MOTT MACDONALD

Bhlaraidh Wind Farm Extension

Appendix 10.3: Stage 1 Peat Management Plan

June 2021

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Bhlaraidh Wind Farm Extension

Appendix 10.3: Stage 1 Peat Management Plan

June 2021

Issue and Revision Record

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FINAL(v3)	25 May 2021	[redacted]	[redacted]	[redacted]	FINAL after ITPE and SSE comments
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Contents

1 Introduction

1.1 Background

Mott MacDonald Limited has been commissioned by SSE Generation Limited (the Applicant) to produce a Stage 1 Peat Management Plan (PMP) with respect to the proposed Bhlaraidh Wind Farm Extension, herein referred to as the 'Proposed Development'.

The purpose of the report is to assess the quantities of peat likely to be excavated during construction and identify suitable reuse and management options. Site reconnaissance, comprising walkovers and phased peat probing surveys, was carried out to collect information on peat depth, stratification and localised hydrological and geomorphological conditions.

This PMP has been produced in accordance with the following peat management guidance produced jointly by Scottish Renewables (SR) and the Scottish Environment Protection Agency (SEPA):

- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste [1]
- SEPA Regulatory Position Statement – Developments on Peat [2]

This document is a draft, which will be refined and updated throughout the development of the wind farm. The final PMP will consider detailed construction plans and will be based on information gathered during further site investigations.

1.1.1 Revision amendments

This version of the report has been revised to account for the peat volumes being calculated using a 3D design model, further details are provided in Section 3.3.

1.2 Site Description

The Proposed Development is located approximately 5.5km to the north west of the village of Invermoriston, in the Great Glen, in the Scottish Highlands. The Proposed Development covers approximately 9.7km^2 and comprises predominantly open upland moorland crossed by rivers and lochans.

Access to the Proposed Development during construction is proposed via the Operational Development access track, which is located off the A887 (refer to Figure 1.1, Figure 1.2 and Figure 1.3 in Chapter 1 of the EIA for the Site Location, Site Layout and Wider Layout Plan), and this will be a shared access track for both developments. The Proposed Development is positioned immediately east of the Operational Development.

The terrain is varied, with turbines proposed on a number of slopes across the Site, predominantly proposed in areas of open moorland.

Peat thicknesses vary across the Site but are generally between 0.5m and 1.0m, with localised thicker peat accumulations (>2.5m). Thick peat accumulations have developed in areas where the terrain is relatively flatter around lower lying areas of the site between the topographical highs. The thickest peat encountered during Site Reconnaissance was 3.3m. Note that turbines locations have been sited to avoid areas of thicker peat.

The Proposed Development includes approximately 11.4km of infrequent and minor upgrade to Operational Development track, and 2.4km of fully upgraded existing track which currently runs to an existing Hydro Scheme to the east of the Proposed Development. The total new track

length is 10.2km. The tracks will accommodate a 4.5m wide running surface with 0.5m wide verge shoulders on each side and incorporate passing places [3].

1.3 Proposed Development

The Proposed Development, as shown on Figure 1.2 and Figure 1.3 in Chapter 1 of the EIA, comprises:

- Access tracks, leading to turbines and a control building and substation compound. This includes:
  - infrequent and minor upgrade of existing Operational Development tracks (11.4km);
  - full upgrade of existing Hydro Scheme track (existing access tracks 2.4km);
  - construction of 10.2km of new access tracks and turning heads, (4.5m wide running surface with 0.5m wide shoulders) incorporating passing places (18 No., each with an area of approximately 60m^2) and watercourse crossings;
- Excavation for turbine bases to a suitable bearing stratum (anticipated depth of ~3.5m and base diameter of ~25.0m);
- Construction of:
  - 18 No. turbine bases and adjacent crane hardstandings (each with a total area of approximately 1875m^2 permanent hardstand);
  - control building and substation with associated compound(s);
  - on site underground cabling, connecting the turbines to the substation;
- Construction (temporary) of:
  - construction compound(s);
  - concrete batching plant;
- Up to 8 No. borrow pits of varying dimensions.

It should be noted that temporary tracks to borrow pits have not been identified at this stage, however, they are anticipated to be adjacent to proposed access tracks and will be within the overall borrow pit area of search. The preferred access points will be identified following further detailed site investigation.

1.4 Terminology and Abbreviations

The term ‘Proposed Development’ is used in reference to 18 No. turbine Bhlaraidh Wind Farm Extension in the Highland region of Scotland.

‘Works’ is used to describe the construction of infrastructure elements.

Acronyms and Abbreviations

- mAOD – metres Above Ordnance Datum
- EIA Report – Environmental Impact Assessment Report
- PSRA – Peat Stability Risk Assessment
- NatureScot – NatureScot (formerly SNH)
- SEPA – Scottish Environment Protection Agency

1.5 Approach to Minimising Peat Excavation

With reference to Figure 1.2 and Figure 1.3 in Chapter 1 of the EIA, several steps have been taken during the preliminary design stages of the Proposed Development in order to minimise the likely peat excavation required.

- The iterative development of a layout which initially used gridded information on peat depths to inform the location of tracks, turbines and other components.

- A sequential phase of targeted peat depth probing to confirm peat depths, characteristics and stability at locations of proposed infrastructure.
- The use of floating roads has not been proposed as peat depths are generally shallow.
- Cognisance of identified constraints when identifying potential temporary and permanent storage areas, as shown on Figure A.1 in Appendix A.

These steps are detailed in Chapter 2 of the EIA Report.

Prior to and during the execution of the Proposed Development, all reasonable measures will be taken to avoid or minimise excavations and minimise disturbance to peat, including:

- Maximisation of batter angles in cuttings, where appropriate;
- The use of appropriate plant to avoid unnecessary disturbance to the ground surface.

Despite the measures described above, there is still a residual requirement to excavate peat as part of the Proposed Development due to the presence of peat on the Site. This draft document details the estimated peat volumes and proposals for the management of excavated peat.

2 Aims and Objectives

2.1 The Need for a Peat Management Plan

As noted in the peat management guidance by Scottish Renewables and SEPA [1], at the EIA stage, the developer must show:

- Thorough pre- and post-consent field surveys, data collection and iterative design, ensuring that the infrastructure layout of the Proposed Development has been refined to minimise the quantity of peat which will be excavated;
- The volume of peat anticipated to be excavated by the Proposed Development has been considered; and
- How excavated peat will be managed and reused.

2.2 Objectives of this Draft Peat Management Plan

The aim of the draft PMP is to outline how peat which is expected to be excavated during the construction of the Proposed Development will be managed and reused. The aims of the PMP are achieved through completion of the following objectives, as noted in the peat management guidance [1] :

- Objective 1: Description of the peat conditions at the Proposed Development and how this was determined.
- Objective 2: Calculating expected volumes of peat to be excavated and reused.
- Objective 3: Classification of excavated material.
- Objective 4: Considering the use of appropriate peat type in borrow pit restoration.
- Objective 5: Describing how excavated peat will be handled to ensure suitability for reuse.
- Objective 6: Describing if temporary storage of peat will be required during construction and how this will be done to ensure suitability for reuse.
- Objective 7: Considering the potential volume of peat which may not be suitable for reuse and development of a Waste Management Plan for the Proposed Development.

3 Details to Inform the Peat Management Plan

3.1 Peat Depth at the Site (Objective 1)

Site reconnaissance surveys with peat depth probing were undertaken between September and November 2011 for the Operational Development, which covers part of the Proposed Development and was previously utilised within the EIA submission for the Operational Development. Site reconnaissance surveys with peat depth probing were undertaken during July 2019 and September 2020, which cover the Proposed Development area.

The purpose of the survey work was to confirm Desk Study findings and provide information on the nature of peat depth and hydrological conditions. The results of the peat depth probing are described in the Peat Stability Risk Assessment [4].

Three phases of peat depth probing were carried out, with a total of 2,909 peat depth probes undertaken:

- Previous 2012 Operational Development PSRA: Peat depth probing undertaken by Mott MacDonald between September and November 2011 (821 of 2,432 probes within the Proposed Development).
- Phase 1: Peat depth probing (599 probes) was undertaken by Mott MacDonald in July to August 2019 based on a 100m grid over the Proposed Development area;
- Phase 2: targeted probing (1,489 probes) was undertaken by Mott MacDonald in August to September 2020, focusing on the 18 No. turbine locations and associated infrastructure.

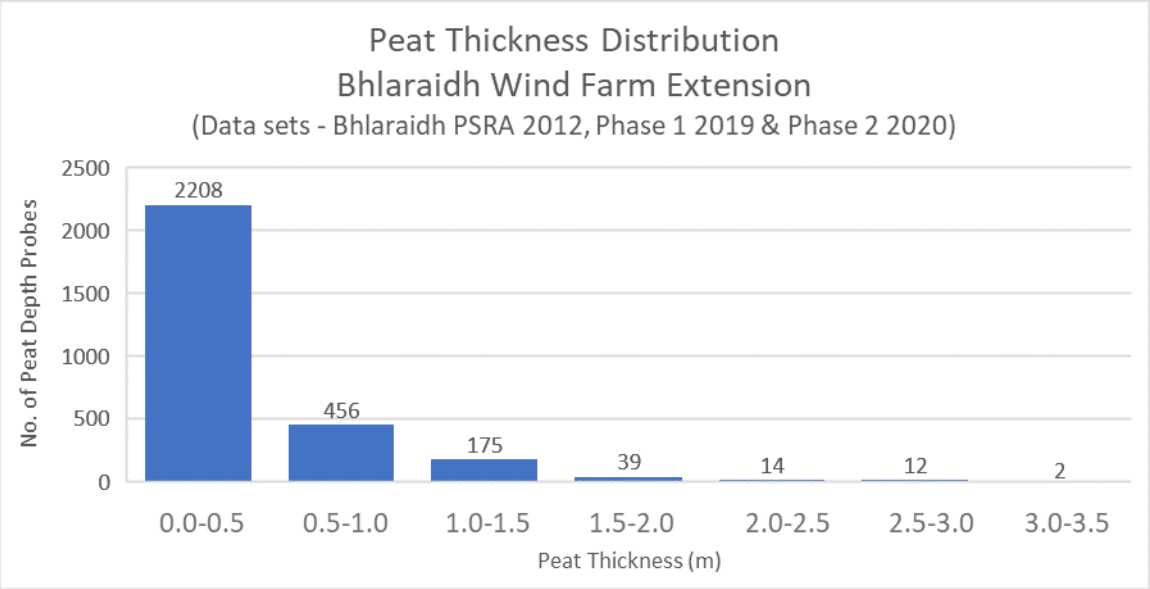
A visual assessment of peat conditions across the Proposed Development was carried out during the surveys, with pertinent features such as active, incipient or relict instability recorded. Peat probing was undertaken using a gouge auger to identify the depth of peat deposits, as well as providing an indication of peat stratification and localised surface hydrological conditions.

A histogram showing the distribution of peat depths encountered is presented in Figure 3.1.

The peat probe surveys undertaken within the Site boundary recorded peat depths >3.0m in two peat depth probes (>0.1% of the 2,909 total peat depth probes). However, the majority of probes 2,208 (76%) recorded peat up to 0.5m thick, and 456 probes (15%) recorded peat depths between 0.5 to 1.0m thickness.

Thicker peat (>2.0m) was not recorded within 15m of the centre of proposed turbine locations. Thick peat was recorded at localised areas near the access tracks, near proposed turbine locations T04, T05, T06, T10, T15 and T18, and near the proposed substation in the centre of the Proposed Development.

Figure 3.1: Peat Depth Distribution



Source: PSRA [4]

3.2 Classification and Observation Gathered During Peat Surveys (Objective 2)

As part of the peat depth probing surveys, an indication of the nature of the peat (fibre content), the peat depth in each category along with information on slope, moisture content and surface hydrology conditions were collected.

Peat deposits can be broadly subdivided into two layers: acrotelmic (upper layer) and catotelmic (lower layer); the boundary between the two layers is generally defined by the lowest level of the water table. Acrotelm represents the upper fibrous vegetation mat where accretion of material is occurring, with the decomposing vegetation below this comprising catotelm. Catotelmic peat is variable in characteristics, with the decomposition of fibres generally increasing with depth, ranging from semi-fibrous in nature through to amorphous where the original structure of the plant is completely decomposed. Water content can be highly variable and, as fibre content, affects structural strength of the material.

Samples of peat were observed in the field as part of the peat depth probing surveys, and descriptions noted with respect to its characteristics, including fibre content, decomposition and moisture content. Observations were also made regarding surface hydrology, terrain type and slope angle.

Of the 2909 peat probes undertaken at the Site, 40% of peat deposits on site were recorded as fibrous, 59% as semi-fibrous and only 1% as amorphous material. It is considered from field observations that all excavated catotelmic peat will have sufficient structural strength to be able to be used in verge restoration i.e. it can be excavated in intact ‘lumps’ and it will not be ‘fluid’. This semi-fibrous catotelmic peat will be dressed with a surface layer of acrotelm to re-establish the peat vegetation.

Shear strength tests were undertaken on the peat deposits encountered in areas of proposed new access tracks. From data specific to the Proposed Development (in-situ Hand Shear Vane Testing data collected by Mott MacDonald), undrained shear strengths for the peat ranges between 0kN/m^2 and 43kN/m^2, though readings were generally between 10kN/m^2 and 20kN/m^2.

The layout of the Proposed Development has sought to avoid deep wet peat deposits, however, if any fluid-like wet catotelmic peat is encountered then it would be placed in appropriate locations such as the base of the borrow pit and dressed with a sequence of semi-fibrous catotelmic and fibrous acrotelmic peat.

Opportunities to reuse catotelmic peat to assist peatland rewetting and restoration as part of the Habitat Management Plan (HMP) may also be considered at detailed design stage; however, it should be noted that this will be dependent on a number of factors such as availability of peat from construction works near to the restoration area, the material is suitable and is not first required for reinstatement of construction disturbed areas and the phasing of construction works coincides with the habitat restoration works to minimise storage and transport of material. This will be reviewed when the final HMP is developed prior to commencement of construction and once a Principal Contractor is appointed.

Further information is provided in the PSRA [4], which concludes that the risk of a peat slide in areas of infrastructure is Very Low to Low provided suitable construction methodologies and control measures are adopted.

3.3 Excavation Calculation and Peat Reuse Requirements (Objective 3)

In order to provide greater accuracy, extracted peat volumes have been calculated using AutoCAD Civils 3D design modelling software.

In the limited areas where 3D design has not been developed at this stage (i.e. the 18 passing places, batching plant, compounds and preferred borrow pits), the same principles have been applied using layout information for estimation of peat volumes.

Table 3.1 shows the construction activities that will generate excavated peat, and the expected volumes of peat produced from each activity. The peat volume estimates have been derived by Mott MacDonald from data gathered during the peat survey programme described in Section 3.1, and dimensions of the components used in the infrastructure layout design.

For the purpose of calculations, it has been assumed that all soil cover across the site is peat, therefore excavation volumes represent a maximum case.

Table 3.1: Peat Excavation by Infrastructure Component

Infrastructure Component	Anticipated Volume of Acrotelm Peat (m^3)	Anticipated Volume of Catotelm Peat (m^3)	Total Anticipated Volume of Peat (m^3)
Turbine Foundations	1,220	670	1,890
Hardstandings and Substation, Batching Plant and Compounds	39,290	38,590	77,880
Access Tracks and Passing Places	17,570	29,330	46,900
Preferred Borrow Pits	7,280	4,620	11,900
Total	65,360	73,210	138,570

Source: Calculations compiled by Mott MacDonald, rounded to the nearest $10m^3$.

Notes and assumptions regarding the excavation of peat as summarised in Table 3.1:

1. Refer to Appendix B for a further breakdown of peat excavation by infrastructure component
2. The calculations are based on the current layout and typical design assumptions, and also could be subject to change with minor amendments during the detailed design of infrastructure

3. Surfaces have been assumed as flat or planar in terms of peat quantification for areas where 2D calculations have been utilised (18 passing places, batching plant, compounds and preferred borrow pits.)
4. Calculations do not include temporary construction compounds that have not been previously identified and any temporary access tracks to borrow pits
5. Crane hardstandings are assumed to be excavated to a suitable soil stratum below bottom of peat.
6. Further details are included in Appendix B.

Table 3.2 shows the requirements for reinstatement of peat for the Proposed Development including the demand for acrotelm and catotelm peat and summarises the total peat balance for the Proposed Development.

Table 3.2: Reinstatement Requirements and Estimated Peat Volume Requirement

Infrastructure Component	Acrotelm Demand (m^3)	Catotelm Demand (m^3)	Total Demand Estimate (m^3)	Assumed Depth of Reuse (m)	Assumptions
Turbine Foundations	6,540	6,540	13,080	0.50	Peat to be used to return ground to undisturbed level. Turbine base diameter of 25m, 1 in 2 side slopes offset by 2m from foundation base.
Hardstandings and Substation, Batching Plant and Compounds	2,250	2,250	4,500	1.00	Assumes 10% of overall infrastructure area will be available for reinstatement around the periphery up to 2.0m.
Access Tracks and Passing Places	15,980	15,980	31,960	0.30	Assumes 1.0m either side of access tracks available for reinstatement.
Preferred Borrow Pits	29,610	82,890	112,500	0.50 acrotelm 1.50 catotelm	Restored surface profile will be below the original surface profile.
Total	**54,380**	**107,660**	**162,040**		

Source: Calculations compiled by Mott Macdonald

Notes and Assumptions regarding the re-use of excavated peat:

1. Refer to Appendix B for full details of volume calculation and the figures in Appendix A for details of peat reuse.
2. Peat will be placed with sufficient depth and at a suitably gentle slope to maintain hydrology with adjacent deposits to minimise the risk of drying out and encourage growth. Peat placed along track edges and around hard standings will be dressed with acrotelmic peat and will not be used as a thin veneer on steeper non-peat slopes.
3. Final reinstatement has been proposed as close to the excavation location as possible to minimise double handling and desiccation of peat during temporary storage.
4. Verges for tracks (including track shoulders) have been sized at 1.0m width either side of cut tracks which batters back to existing ground level (Figure A.1, Appendix A). As the track edges will have graded slopes, peat depths may vary slightly across the profile of the final track edges to tie into existing ground form (Figure A.2 Appendix A).

5. Peat will not be placed / stored within hydrology buffer zones.
6. Borrow pits will be restored to a ground surface profile below that of the undisturbed ground and will be reinstated using peat at stable slope angles.

A more detailed summary of peat excavation and reuse volumes is provided in Appendix B.

Table 3.3: Summary of Demand and Supply

	Total Peat Supply from Excavation (m^3)	Total Peat Demand Estimate for Reinstatement (m^3)	Surplus (+) or Deficit (-) (m^3)
Acrotelm	65,360	54,380	(+) 10,980
Catotelm	73,210	107,660	(-) 34,450
Total	138,570	162,040	(-) 23,470

Source: Calculations compiled by Mott MacDonald

The results of the peat balance calculation show the total estimated demand for reinstatement (as shown in Table 3.3) exceeds supply of peat from excavation.

Restoration depths of acrotelm and catotelm will be adjusted to account for the surplus of acrotelm peat which is available for restoration.

It should be noted that these calculations are approximate in relation to both the volume of peat that will be generated and the volume of peat that can be reused, in all cases the calculations are thought to be conservative. It is also expected that peat excavation will be minimised further during construction by track micrositing.

3.4 Use of Peat in Borrow Pit Restoration (Objective 4)

Eight potential borrow pit areas of search have been identified, however, it is not yet known which will be utilised as part of the development. If all eight borrow pits are utilised, the total worked excavation area will be approximately 218,200m^2. On the basis of data gathered during peat probing, this is estimated to generate approximately 83,650m^3 of peat.

Currently the Borrow Pit Appraisal Report [5] recommends the use of six of the eight borrow pits based on aggregate requirement, preferred geology, and preferred location, with some on a reduced area to achieve slopes less then 15m height. The total worked excavation area for these six preferred borrow pits is 59,205m^2 and on the basis of the data gathered during the peat probing, this is estimated to generate a volume of approximately 11,900$m^3$of peat.

The final design of the borrow pits will be confirmed prior to construction and may be subject to further detailed ground investigation once the infrastructure contractor is appointed.

The following principles will be adopted in the final method statements for borrow pit restoration:

- All peat and soil excavated from the borrow pit will be replaced within the same borrow pit footprint where possible;
- Temporary storage locations, to be agreed with the Ecological Clerk of Works and Geotechnical Advisor, will be appropriately located and designed to minimise the impact on sensitive habitats and species, prevent risks from material instability and run-off into watercourses;
- Wet, structurally poor peat will be placed at the bottom of any restoration profile, followed by more fibrous peat with turf material from the source borrow pit placed on top;
- Borrow pits will be restored to a ground profile below that of the previous undisturbed ground using appropriate shallow slope angles that the peat is stable at. A minimum 0.5m layer of acrotelm peat will be placed on the surface of the reinstated borrow pits; and

- Restoration activities will be overseen by the Ecological Clerk of Works to ensure methods are properly adhered to.

If these principles are followed, further material treatment or specific engineering of borrow pits will not be required to ensure suitability for use for restoration purposes.

3.5 Handling and Storage of Excavated Peat (Objectives 5 & 6)

It will be necessary for the final construction PMP to prescribe precise methods and timing involved in excavating, handling and storing peat for use in reinstatement. A method statement to govern the process will be produced and will be based on the following principles:

- The peat turfs will be stripped first and stored for re-use. Turfs shall be stored with root structure facing downward to preserve the vegetation and then reinstated in the original orientation.
- The surface layer of peat (acrotelm) will be stripped separately from the catotelmic peat. This will involve an excavation depth generally between 0.3m and 0.5m;
- Acrotelmic material will be stored separately from catotelmic material;
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be reused;
- Less humified catotelmic peat (consolidated peat) which maintains its structure upon excavation will be kept separate from any highly humified amorphous peat;
- Acrotelmic material will be replaced as intact as possible once construction is complete;
- To minimise handling and transportation of peat, acrotelmic and catotelmic material will be replaced, as far as is reasonably practicable, in the location from which it was removed; Acrotelmic material will be placed on the surface;
- Additional peat required in order to address local deficits in relation to track screening or dressing will be taken from the closest possible source of peat excavation;
- Temporary storage of peat will be minimised, the size and location of these areas will be considered during the detailed design of the project, accounting for constraints identified within the EIA, e.g. avoiding areas of intact peatland and considering restoration of degraded peatland;
- If necessary, temporary stockpiles may be sprayed with water during dry periods of weather to prevent drying out;
- Storage areas should be sited in areas with lower ecological value, low stability risk and at a suitable distance from water courses;
- Reinstatement will be carried out at the earliest opportunity to minimise storage of turves and other materials;
- Temporary storage and replacement of peat excavated will be, where possible, located adjacent to and within the source area;
- Transport of peat on site from excavation to temporary storage and restoration will be kept to practicable minimum.
- The location of any temporary peat or soil storage areas such that erosion and run-off is limited, leachate from the stored material is controlled and stability of the existing ground, particularly in peatland areas, is not affected. Consideration should also be given to the impacts of poor drainage control in any areas where peat is used in reinstatement.
- Interceptor ditches, down slope drainage collection systems, containment berms (embedded where appropriate), and appropriate drainage mitigation measures will be required as with other infrastructure.
- The locations and design of the peat and other spoil storage requirements will be carefully considered, including methods for reinstatement works and incorporated drainage elements. Such design will be prepared in consultation with the ECoW prior to works commencing.

3.6 Peat Unsuitable for Reuse (Objective 7)

Based on field observations and calculations there are sufficient and appropriate reuse options for all excavated peat within the Proposed Development and it is highly unlikely that there will be a surplus of excavated peat. Therefore, it is not anticipated that a Waste Management Plan and license will be required.

4 Conclusions

The following conclusions are drawn regarding the management of peat within the Proposed Development:

- As a result of the preliminary peat volume calculations undertaken based on the available design layouts, the overall balance on site suggests that there will be no surplus of excavated peat. Therefore, a Waste Management Licence is unlikely to be required.
- Sufficient procedures will be put in place to ensure that peat can be sensitively handled and temporarily stored on site when and if required, therefore allowing for effective reuse.
- Only 2% of the total catotelmic peat encountered on site is amorphous in nature, the remaining 98% is semi-fibrous
- Both acrotelmic and catotelmic peat present at the site are considered suitable for restoration purposes. Should fluid like catotelmic and amorphous peat be encountered then it would be placed in more appropriate locations i.e. the borrow pits and dressed with a sequence of semi-fibrous catotelmic and fibrous acrotelmic peat.
- Options to reuse peat to assist peatland restoration as part of the HMP may also be considered at detailed design stage; however, while this may be of benefit to the HMP activities it is not noted to be essential and therefore a review of the options and opportunities will be undertaken when the final HMP is developed (prior to commencement of construction and once a Principal Contractor is appointed).

5 References

[1] Scottish Renewables, Scottish Environment Protection Agency (SEPA), “Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste,” Scottish Govenment, January 2012.

[2] Scottish Environment Protection Agency (SEPA), “SEPA Regulatory Position Statement - Developments on Peat,” February 2010.

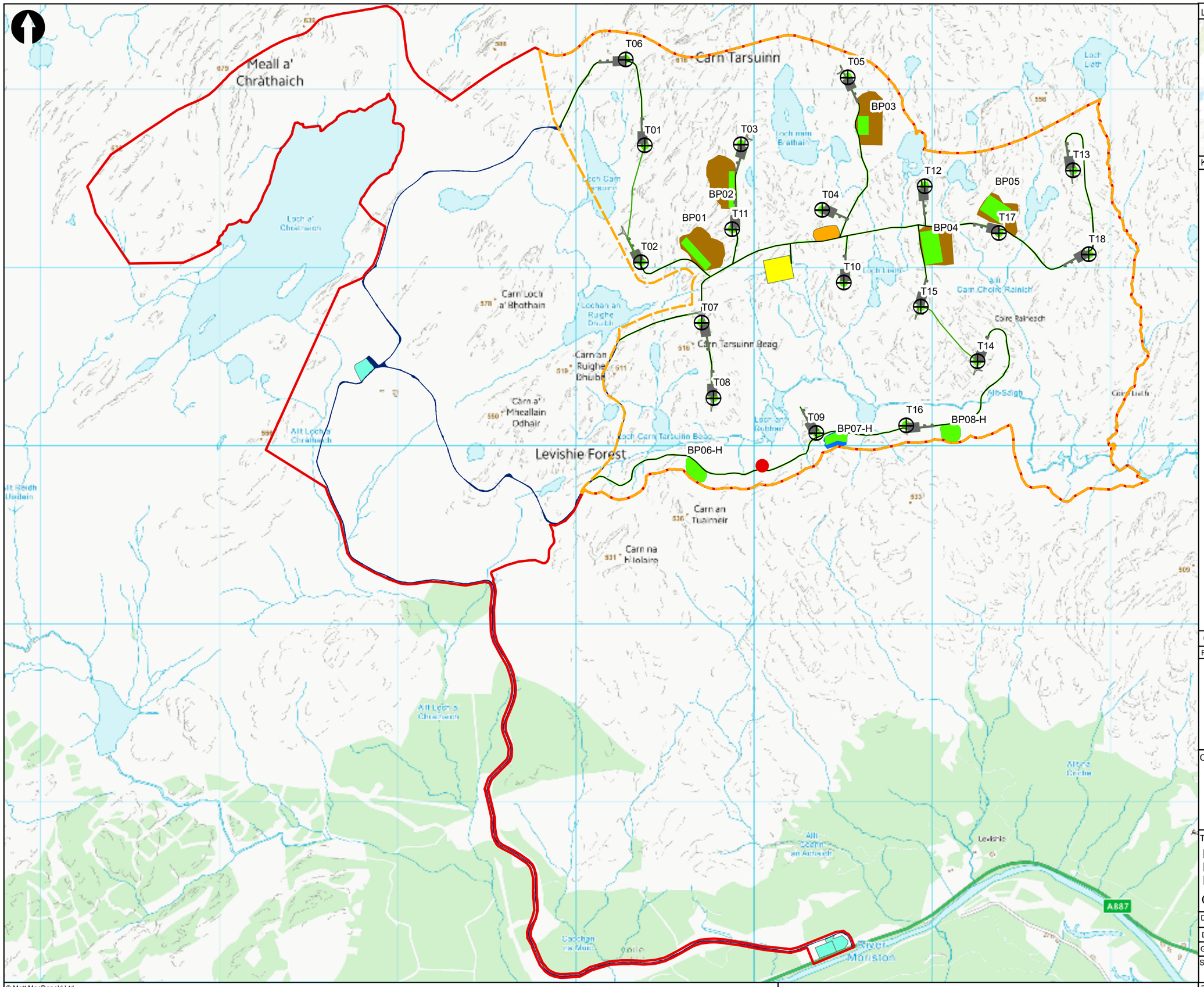
[3] SSE Renewables (SSER), “Bhlaraidh Ext EIAR Project Specifics Summary Sheet,” February 2020.

[4] Mott MacDonald Limited, “Bhlaraidh Wind Farm Extension - Peat Stability Risk Assessment Report,” March 2021.

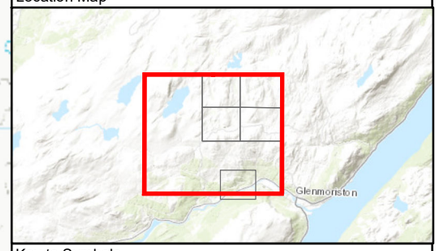
[5] Mott MacDonald Limited, “Bhlaraidh Wind Farm Extension - Borrow Pit Appraisal Report,” March 2021.

A. Figures

A.1 Indicative Peat Storage Areas



Location Map



Key to Symbols

- Indicative Peat Storage Areas
- Turbine_Development_Area
- Site_Boundary
- Turbines
- LiDAR
- Cross_Country_Cable
- Hardstanding
- Turning_Heads
- Track_Option
- Access_route_via_existing_wind_farm__track
- Substation
- Batching_Plant_Search
- Proposed Borrow Pits_for peat storage
- Borrow_Pits_Search
- Hydro_Borrow_Pits_Search
- Temporary_Construction_Compound

Rev	Date	Drawn	Description	Ch'k'd	App'd
02	17/08/21	SEY	For Information	AT	GMcP

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Client

sse Renewables

Title

Bhlaraidh Wind Farm Extension
Peat Management Plan (PMP)
Figure A.1 - Indicative Peat Storage Areas

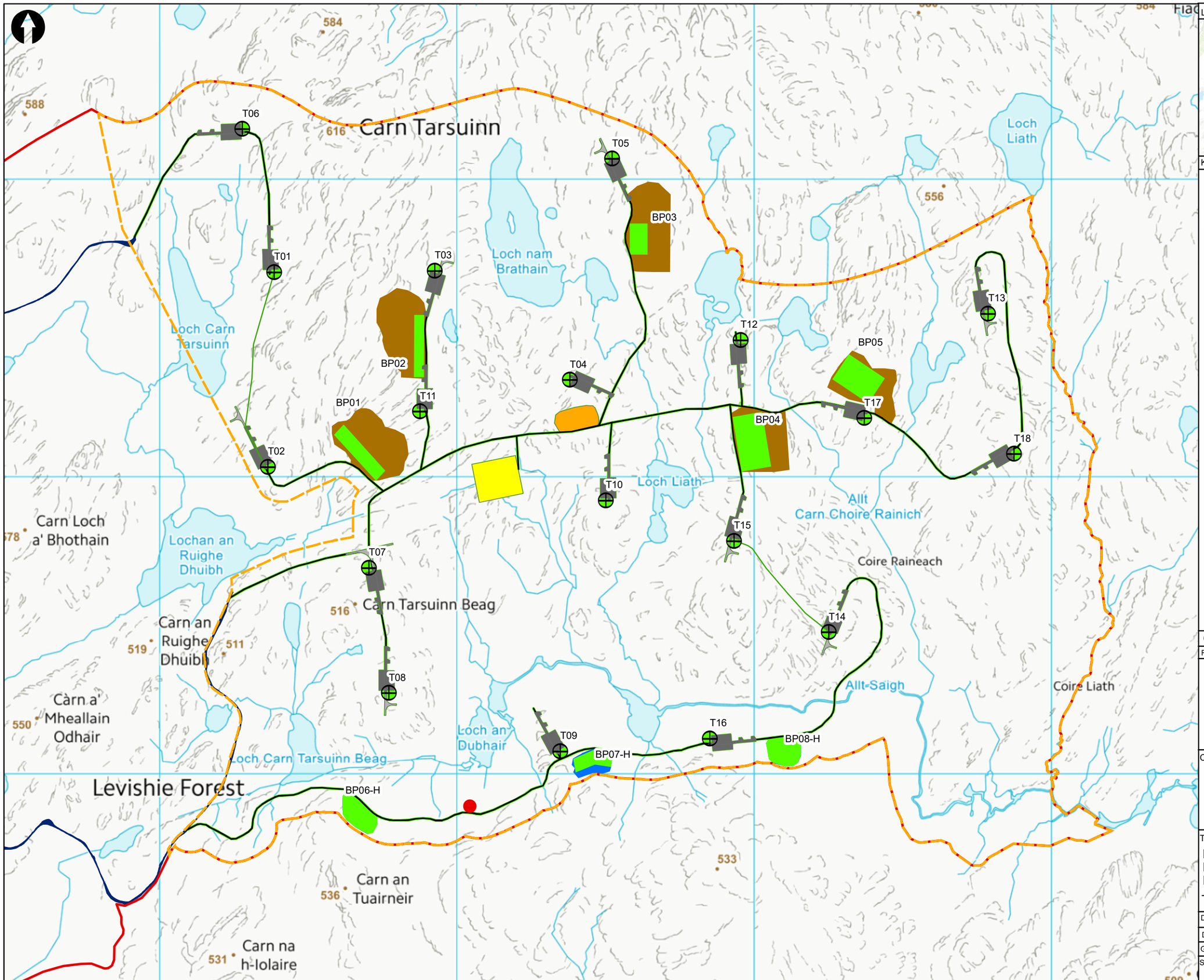
Overview

Designed	S Eyers-Young		Eng Check	A Tourish	
Drawn	S Eyers-Young		Coordination	S Eyers-Young	
GIS Check	J Lawie		Approved	G McPake	

Scale at A3	Status	Rev	Security
1:20,000	FI	02	STD

Drawing Number

MMD-100410845-DR-PMP-GIS-001



Location Map

Key to Symbols

- Indicative Peat Storage Areas
- Turbine_Development_Area
- Site_Boundary
- Turbines
- LiDAR
- Cross_Country_Cable
- Hardstanding
- Turning_Heads
- Track_Option
- Access_route_via_existing_wind_farm__track
- Substation
- Batching_Plant_Search
- Proposed Borrow Pits_for peat storage
- Borrow_Pits_Search
- Hydro_Borrow_Pits_Search
- Temporary_Construction_Compound

Rev	Date	Drawn	Description	Ch'k'd	App'd
02	17/08/21	SEY	For Information	AT	GMcP

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Title

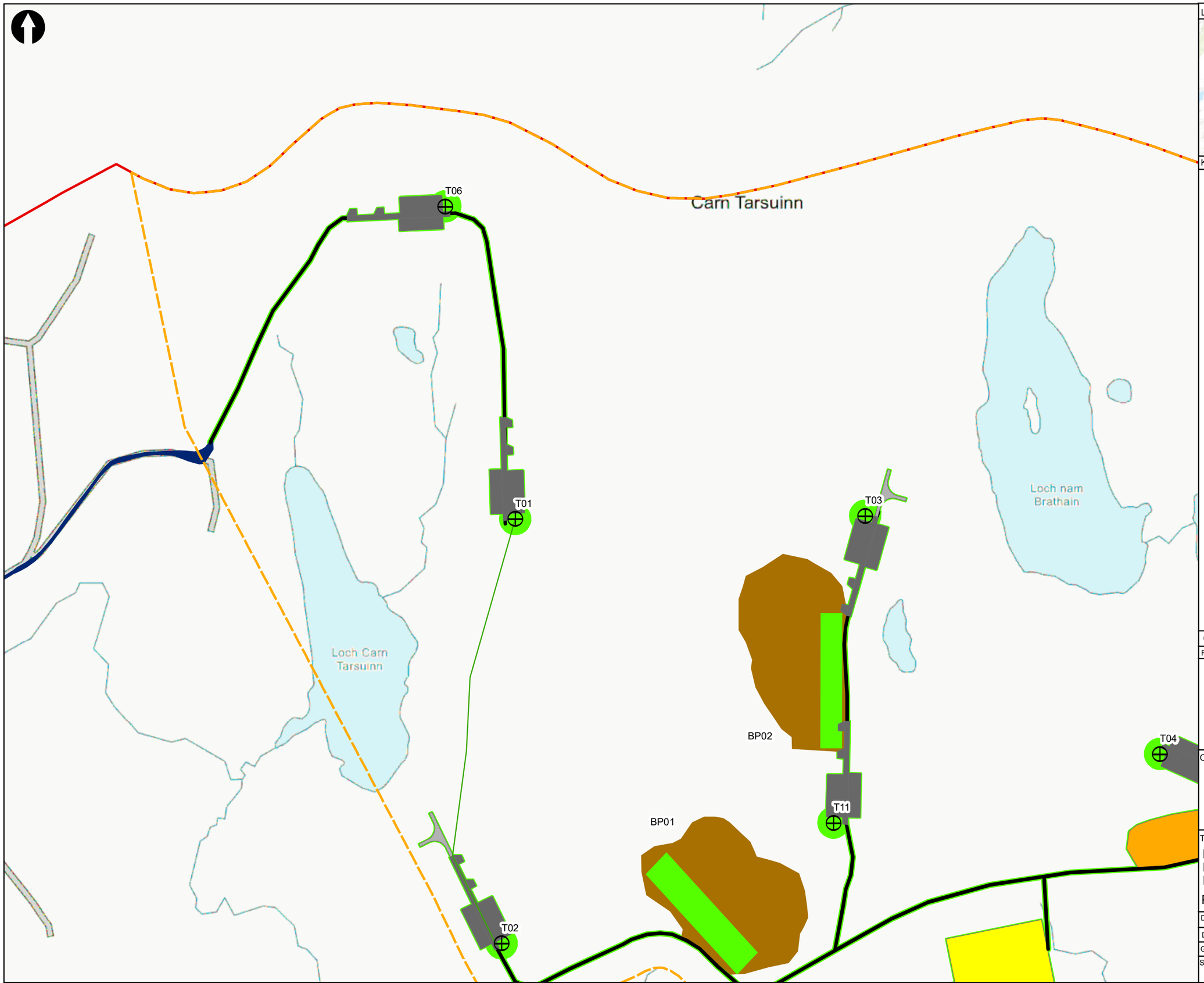
Bhlaraidh Wind Farm Extension
Peat Management Plan (PMP)
Figure A.1 - Indicative Peat Storage Areas

Turbine Development Area

Designed	S Eyers-Young		Eng Check	A Tourish	
Drawn	S Eyers-Young		Coordination	S Eyers-Young	
GIS Check	J Lawie		Approved	G McPake	

Scale at A3	Status	Rev	Security
1:12,000	FI	02	STD

Drawing Number: MMD-100410845-DR-PMP-GIS-001



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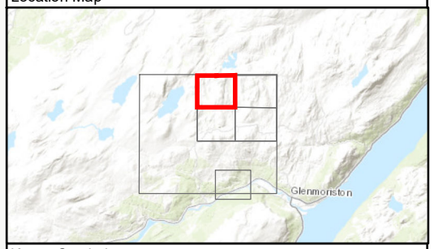

Key to Symbols

- Indicative Peat Storage Areas
- Turbine_Development_Area
- Site_Boundary
- Turbines
- LiDAR
- Cross_Country_Cable
- Hardstanding
- Turning_Heads
- Track_Option
- Access_route_via_existing_wind_farm__track
- Substation
- Batching_Plant_Search
- Proposed Borrow Pits_for peat storage
- Borrow_Pits_Search
- Hydro_Borrow_Pits_Search
- Temporary_Construction_Compound

Rev	Date	Drawn	Description	Ch'k'd	App'd
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Title

Bhlaraidh Wind Farm Extension
Peat Management Plan (PMP)
Figure A.1 - Indicative Peat Storage Areas

Page 1

Designed	S Eyers-Young		Eng Check	A Tourish	
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Scale at A3	Status	Rev	Security
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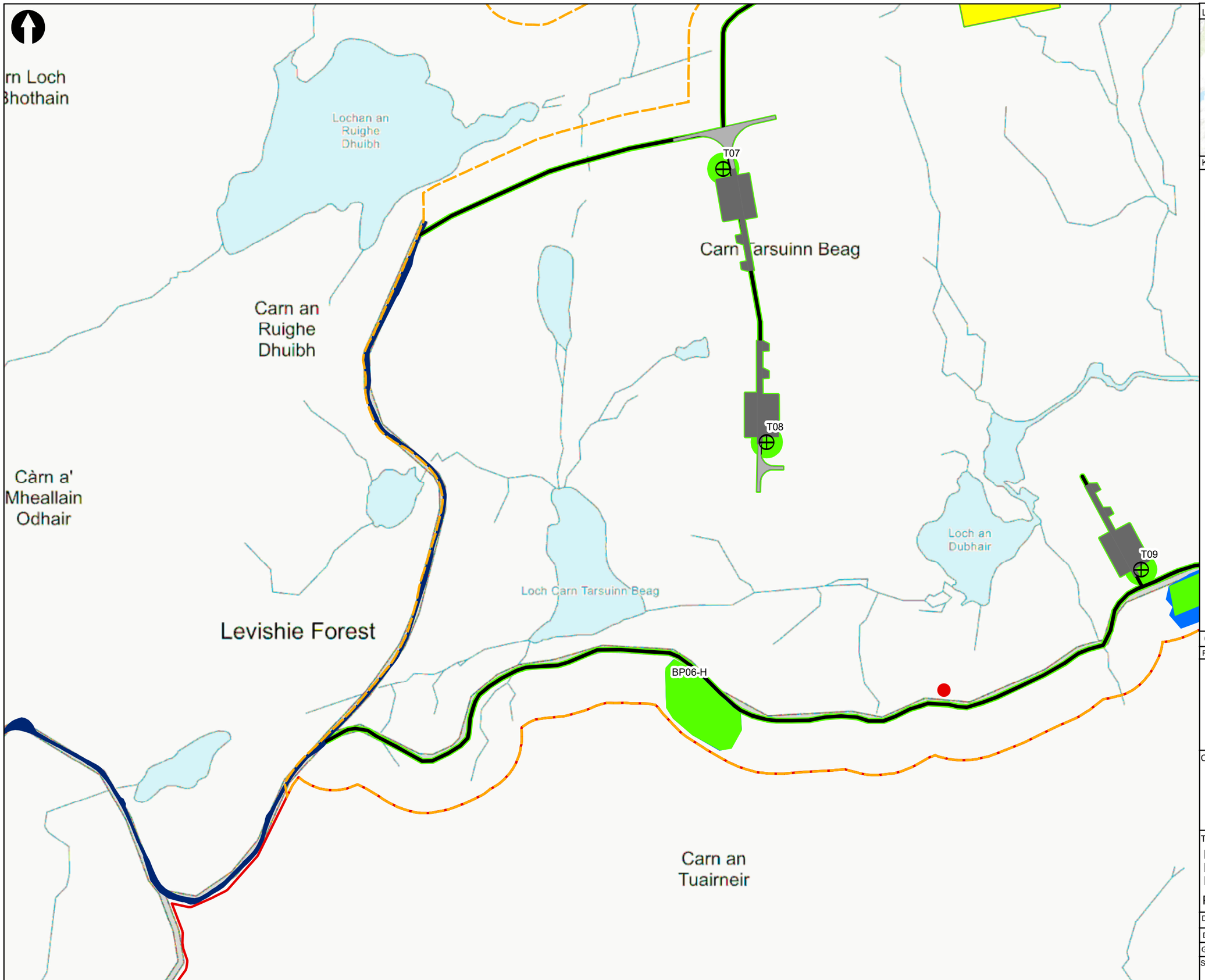

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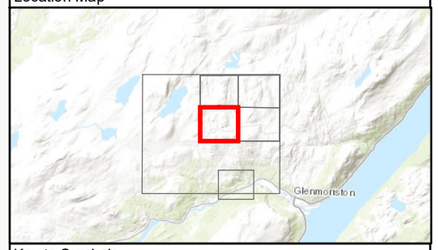

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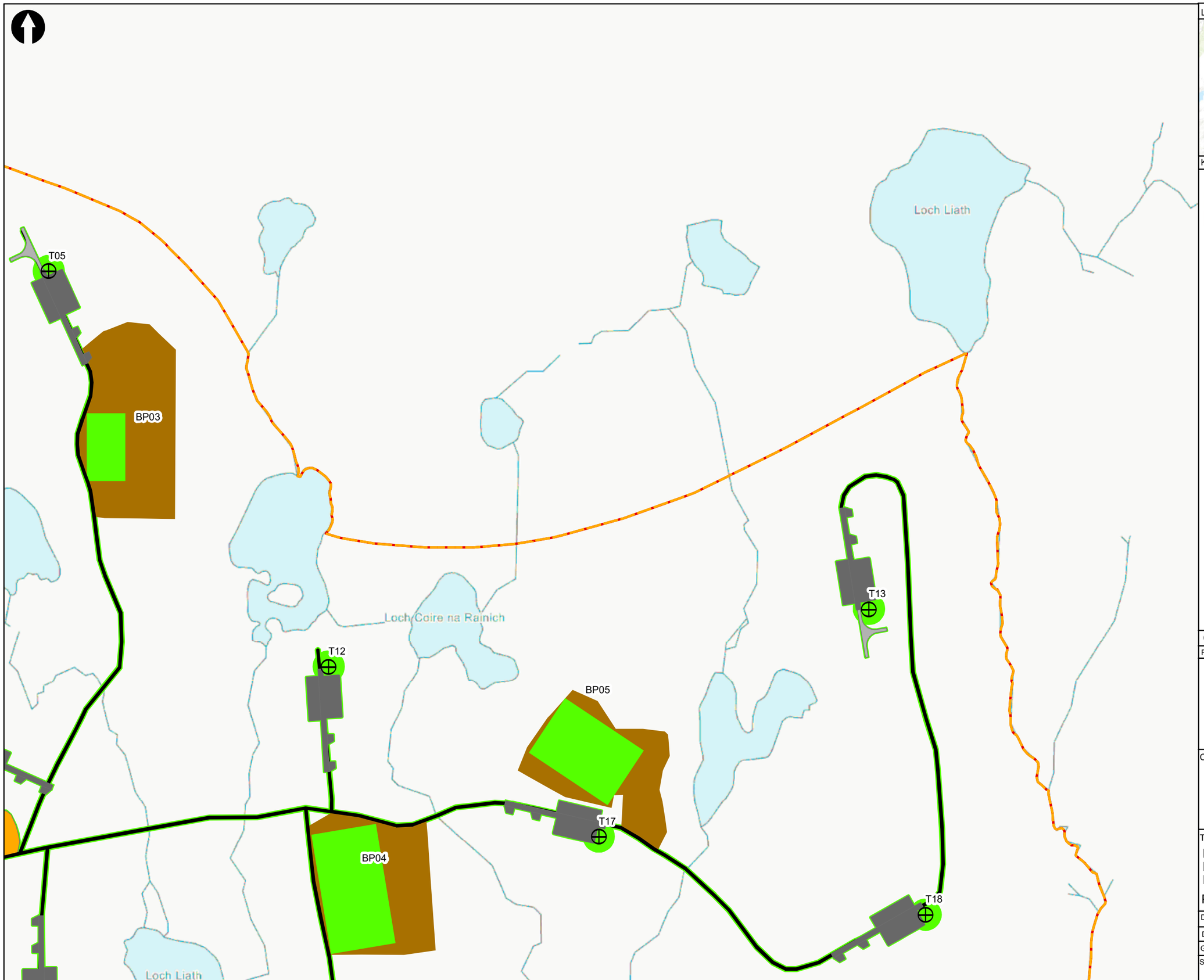

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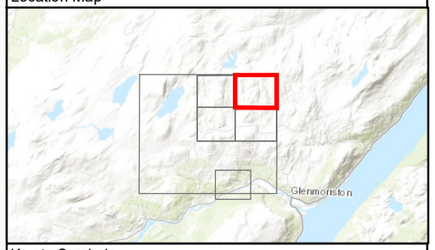

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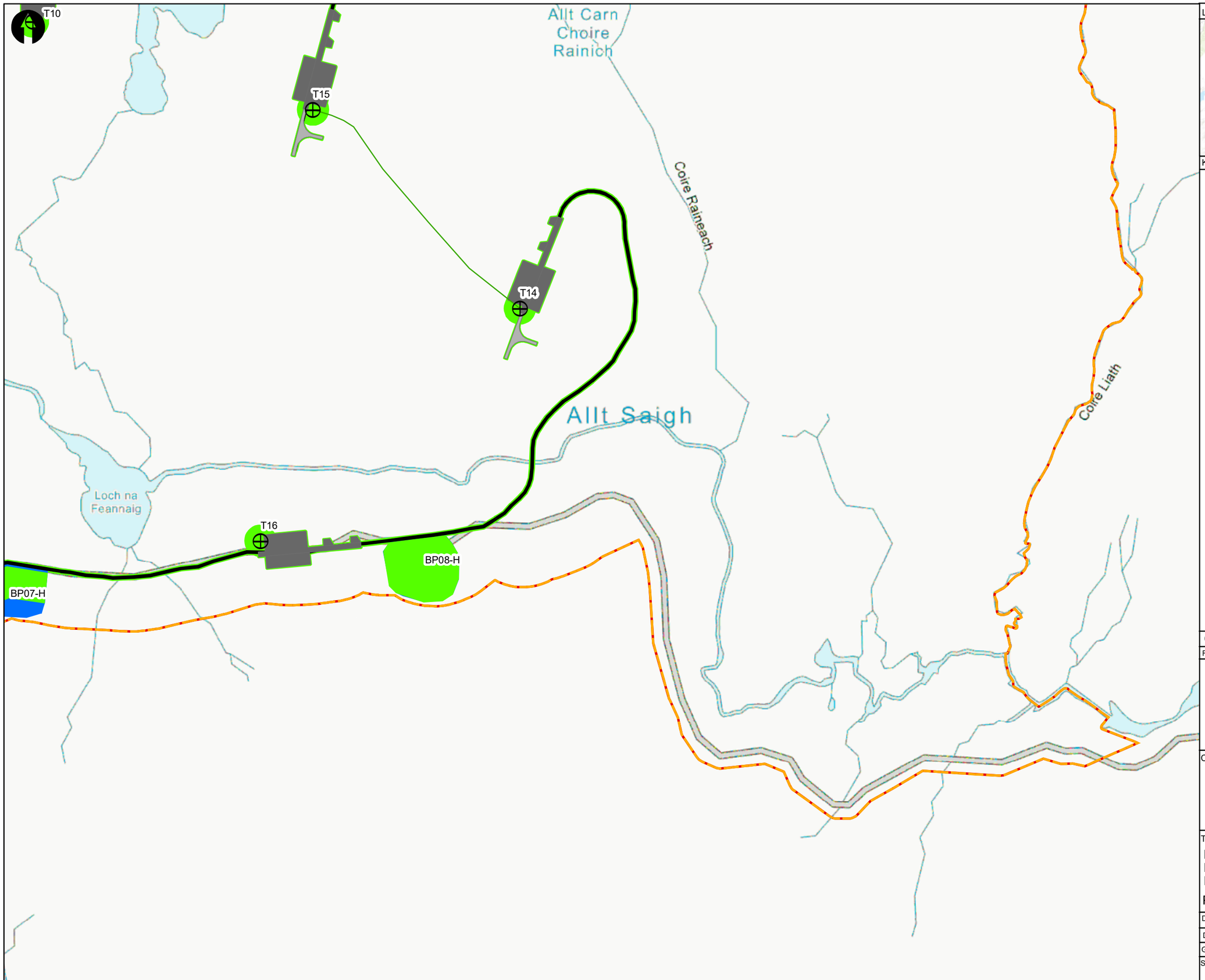

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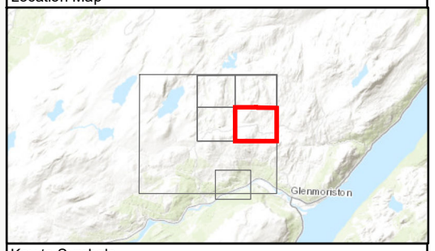

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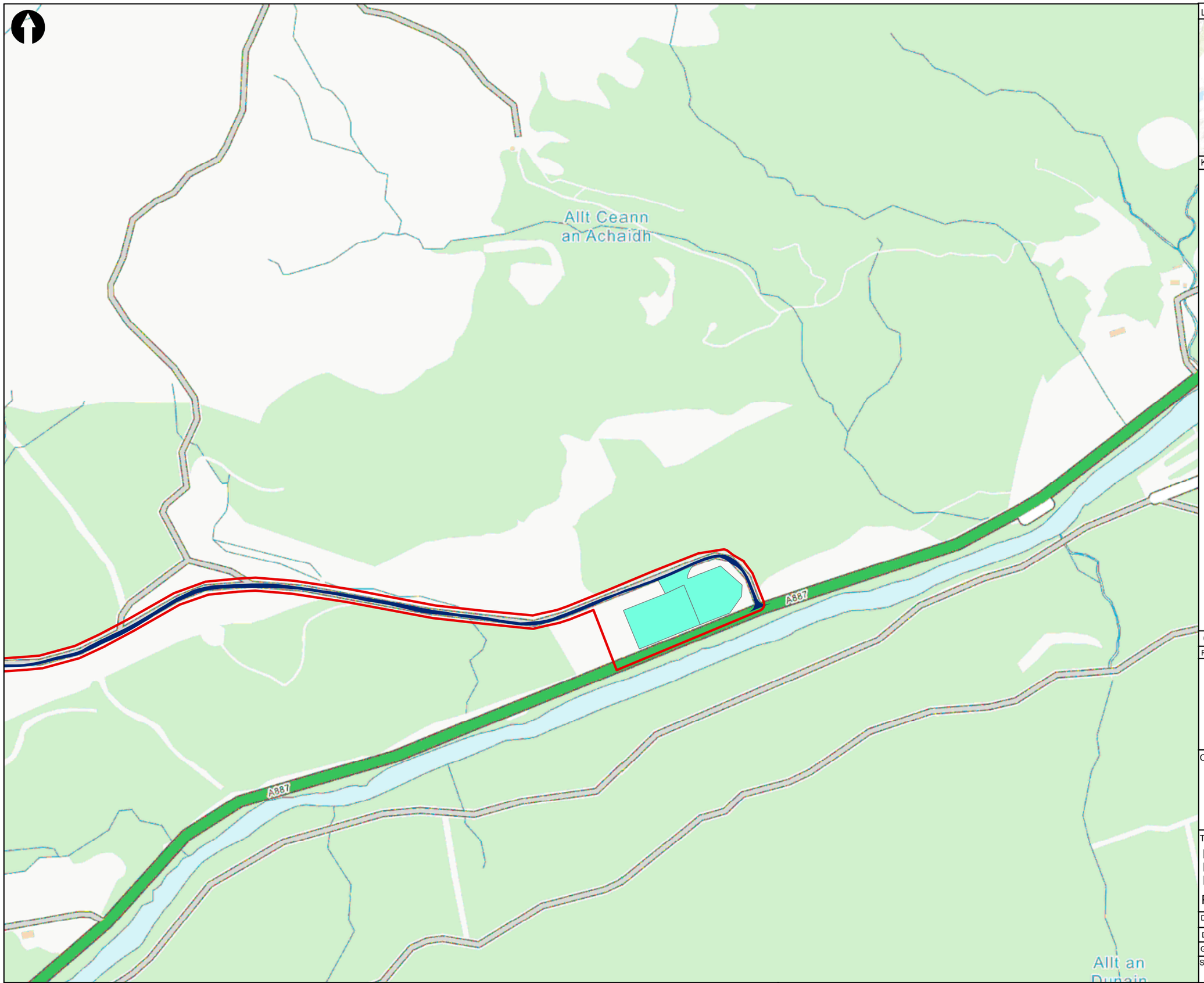
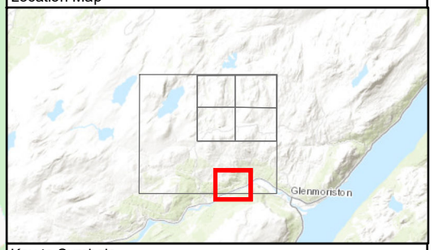
0 100 200 m



Location Map



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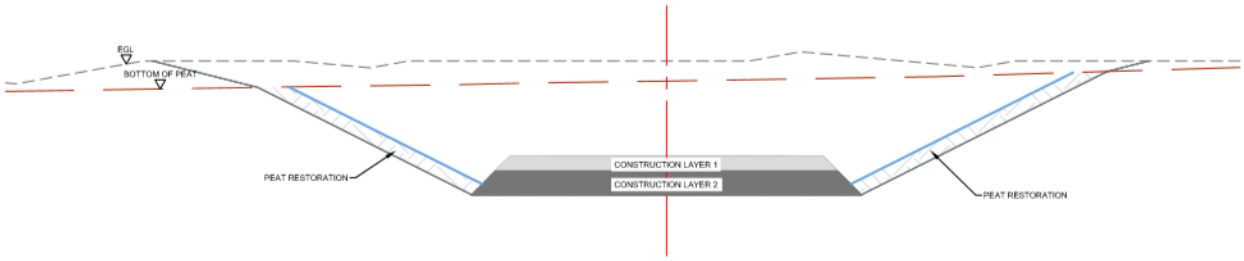
Drawing Number
MMD-100410845-DR-PMP-GIS-001

0 100 200 m

A.2 Indicative Track Profile with Peat Restoration

Figure A.2: Cut track profile with peat reinstatement



B. Calculations

B.1 Turbine Foundations

Table B.1: Excavation at Turbines

Turbine	Acrotelm Peat Volume (m^3)	Catotelm Peat Volume (m^3)	Total Peat Volume (m^3)
T01	340.137	73.692	413.829
T02	8.652	67.659	76.311
T03	228.016	130.984	359.00
T04	7.172	29.166	36.338
T05	62.916	9.574	72.49
T06	23.937	48.734	72.671
T07	9.784	3.612	13.396
T08	83.15	22.513	105.663
T09	20.907	15.084	35.991
T10	19.258	9.017	28.275
T11	13.315	122.90	136.215
T12	27.332	40.471	67.803
T13	1.888	0.016	1.904
T14	181.691	6.607	188.298
T15	0.013	62.757	62.77
T16	46.643	1.701	48.344
T17	84.617	0	94.617
T18	53.771	22.908	76.679
	1213.199	**667.395**	**1880.595**
	Total Acrotelm (m3)	**Total Catotelm (m3)**	**Total Peat (m^3)**

Table B.2: Restoration at Turbines

Aspect	Values
Assumed Restoration Peat Depth – Acrotelm (m)	0.25
Assumed Restoration Peat Depth – Catotelm (m)	0.25
Peat Reinstatement Volume – Acrotelm (m^3)	6,535.00
Peat Reinstatement Volume – Catotelm (m^3)	6,535.00
Total Peat Reinstatement Volume (m^3)	13,070.00

B.2 Hardstandings, Substation, Batching Plant and Compounds

Table B.3: Excavation at Hardstandings, Substation, Batching Plant and Compounds

ID	Acrotelm Peat Volume (m^3)	Catotelm Peat Volume (m^3)	Total Peat Volume (m^3)
Hardstandings	30779.86	28501.23	59281.11
Turning Heads	3343.424	2304.838	5648.262
Sub Station	5159.184	4111.032	9270.216
Batching Plant*	-	1,276.75	1,276.75
Satellite Compound*	-	724.35	724.35
Compound – Temp*	-	1,663.40	1,663.40
Compound – existing*	-	-	-
	39282.468	**38581.6**	**77864.088**
	Total Acrotelm (m3)	**Total Catotelm (m3)**	**Total Peat (m3)**

Note: * Calculated using 2D methods as 3D design not available for this area.

Table B.4: Restoration at Hardstandings, Substation, Batching Plant and Compounds

Aspect	Values
Assumed Restoration Peat Depth – Acrotelm (m)	0.50
Assumed Restoration Peat Depth – Catotelm (m)	0.50
Peat Reinstatement Volume – Acrotelm (m^3)	2,250.00
Peat Reinstatement Volume – Catotelm (m^3)	2,250.00
Total Peat Reinstatement Volume (m^3)	4,500.00

Note: Assumes total restoration area of 4,500m^2 (10% of total area) will be available around infrastructure

B.3 Access Tracks and Passing Places

Table B.5: Excavation at Access Tracks and Passing Places

ID	Acrotelm Peat Volume (m^3)	Catotelm Peat Volume (m^3)	Total Peat Volume (m^3)
Access Tracks	17387.33	29165.49	46552.81
18 Passing Places*	175.56	158.30	333.85
	17562.88	**29323.78**	**46886.66**
	Total Acrotelm (m3)	**Total Catotelm (m3)**	**Total Peat (m^3)**

Note: : * Calculated using 2D methods as 3D design not available for this area

Table B.6: Restoration at Access Tracks and Passing Places

Aspect	Values
Assumed Restoration Peat Depth – Acrotelm (m)	0.15
Assumed Restoration Peat Depth – Catotelm (m)	0.15
Peat Reinstatement Volume – Acrotelm (m^3)	15,980
Peat Reinstatement Volume – Catotelm (m^3)	15,980
Total Peat Reinstatement Volume (m^3)	31,960

Note: Assumes 0.30m of peat restoration 1m either side of all access tracks

B.4 Preferred Borrow Pits

Table B.7: Excavation at Preferred Borrow Pits

ID	Average Acrotelm Peat Depth (m)	Average Catotelm Peat Depth (m)	Average Total Peat Depth (m)	Acrotelm Peat Volume (m^3)	Catotelm Peat Volume (m^3)	Total Peat Volume (m^3)
BP02	0.15	0.17	0.32	1102.50	1255.89	2358.39
BP03	0.22	0.10	0.32	1597.21	749.13	2346.35
BP04	0.16	0.16	0.32	1176.00	1139.25	2315.25
BP06-H	0.13	0.03	0.16	955.50	220.50	1176.00
BP07-H	0.17	0.17	0.34	1249.50	1249.50	2499.00
BP08-H	0.16	0.00	0.16	1194.38	0.00	1194.38
				7,275.09	**4,614.28**	**11,889.37**
				Total Acrotelm (m3)	**Total Catotelm (m3)**	**Total Peat (m^3)**

Note: Only preferred borrow pits and their sizes have been included.

Table B.8: Restoration at Preferred Borrow Pits

Aspect	Values
Assumed Restoration Peat Depth – Acrotelm (m)	0.50
Assumed Restoration Peat Depth – Catotelm (m)	1.50
Peat Reinstatement Volume – Acrotelm (m^3)	29,602.50
Peat Reinstatement Volume – Catotelm (m^3)	82,887.00
Total Peat Reinstatement Volume (m^3)	112,489.50