1:35,000 @ A3 Date FEBRUARY 2024



Peat Probe Location

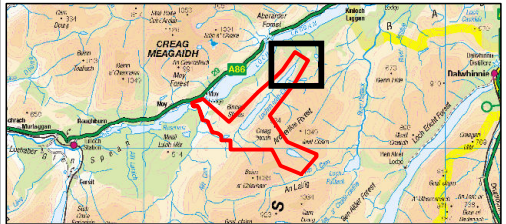
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2

LEGEND

- Site Boundary
- Grid Connection
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Inundation Area
- Borrow Pit
- Proposed Shias Valve House and Fish Pool
- Site Compounds
- Dam



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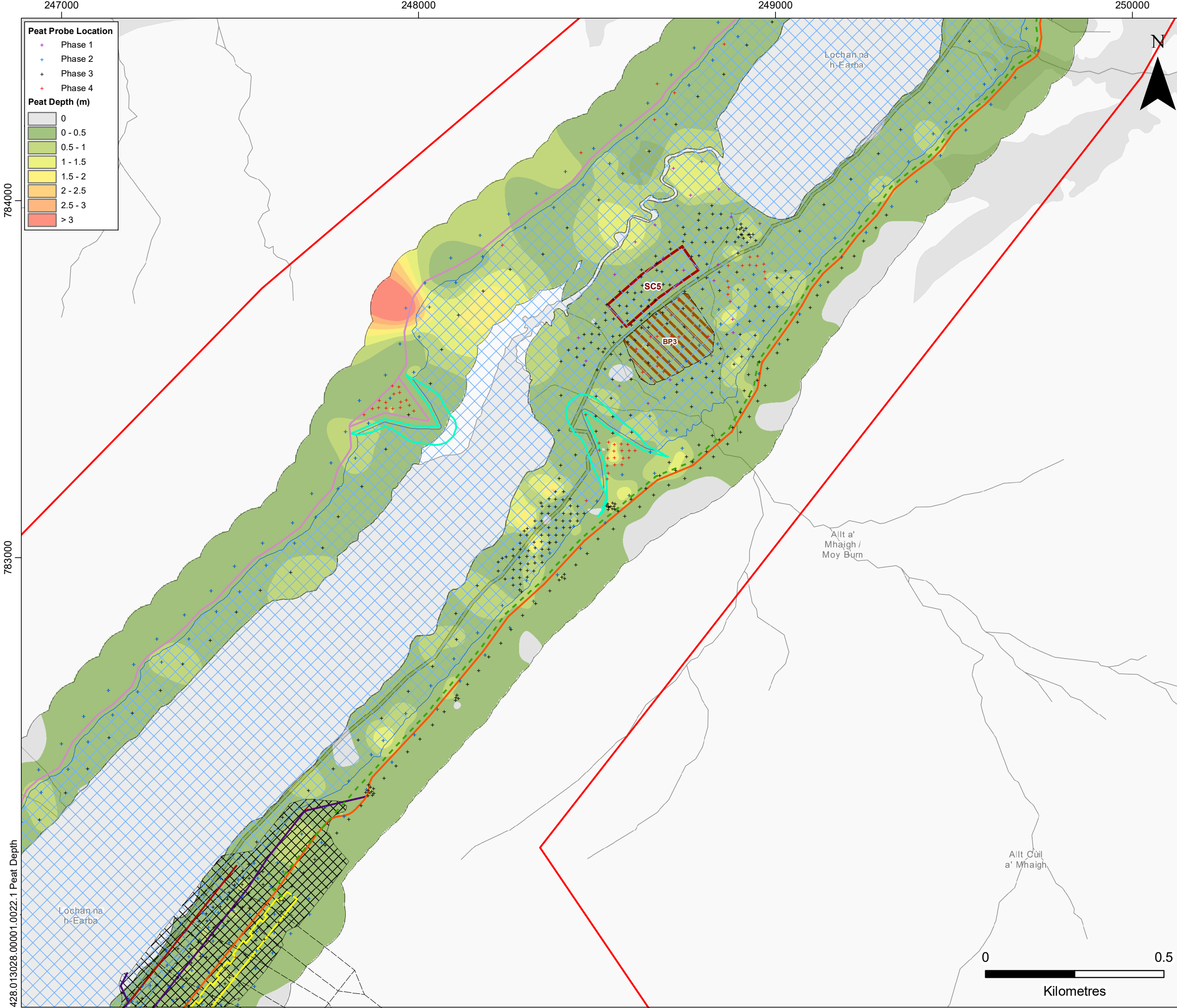
PEAT MANAGEMENT PLAN (PMP)

PEAT DEPTH

FIGURE 12.2.3 - PAGE 2

Scale 1:10,000 @ A3

Date FEBRUARY 2024



Peat Probe Location

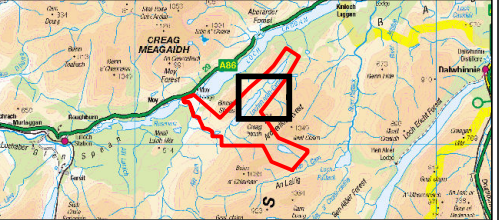
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boudary
- Tunnel
- Grid Connection
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 10 m / Operational Width: 4 m
- Powerhouse
- Peninsula
- Inundation Area
- Borrow Pit
- Site Compounds
- Powerhouse Earthworks



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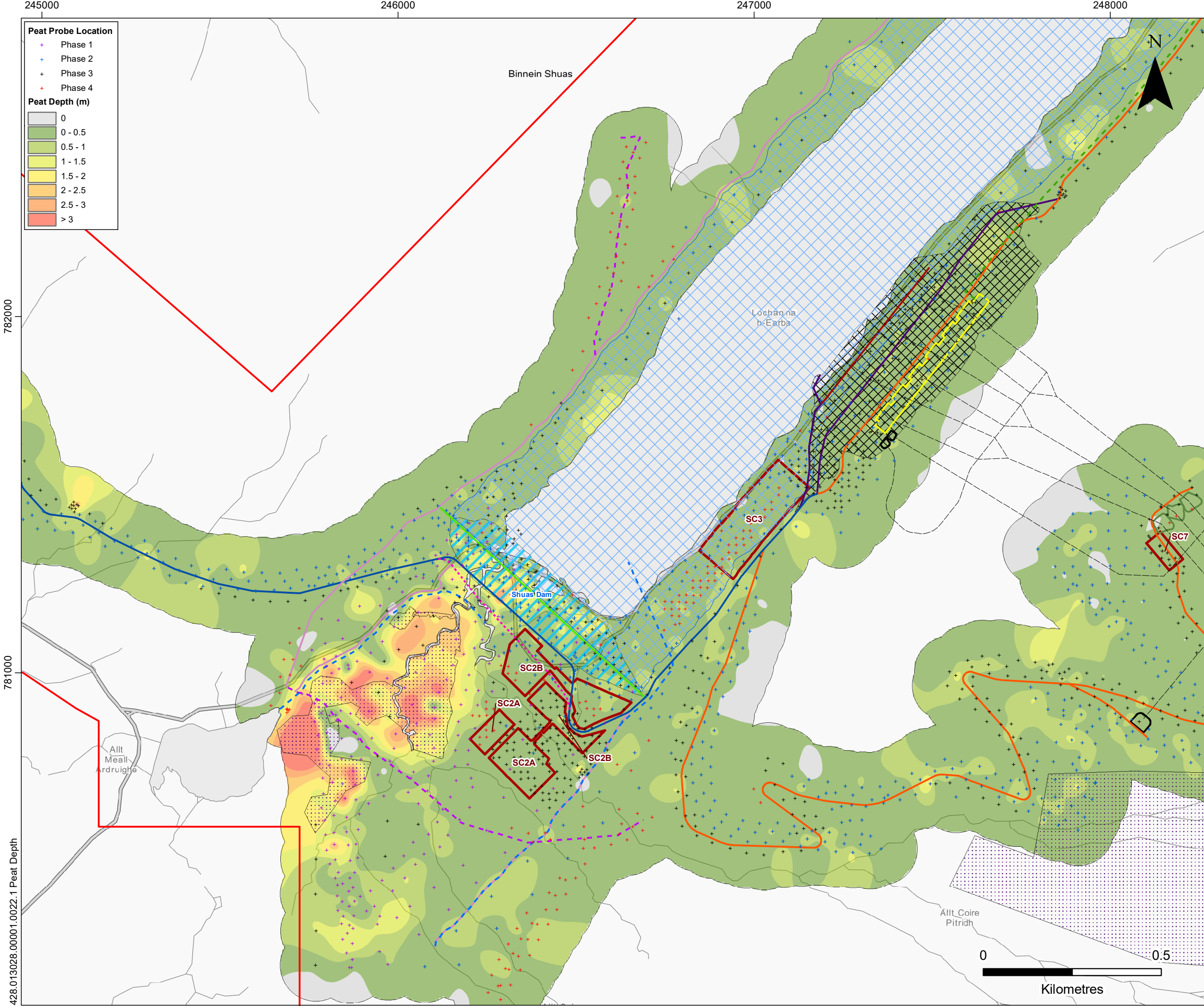
PEAT MANAGEMENT PLAN (PMP)

PEAT DEPTH

FIGURE 12.2.3 - PAGE 3

Scale 1:10,000 @ A3

Date FEBRUARY 2024



Peat Probe Location

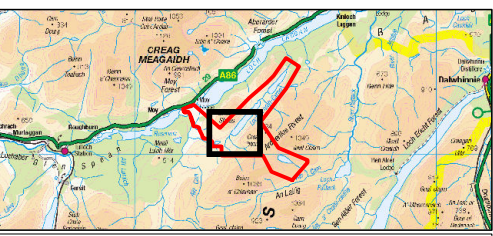
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 10 m / Operational Width: 4 m
- Powerhouse
- Inundation Area
- Adit
- Surge
- Site Compounds
- Dam
- Powerhouse Earthworks
- Peat Restoration Area





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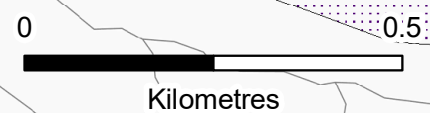
PEAT MANAGEMENT PLAN (PMP)

PEAT DEPTH

FIGURE 12.2.3 - PAGE 4

Scale1:10,000 @ A3

DateFEBRUARY 2024





Peat Probe Location

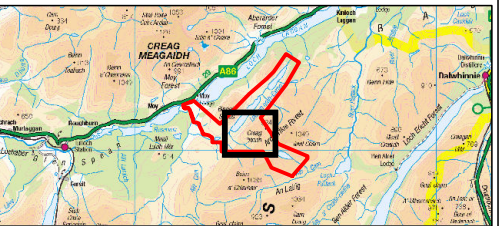
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 10 m / Operational Width: 4 m
- Powerhouse
- Inundation Area
- Adit
- Surge
- Proposed Leamhain Upper Gate House
- Site Compounds
- Dam
- Valve House Earthworks
- Powerhouse Earthworks
- Peat Restoration Area



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PEAT MANAGEMENT PLAN (PMP)

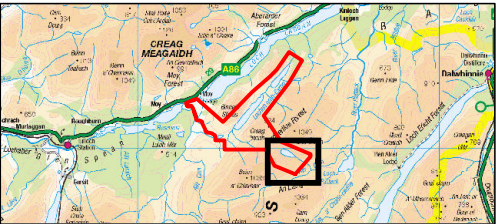
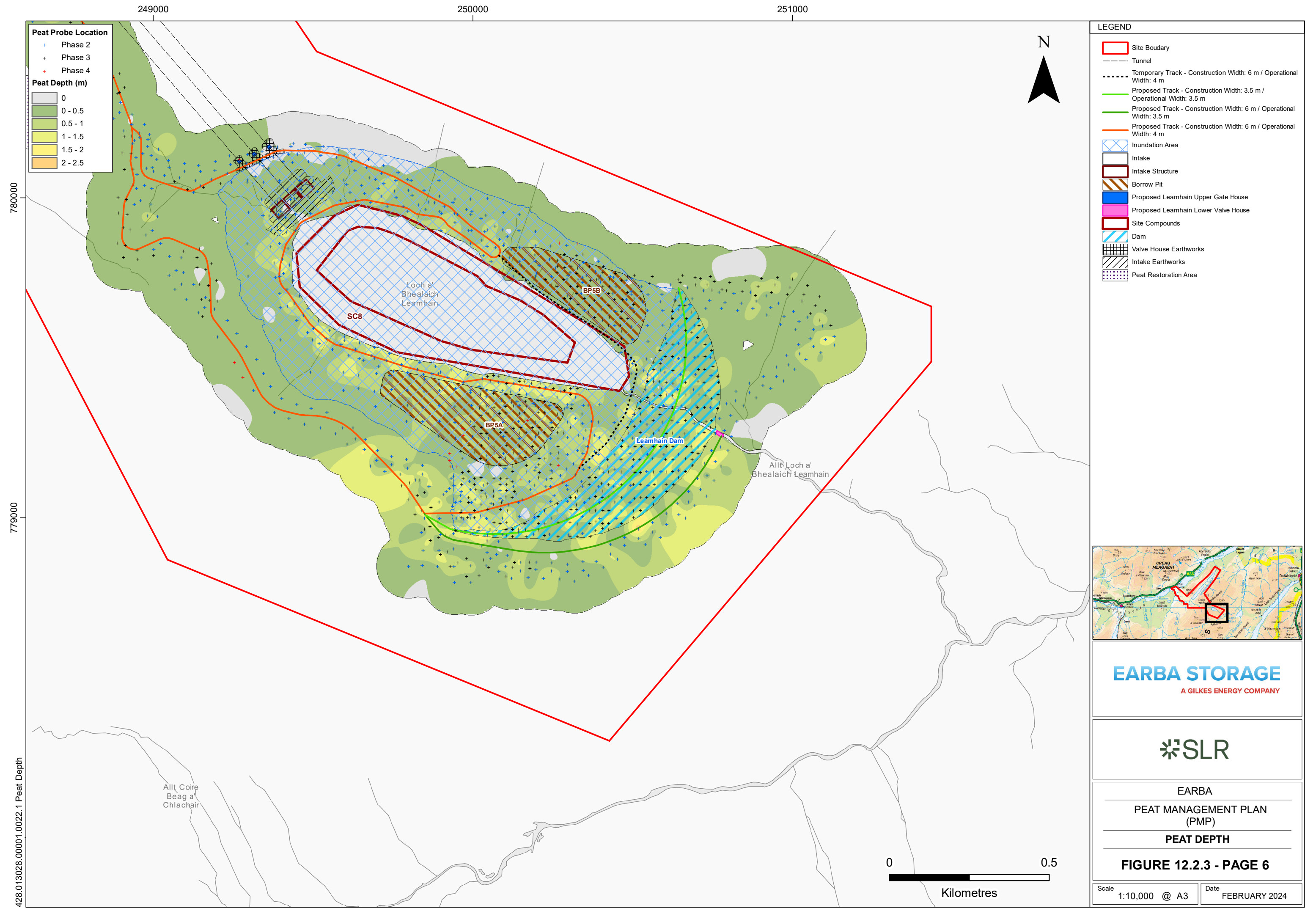
PEAT DEPTH

FIGURE 12.2.3 - PAGE 5

Scale 1:10,000 @ A3

Date FEBRUARY 2024





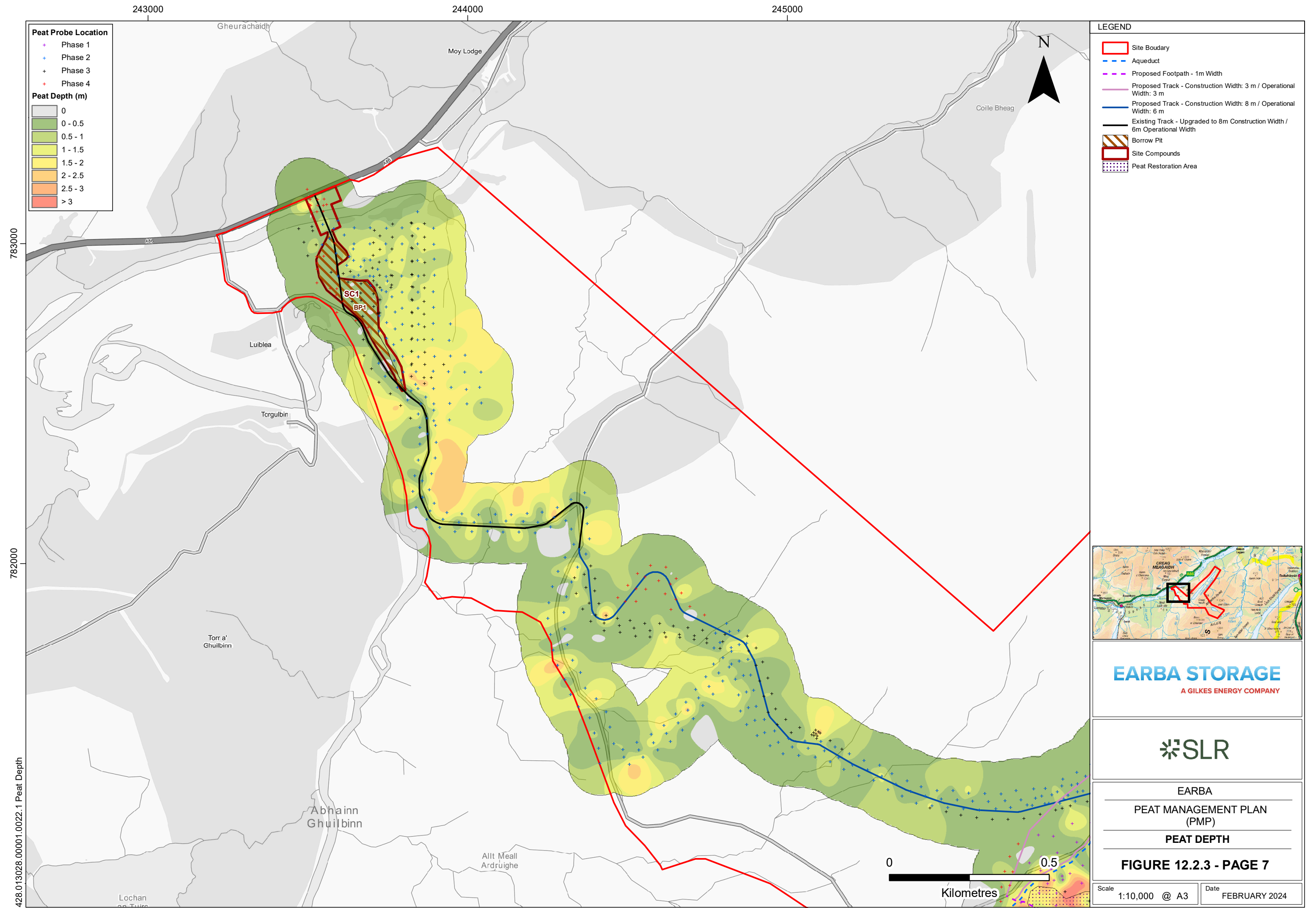
EARBA STORAGE
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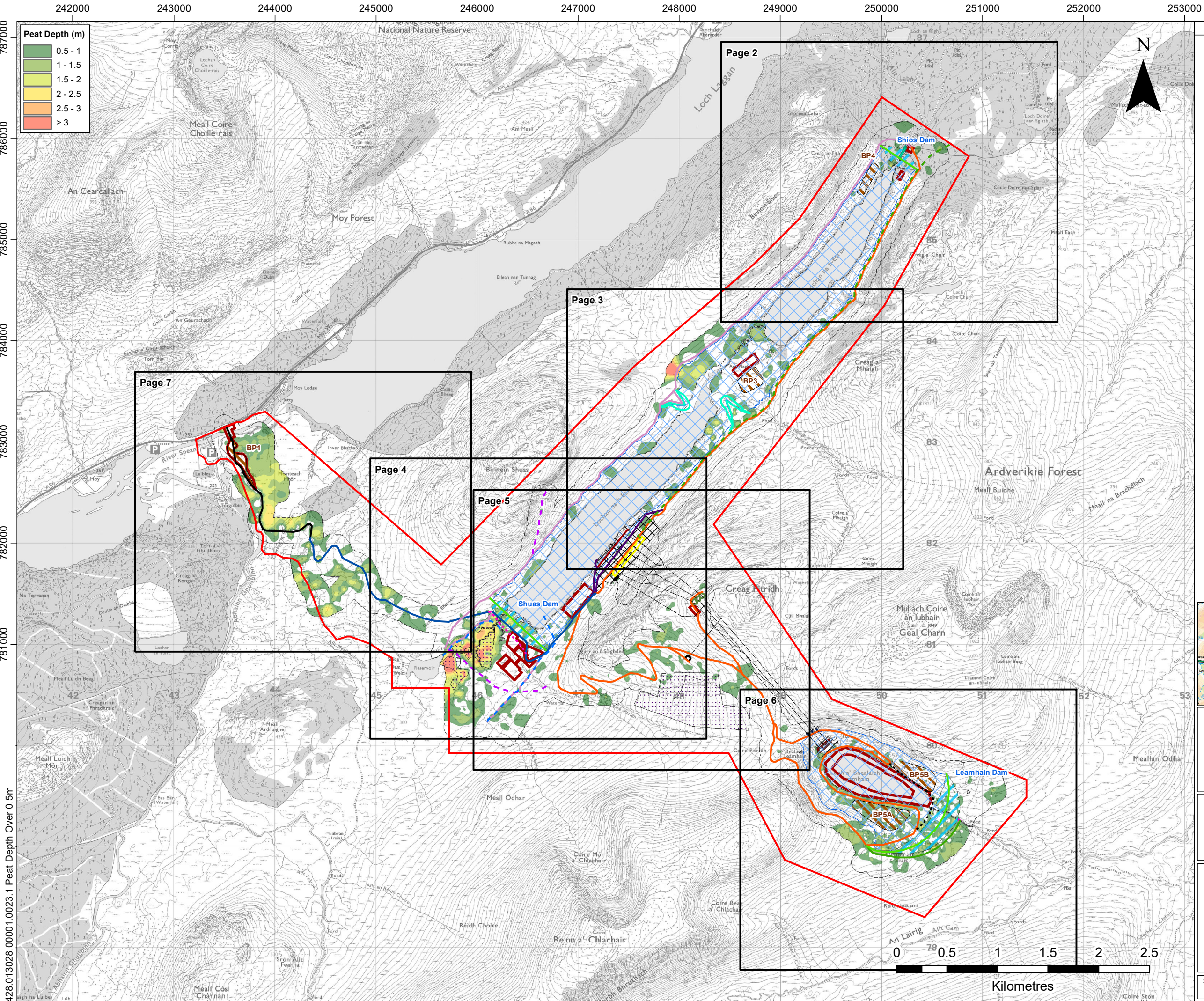


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PEAT MANAGEMENT PLAN
(PMP)
PEAT DEPTH

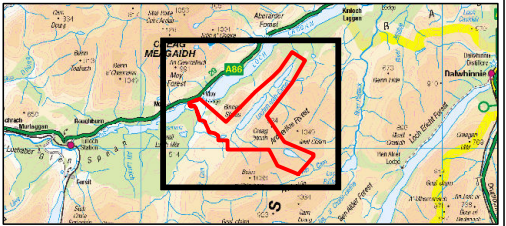
FIGURE 12.2.3 - PAGE 6

Scale 1:10,000 @ A3 Date FEBRUARY 2024





- LEGEND**
- Site Boundary
 - Tunnel
 - Aqueduct
 - Grid Connection
 - Proposed Footpath - 1m Width
 - Temporary Track - Construction Width: 6 m / Operational Width: 4 m
 - Temporary Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 3 m / Operational Width: 3 m
 - Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 5 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 10 m / Operational Width: 4 m
 - Existing Track - Upgraded to 8m Construction Width / 6m Operational Width
 - Powerhouse
 - Peninsula
 - Inundation Area
 - Adit
 - Surge
 - Intake
 - Intake Structure
 - Borrow Pit
 - Proposed Shias Valve House and Fish Pool
 - Proposed Leamhain Upper Gate House
 - Proposed Leamhain Lower Valve House
 - Site Compounds
 - Dam
 - Valve House Earthworks
 - Intake Earthworks
 - Powerhouse Earthworks
 - Peat Restoration Area



EARBA STORAGE
A GILKES ENERGY COMPANY

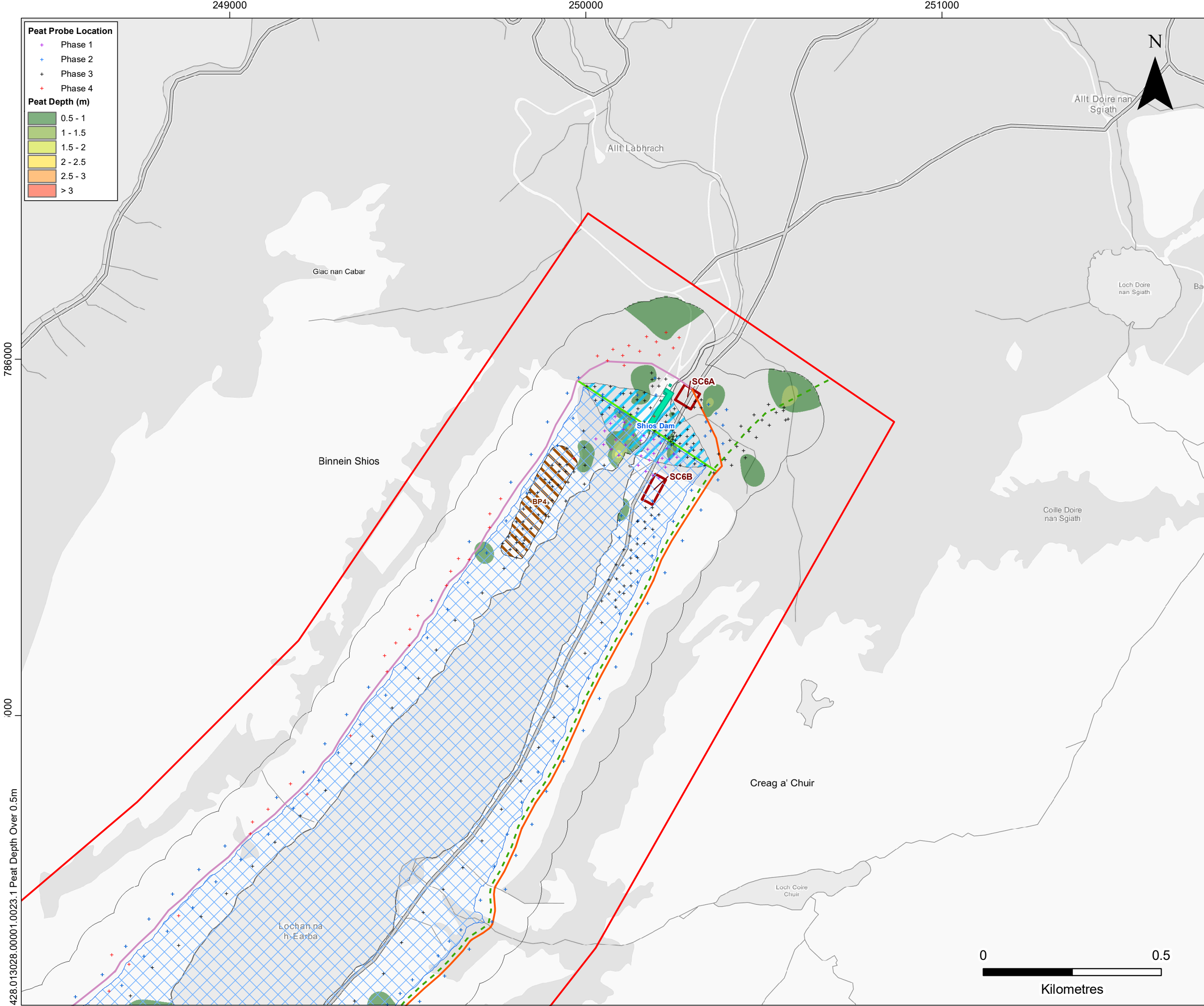


EARBA
PEAT MANAGEMENT PLAN
(PMP)

PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - OVERVIEW

Scale 1:35,000 @ A3 Date FEBRUARY 2024



786000

.000

428.013028.00001.0023.1 Peat Depth Over 0.5m

Peat Probe Location

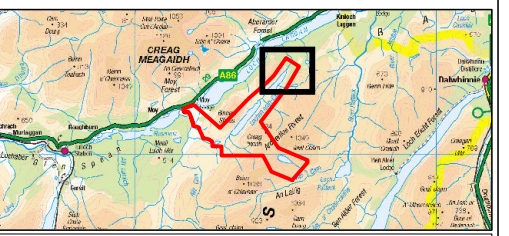
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 6 m / Operational Width: 4 m
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 4 m
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PEAT MANAGEMENT PLAN (PMP)

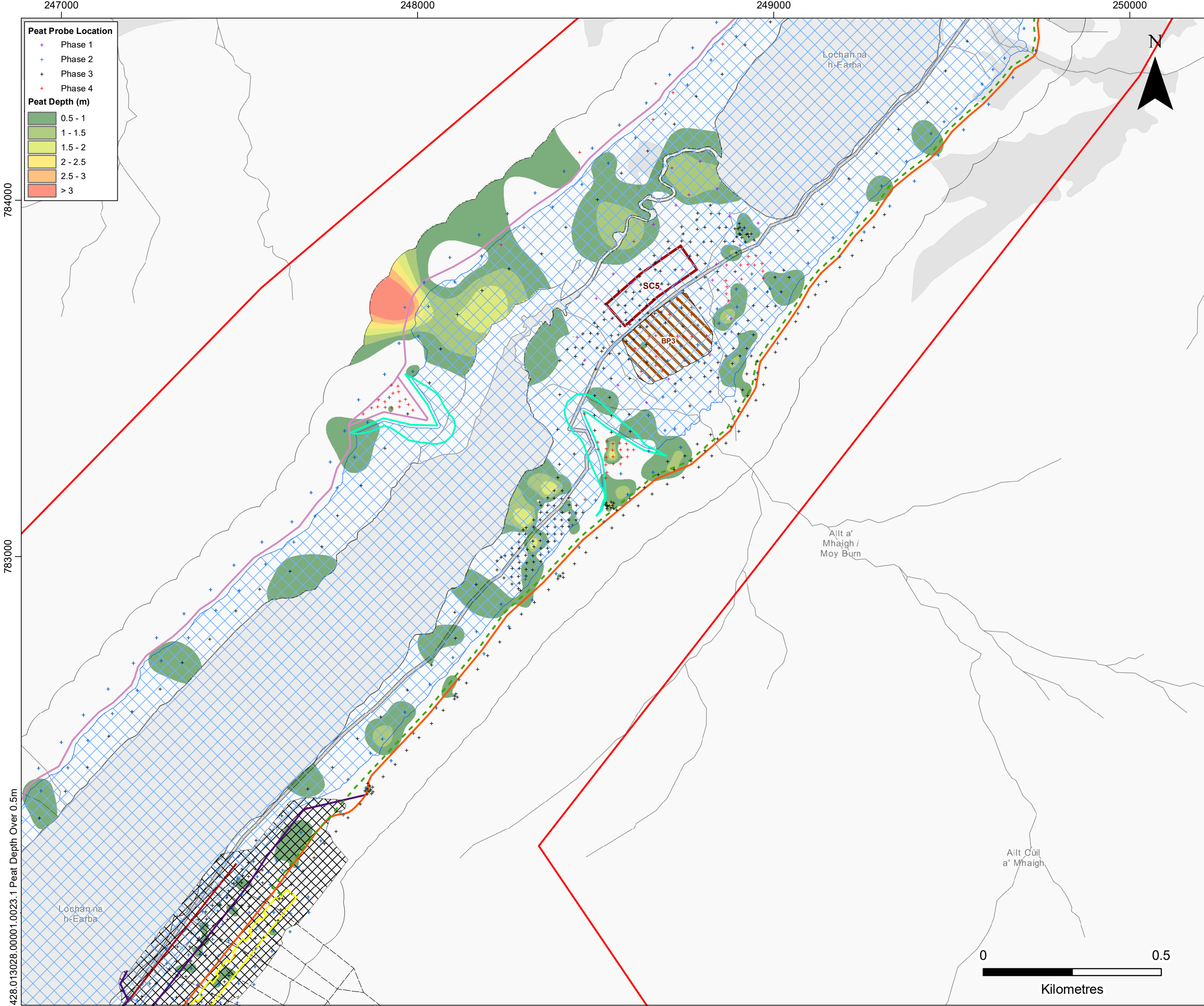
PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 2

Scale 1:10,000 @ A3

Date FEBRUARY 2024





Peat Probe Location

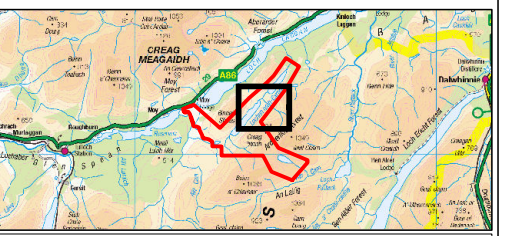
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 6 m / Operational Width: 4 m
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
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A GILKES ENERGY COMPANY

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PEAT MANAGEMENT PLAN (PMP)

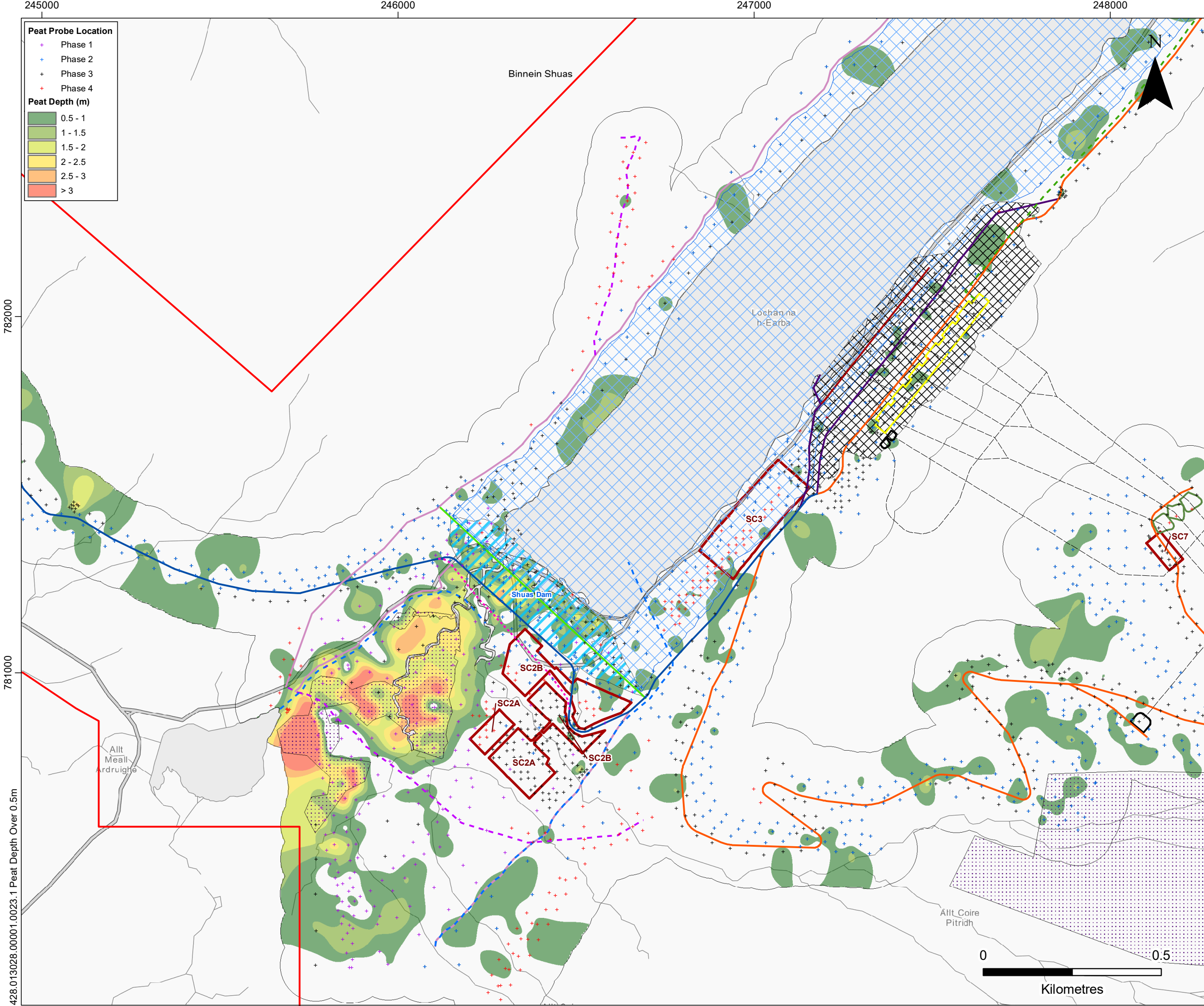
PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 3

Scale 1:10,000 @ A3

Date FEBRUARY 2024





Peat Probe Location

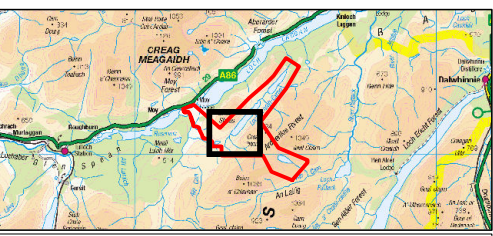
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 6 m / Operational Width: 4 m
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 6 m
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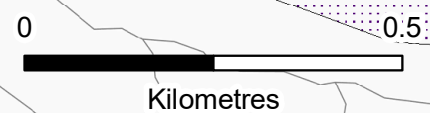
PEAT MANAGEMENT PLAN (PMP)

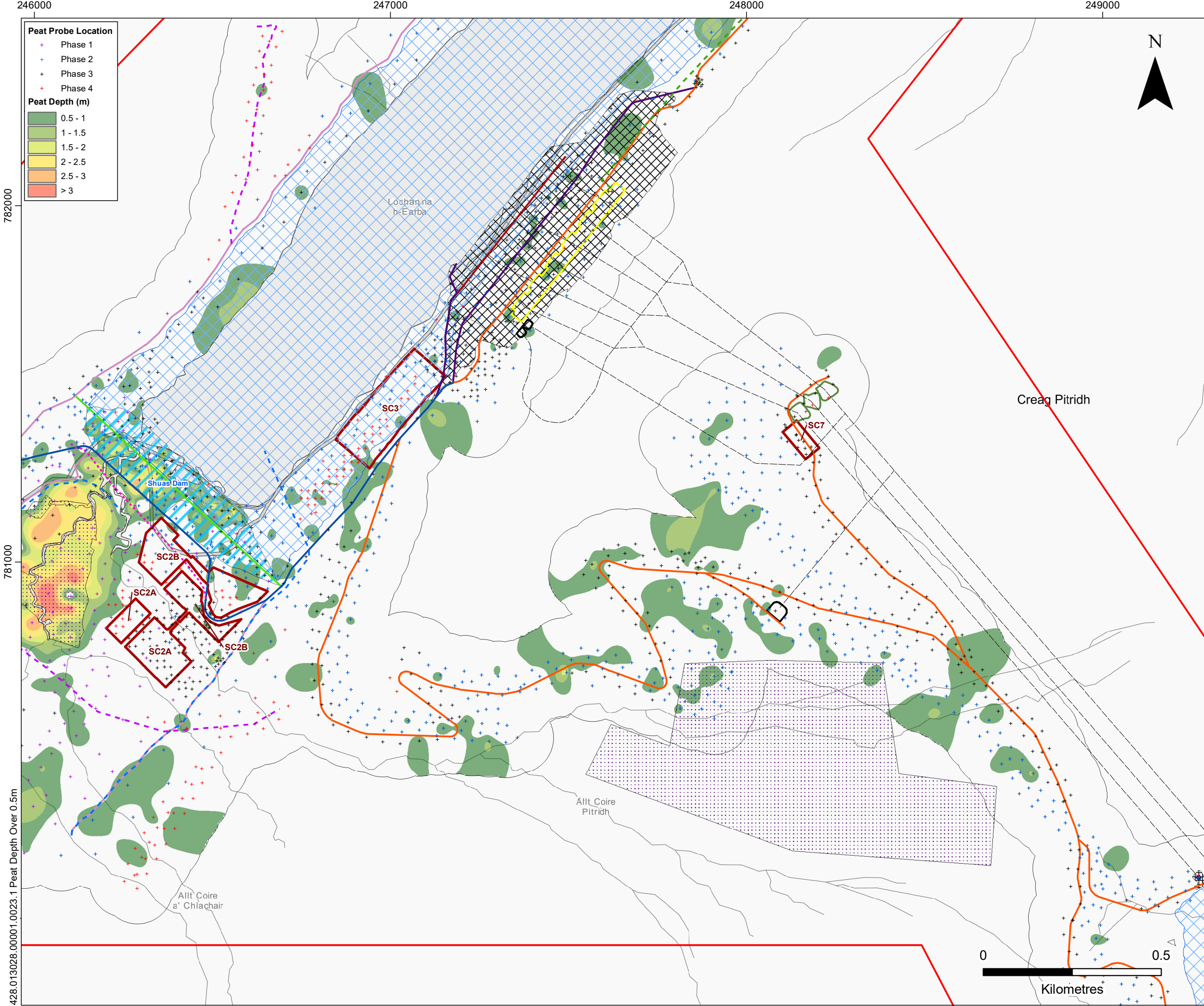
PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 4

Scale 1:10,000 @ A3

Date FEBRUARY 2024





Peat Probe Location

- Phase 1
- Phase 2
- Phase 3
- Phase 4

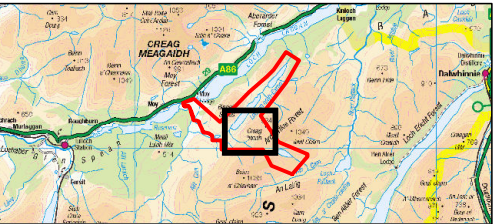
Peat Depth (m)

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



LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 6 m / Operational Width: 4 m
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 4 m
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EARBA STORAGE
A GILKES ENERGY COMPANY

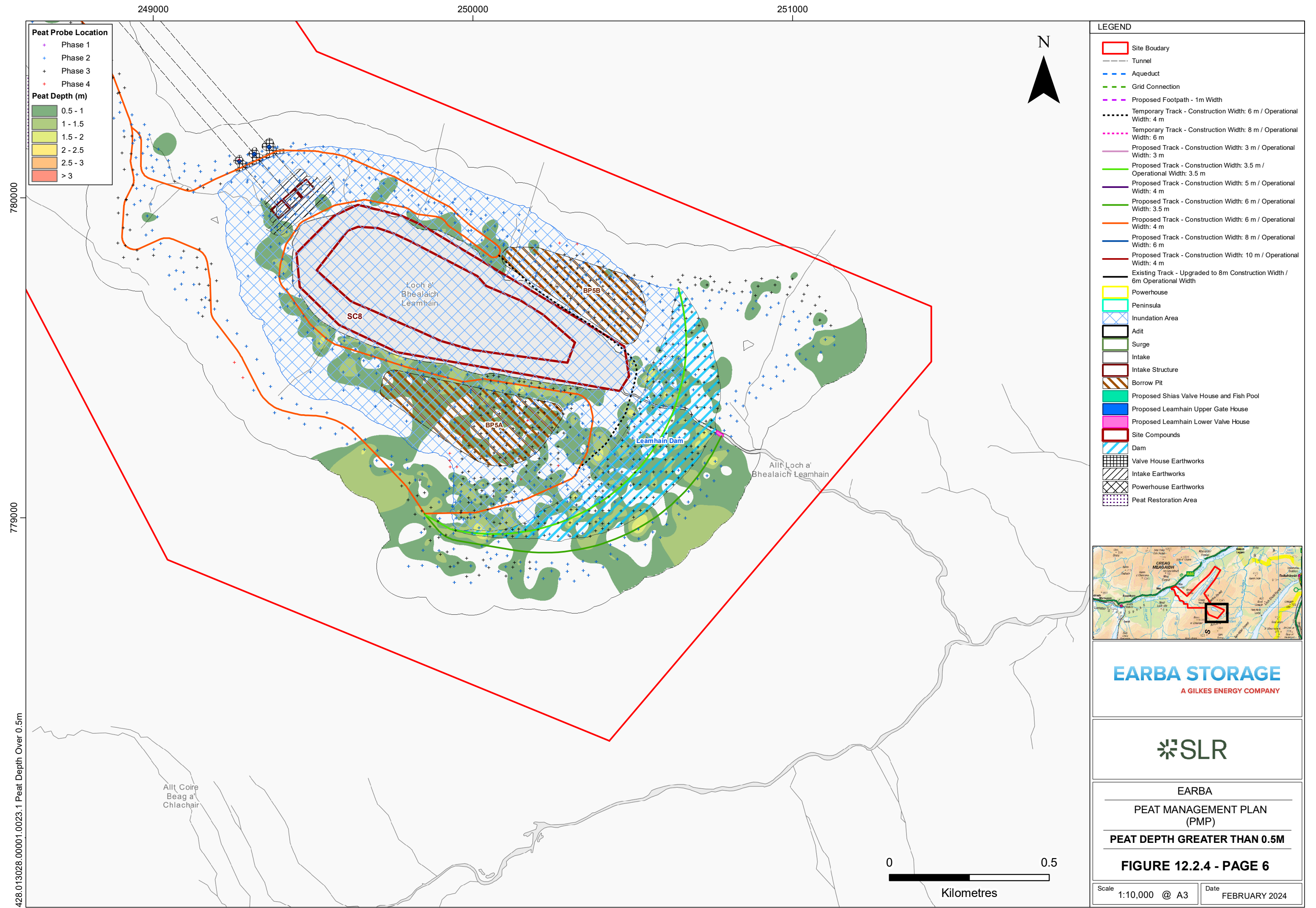


EARBA
PEAT MANAGEMENT PLAN
(PMP)
PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 5

Scale 1:10,000 @ A3 Date FEBRUARY 2024





249000 250000 251000

780000

779000

428.013028.00001.0023.1 Peat Depth Over 0.5m

Peat Probe Location

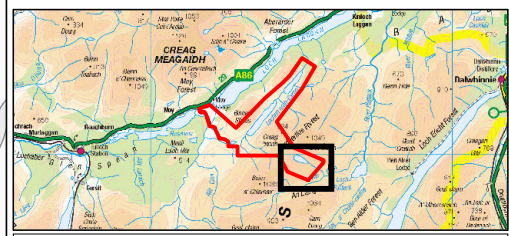
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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



- LEGEND**
- Site Boundary
 - Tunnel
 - Aqueduct
 - Grid Connection
 - Proposed Footpath - 1m Width
 - Temporary Track - Construction Width: 6 m / Operational Width: 4 m
 - Temporary Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 3 m / Operational Width: 3 m
 - Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 5 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 8 m / Operational Width: 6 m
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 - Intake Earthworks
 - Powerhouse Earthworks
 - Peat Restoration Area



A GILKES ENERGY COMPANY

EARBA

PEAT MANAGEMENT PLAN (PMP)

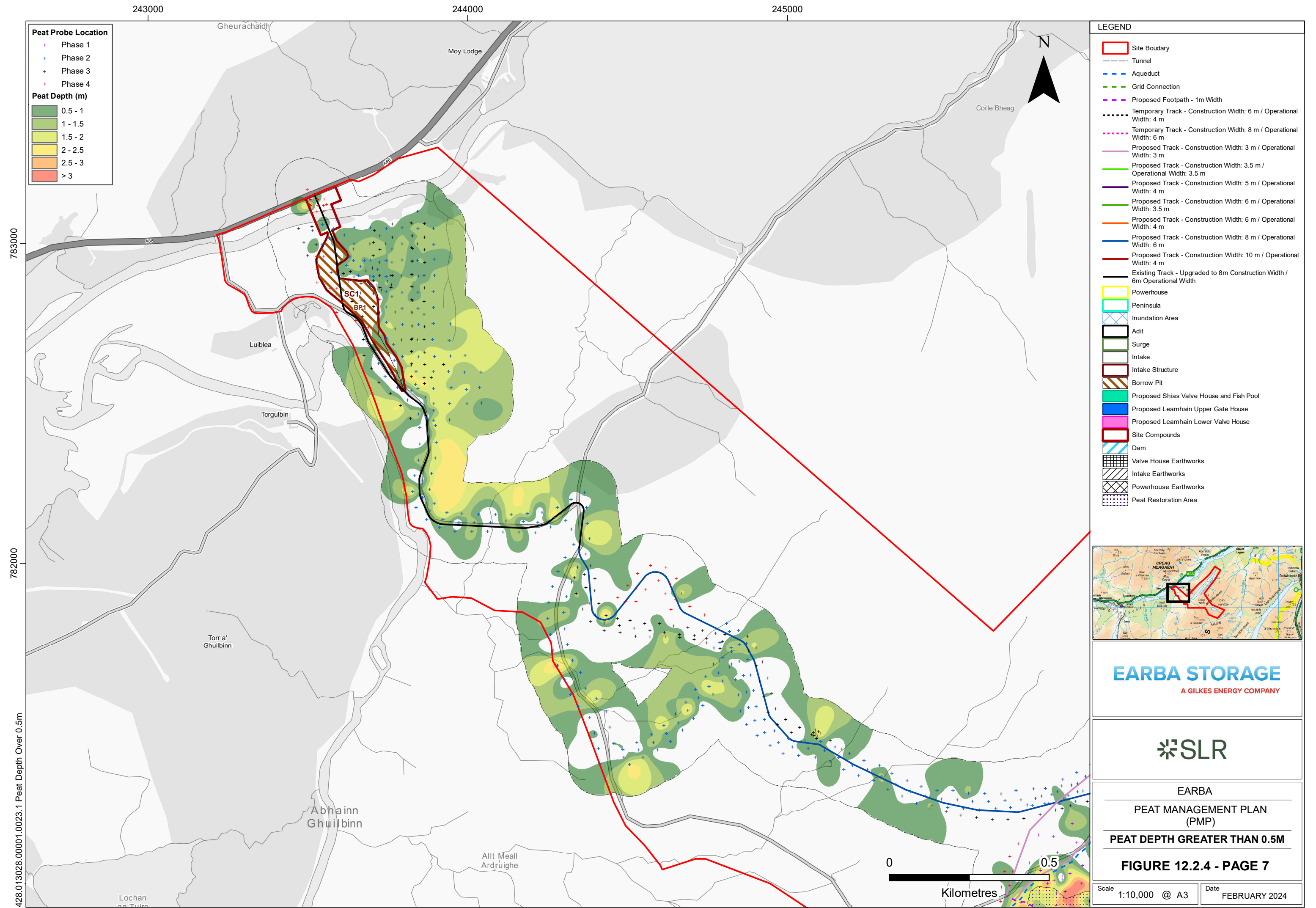
PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 6

Scale 1:10,000 @ A3

Date FEBRUARY 2024





Peat Probe Location

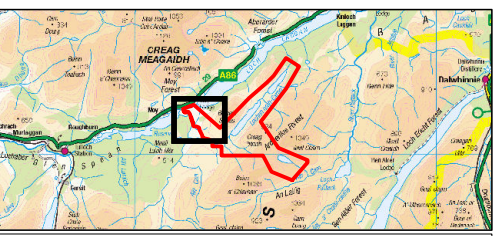
- Phase 1
- Phase 2
- Phase 3
- Phase 4

Peat Depth (m)

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

LEGEND

- Site Boundary
- Tunnel
- Aqueduct
- Grid Connection
- Proposed Footpath - 1m Width
- Temporary Track - Construction Width: 6 m / Operational Width: 4 m
- Temporary Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 3 m / Operational Width: 3 m
- Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 5 m / Operational Width: 4 m
- Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
- Proposed Track - Construction Width: 6 m / Operational Width: 4 m
- Proposed Track - Construction Width: 8 m / Operational Width: 6 m
- Proposed Track - Construction Width: 10 m / Operational Width: 4 m
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EARBA STORAGE

A GILKES ENERGY COMPANY

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PEAT MANAGEMENT PLAN (PMP)

PEAT DEPTH GREATER THAN 0.5M

FIGURE 12.2.4 - PAGE 7

Scale 1:10,000 @ A3

Date FEBRUARY 2024



Annex A Excavated Materials Calculations

Technical Appendix 12.2: Peat Management Plan

Earba Pump Storage Scheme

Earba Storage Limited

SLR Project No.: 428.013028.00001

21 February 2024

Infrastructure on Peat >0.5m	Area (m ²)	Average Depth of Peat (m)	Total Excavated Volume Acrotelm Peat (m ³)	Total Excavated Volume Catotelm Peat (m ³)	Total Excavated Volume Peat (m ³)	Area (m ²)	Average Thickness of Peat (m)	Total Re-use Volume Acrotelm Peat (m ³)	Total Re-use Volume Catotelm Peat (m ³)	Total Re-use Volume of Peat (m ³)	Notes
Temporary Track - Construction Width: 6 m / Operational Width: 4 m	1716	1.01	515	1218	1733					0	Located within inundation area
Temporary Track - Construction Width: 8 m / Operational Width: 6 m	1454	1.04	436	1076	1512	4598	0.50	690	1609	2299	
Existing Track - Upgraded to 8m Construction Width / 6m Operational Width	3148	0.90	944	1889	2833	4721	0.50	708	1652	2361	
Proposed Track - Construction Width: 3 m / Operational Width: 3 m	4368	0.93	1310	2752	4062	35817	0.50	5373	12536	17908	
Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m					0					0	Located on Dam D1
Proposed Track - Construction Width: 5 m / Operational Width: 4 m	1070	0.59	321	310	631	5924	0.50	889	2073	2962	
Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m	4602	0.96	1381	3037	4418	7236	0.50	1085	2532	3618	
Proposed Track - Construction Width: 6 m / Operational Width: 4 m	19520	0.82	5856	10150	16006	83098	0.50	12465	29084	41549	
Proposed Track - Construction Width: 8 m / Operational Width: 6 m	9908	0.81	2972	5053	8025	24200	0.50	3630	8470	12100	
Proposed Track - Construction Width: 10 m / Operational Width: 4 m	4882	0.20	976		976					0	Located within inundation area
Dam D1 - Average Peat Depth (Shuas)	45203	1.09	13561	35882	49443					0	Re-use details included below.
Dam D2 - Average Peat Depth (Leamhain)	99119	0.86	29736	55727	85463					0	Re-use details included below.
Dam D3 - Average Peat Depth (Shios)	8972	0.77	2692	4177	6869					0	Re-use details included below.
Borrow Pit BP1 (Located within SC1)	17300				0	17300	1.50	7785	18165	25950	Located within SC1
Borrow Pit BP5A - Inundation Area - Average Peat Depth	60467	0.75	18140	27014	45154					0	Located within inundation area
Aqueduct - Construction Width: 15m	9000	0.49	2700	1710	4410	2400	1.00	720	1680	2400	
Footpath - Construction Width: 1m	1855				0					0	Floated.
Intake Earthworks	24653	0.29	7149		7149					0	Located within inundation area
Proposed Leamhain Lower Valve House	240	0.63	72	80	152	50	1.00	15	35	50	
SC1 (includes BP4)	30583	0.16	5024		5024	13283	1.00	3985	9298	13283	
SC2A	28905				0	28905	1.00	8672	20234	28905	Blanket bog adjacent.
SC2B	49558	0.32	14867	799	15667	49558	1.00	14867	34690	49558	Blanket bog adjacent.
SC6A	5299	0.25	1325		1325					0	Located within inundation area
SC6B	4826	0.17	804		804	4826	1.00	1448	3378	4826	Blanket bog adjacent.
Shios Dam (D3), 300mm of peat placed on downstream face								6450		6450	
Shios Dam (D3), 20m strip placed on downstream toe								9000		9000	
Shuas Dam (D1), 300mm of peat placed on downstream face								12840		12840	
Shuas Dam (D1), 20m strip placed on downstream toe								15500		15500	
Leamhain Dam (D2), 20m strip placed on downstream toe								28800		28800	
Peatland restoration east of Shuas Dam (D1)								6690	15610	22300	
Peatland restoration Coire Pitridh area								450	1050	1500	
Peatland restoration south of Leamhain Dam (D2)										0	
River Pattack peatland reinstatement and enhancement (A to K)								3495	8155	11650	
Totals			110782	150875	261657			145555	170253	315808	

Total Excavated Volume Acrotelm Peat (m³)	110782
Total Excavated Volume Catotelm Peat (m³)	150875
Total Excavated Volume Peat (m³)	261657
Total Re-use Volume Acrotelm Peat (m³)	145555
Total Re-use Volume Catotelm Peat (m³)	170253
Total Re-use Volume of Peat (m³)*	315808
Net Balance (m³)	-54151



Annex B Peat Core Data

Technical Appendix 12.2: Peat Management Plan

Earba Pump Storage Scheme

Earba Storage Limited

SLR Project No.: 428.013028.00001

21 February 2024

		Peat Core Log						Hole No. PC01 Sheet 1 of 2	
Project: Earba Pump Storage				Client: Gilkes Energy Ltd				Dates: 31-05-2023	
Project No: 428.013028.00001				Logger: CR		Approved By:		Coordinates: E: 246297.00 N: 781234.00	
Location: Loch Laggan				Hole Type: PC		Level:		Vertical Scale: 1:11	
Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description	
	0.00 - 1.00	C	0.00 - 1.00	Recovery = 100%	0.80			Brown fibrous PEAT. (H3), (B3)	1
					1.00			Brown fibrous PEAT. (H5), (B3)	
	1.00 - 2.00				1.50			Brown fibrous PEAT. (H6), (B3)	
					2.00			Brown fibrous PEAT. (H7), (B3)	
		C	1.00 - 2.00					Peat Core Continued on Next Page	2
Remarks: Peat core recovered using peat sampler.									



Hole No.

PC01

Sheet 2 of 2

[illegible]

Remarks:

Peat core recovered using peat sampler.

		Peat Core Log						Hole No. PC02 Sheet 1 of 1	
Project: Earba Pump Storage				Client: Gilkes Energy Ltd				Dates: 31-05-2023	
Project No: 428.013028.00001				Logger: CR		Approved By:		Coordinates: E: 246303.00 N: 781271.00	
Location: Loch Laggan				Hole Type: PC		Level:		Vertical Scale: 1:11	
Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description	
	0.00 - 1.00	C	0.00 - 1.00	Recovery = 100%	0.50			Brown fibrous PEAT. (H3), (B3)	1
0.70							Brown fibrous PEAT. (H6), (B3)		
1.00							Brown fibrous PEAT. (H5), (B3)		
	1.00 - 1.70	C	1.00 - 1.70	Recovery = 100%	1.40			Brown fibrous PEAT. (H6), (B3)	2
					1.70			Brown fibrous PEAT. (H7), (B3)	
								Peat Core Complete at 1.70m	
Remarks: Peat core recovered using peat sampler.									

		Peat Core Log						Hole No. PC03 Sheet 1 of 1	
Project: Earba Pump Storage				Client: Gilkes Energy Ltd				Dates: 17-08-2023	
Project No: 428.013028.00001				Logger: CR		Approved By:		Coordinates: E: 250240.00 N: 785759.00	
Location: Loch Laggan				Hole Type: PC		Level:		Vertical Scale: 1:11	
Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description	
	0.00 - 1.00	C	0.00 - 1.00	Recovery = 100%	0.40			Brown fibrous PEAT. (H3), (B4).	
1.00							Brown fibrous PEAT. (H4), (B2).		
							Peat Core Complete at 1.00m		
									2
Remarks: Peat core recovered using peat sampler.									

		Peat Core Log						Hole No. PC04 Sheet 1 of 1	
Project: Earba Pump Storage				Client: Gilkes Energy Ltd				Dates: 17-08-2023	
Project No: 428.013028.00001				Logger: CR		Approved By:		Coordinates: E: 248931.00 N: 783897.00	
Location: Loch Laggan				Hole Type: PC		Level:		Vertical Scale: 1:11	
Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description	
	0.00 - 1.00	C	0.00 - 1.00	Recovery = 100%	0.60			Dark brown fibrous PEAT. Frequent plant fibres present. (H4), (B3).	1
					1.00			Dark brown fibrous PEAT. (H5), (B3).	
								Peat Core Complete at 1.00m	2
Remarks: Peat core recovered using peat sampler.									

		Peat Core Log						Hole No. PC05 Sheet 1 of 2	
Project: Earba Pump Storage				Client: Gilkes Energy Ltd				Dates: 17-08-2023	
Project No: 428.013028.00001				Logger: CR		Approved By:		Coordinates: E: 248391.00 N: 783182.00	
Location: Loch Laggan				Hole Type: PC		Level:		Vertical Scale: 1:11	
Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description	
	0.00 - 1.00	C	0.00 - 1.00	Recovery = 100%	0.30			Brown fibrous PEAT. (H3), (B3).	
0.85							Brown fibrous PEAT. (H4), (B3).		
1.00							Brown fibrous PEAT. (H5), (B3).		
1.50							Dark brown fibrous PEAT. (H5), (B4).		
2.00							Brown fibrous PEAT. Occasional Rootlets present. (H6), (B4).		
	1.00 - 2.00	C	1.00 - 2.00					Peat Core Continued on Next Page	2
Remarks: Peat core recovered using peat sampler.									



Hole No.

PC05

Sheet 2 of 2

[illegible]

Remarks:

Peat core recovered using peat sampler.



Peat Auger 1
0 – 1.0m



Peat Auger 1
1.0 – 2.0m



Suite 223ab
4 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

Tel: 0131 335 6830
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Web: www.slrconsulting.com

Project : Earba Pump Storage Scheme

Gilkes Energy Ltd

Project No. :- 428.013028.00001

Date :- August 2023



Peat Auger 2
0 – 1.0m



Peat Auger 2
1.0 – 1.7m



Suite 223ab
4 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

Tel: 0131 335 6830
Fax: 0131 335 6831
Web: www.slrconsulting.com

Project : Earba Pump Storage Scheme

Gilkes Energy Ltd

Project No. :- 428.013028.00001

Date :- August 2023



Peat Auger 3
0 – 1.0m



Peat Auger 4
0 – 1.0m



Suite 223ab
4 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

Tel: 0131 335 6830
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Project : Earba Pump Storage Scheme

Gilkes Energy Ltd

Project No. :- 428.013028.00001
Date :- August 2023



Peat Auger 5
0 – 1.0m



Peat Auger 5
1.0 – 2.0m



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