Bhlaraidh Wind Farm Extension

Appendix 10.1: Borrow Pit Appraisal Report

June 2021

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Bhlaraidh Wind Farm Extension

Appendix 10.1: Borrow Pit Appraisal Report

June 2021

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
DRAFT	9 March 2021	[redacted]	[redacted]	[redacted]	DRAFT
FINAL v.1	25 May 2021	[redacted]	[redacted]	[redacted]	FINAL after ITPE and SSE comments
FINAL v.2	23 June 2021	[redacted]	[redacted]	[redacted]	FINAL after legal review

Document reference: 100410845 BB06 | 002 | FINAL.v.2

Information class: Standard

Contents

1 Introduction

As part of a review of the overall site layout for Bhlaraidh Wind Farm Extension, SSE Generation Limited (the Applicant) have appointed Mott MacDonald Limited to identify potential borrow pit (BP) locations through desktop review and select those carried forward as areas of search within the Proposed Development layout.

1.1 Description of the Development

The Proposed Development comprises:

- Up to 18 wind turbine generators (WTGs)
- Substation/Control building compound
- Temporary contractor's compounds
- Concrete batching plant
- Up to eight potential borrow pit locations
- 10.2km of new site access tracks

The Site layout, with the existing Bhlaraidh Wind Farm (Operational Development) in the west, is shown on Figure A.1 in Appendix A.

Crushed rock is required for the construction of the Proposed Development infrastructure and it is anticipated to source this material, where possible, from on-site borrow pits to reduce the need to import materials. In addition, rock extracted from borrow pits may be a suitable source of aggregate for on-site concrete batching.

For the purposes of borrow pit development it is necessary to identify rock of appropriate type and quality at shallow depth which may be extracted.

1.2 Scope

The scope of the assessment comprises the findings of a desk top review of available information, observations from the site reconnaissance survey and provides an assessment of the prevailing ground conditions as they relate to potential borrow pit locations. A description and assessment of the likely suitability of the borrow pit locations, and a summary of conclusions and recommendations for further investigation is outlined.

2 Desk Study

The desk study comprised an analysis of available published information relating to topography and geology of the Site, including a review of information provided for the adjacent Operational Development. In addition, a site reconnaissance survey was undertaken to identify potential suitable borrow pit locations. The sources of information used to inform this desk study are provided below:

- Digital Aerial Photography, ESRI [1]
- British Geological Survey (BGS) Onshore GeoIndex Viewer [2]
- BGS Onshore GeoIndex - Hydrogeology Viewer [3]
- BGS Superficial Geology Map Sheet 73W Invermoriston; 1:50,000 Geological Mapping [4]
- BGS Solid Geology Map Sheet 73W Invermoriston; 1:50,000 Geological Mapping [5]
- Mott Macdonald; Bhlaraidh Wind Farm Borrow Pit Assessment; June 2012 [6]
- Mott MacDonald; Bhlaraidh Wind Farm Extension, Peat Stability Risk Assessment, March 2021 [7]
- Digital Terrain Model; OS Terrain 5 digital terrain model (DTM) data.

2.1 Superficial Geology and Soils

The 1:50,000 BGS Superficial Geology Map (Ref. [2]) [4] indicates that superficial cover is absent across the majority of the Site, suggesting that bedrock is at or close to the surface. Peat is indicated to be present in a number of localised areas across the Proposed Development, predominantly within topographical depressions or adjacent to waterbodies.

Peat probing across the Site indicated peat depths were typically between 0.5 and 1m thick, with the thickest deposits recorded being >2.5m thick. Thick peat was recorded at localised areas near the proposed access tracks, near proposed turbine locations T04, T05, T06, T10, T15, T18 and near the proposed substation in the centre of the Proposed Development. [7].

Historical ground investigation records are available for the Operational Development [8], in the west of the Site, however this only partially over laps the western extent of the Proposed Development to the east of the Site. Boreholes along the western extent of the Proposed Development (BHT26, BHT31 and BHT32) recorded the superficial deposits to comprise peat to a depth of between 0.4 to 0.9mbgl, underlain by a thin layer of sand (0.9 to 1.2mbgl) at BHT32 in the south west.

2.2 Solid Geology

The 1:50,000 BGS Bedrock Geology Map [2] and BGS Solid Geology Map Sheet 73W [5] indicate that the solid geology underlying the Site comprises psammite with micaceous layers and calc-silicate pods of the Upper Garry Psammite Formation in the west of the Site (also known as the Tarvie Psammite Formation), and interbedded psammite and semipelite of the Achnaconeran Striped Formation in the east of the Proposed Development.

Proposed turbine location T02 in the west of the Proposed Development is underlain by semipelite with relic kyanite porphyroplasts of the Tarvie Psammite Formation.

A small number of localised and minor unnamed igneous intrusions are indicated across the Site, recorded to comprise amphibolite and hornblende schist of Pre-Cambrian age.

During the site reconnaissance survey, outcrops were visible across the majority of the Proposed Development.

Historical ground investigation undertaken along the western extent of the Proposed Development (BHT26, BHT31 and BHT32) recorded the solid geology to comprise Psammite to a depth of between 0.5 to 7.2mbgl.

The Site layout overlain with solid geology is shown on Figure A.2 in Appendix A.

2.3 Structural Geology

A number of faults are inferred across the western half of the Proposed Development (Refs. [2] and [5]) and generally trend northeast to southwest. The axial plane of a major synform is indicated to underlie turbine location T02 in the west of the Proposed Development.

An axial plane trace of an antiform and an axial plane trace of a synform are indicated west of the Proposed Development, located generally parallel, and trending north to south.

3 Borrow Pit Appraisal

A site reconnaissance survey was undertaken by Mott MacDonald geologists in 2019 and 2020 during the two phases of peat probing, with a subsequent specific borrow pit site visit also undertaken in 2020.

In identifying potential borrow pit locations, consideration was given to the practical aspects of borrow pit development, including ease of access for development, proximity to likely access track alignments and areas where borrow pit development would not have a high visual impact or impact upon environmentally sensitive areas.

A subjective visual assessment was undertaken at each location which included for:

- General site topography;
- Identification of rock type, where possible;
- Estimated thickness and classification of overburden material;
- Photographic record of any rock exposures encountered; and
- Visual inspection of hand specimens of typical rock types observed (where available).

It should be noted that no intrusive ground investigations have been undertaken at this stage. A site-specific ground investigation would be required to confirm any assumptions made with regards to geotechnical properties and suitability of the potential rock resources for use during construction of the Proposed Development.

Through development of the site layout and discussions with the EIA team, eight locations have been selected for potential extraction during construction of the wind farm. Three of these locations are positioned along an existing track to the south of the Site, which have been worked previously and have been identified as having potential to be re-worked to extract further material for use in construction. The rock types that are potentially available at the eight identified borrow pit search areas are expected to comprise mainly psammite and semi-pelite.

The rock types have been assumed based on geological mapping for the majority of the borrow pits. Dimensions of the borrow pits and volumes of rock have been estimated based on cross-sectional areas through a digital terrain model (DTM), these are required to be confirmed by future intrusive ground investigation works.

Table 3.1 provides a summary of the geology and site observations at the eight potential borrow pits identified by Mott MacDonald which were visited during the site reconnaissance surveys.

Table 3.1: Summary of Potential Borrow Pits and Estimated Volumes

Borrow Pit No.	Location	Estimated Peat Thickness (m) [1]	Geology	Comments/ Observations	Estimated Extractable Volume (m^3)
BP01	East of access track to T02	0.50	Tarvie Psammite Formation – Psammite. Unnamed Igneous Intrusion, Pre-Caledonian - Amphibolite And Hornblende Schist.	Rock visible at surface, particularly in the eastern half. Assumed to be psammite in the north; and amphibolite and hornblende schist in the south based on geological mapping. Less favourable geology due to variation in strata types across BP footprint,	50,000

Borrow Pit No.	Location	Estimated Peat Thickness (m) [1]	Geology	Comments/ Observations	Estimated Extractable Volume (m^3)
BP02	West of access track between T11 and T03	0.50	Tarvie Psammite Formation - Psammite	Rock visible at surface, particularly in the western half. Assumed to be psammite based on geological mapping.	31,000
BP03	East of access track to T05	0.50	Achnaconeran Striped Formation - Psammite and Semipelite	Rock visible at surface, particularly in the central section. Assumed to be psammite and semipelite based on geological mapping.	34,000
BP04	East of access track to T15, south of main east-west access track from the substation and batching plant	1.00	Achnaconeran Striped Formation - Psammite and Semipelite	Rock visible at surface, across the majority of the area. Assumed to be psammite and semipelite based on geological mapping.	112,000
BP05	North of T17 and main east-west access track from the substation and batching plant	0.50	Achnaconeran Striped Formation - Psammite and Semipelite	Rock visible at surface, particularly in the western section. Assumed to be psammite and semipelite based on geological mapping. Variable geology across the borrow pit footprint.	87,000
BP06-H	South of access track to T09	0.50	Tarvie Psammite Formation - Psammite	Rock visible at surface, particularly in the western section. Assumed to be psammite based on geological mapping.	52,000
BP07-H	South of access track between T09 and T16	0.50	Tarvie Psammite Formation – Psammite	Existing minor borrow pit, assumed to have been utilised for the existing track. Visible outcrops of rock observed to be thickly bedded psammite with numerous fractures. Rock visible in existing small excavation. (Achnaconeran Striped Formation - Psammite And Semipelite along the eastern boundary)	36,000
BP08-H	South of access track between T16 and T14	0.20	Achnaconeran Striped Formation - Psammite and Semipelite	Rock visible at surface, particularly in the western section. Assumed to be psammite based on geological mapping.	50,000
				TOTAL (not including BP01 and BP05)	**315,000**

Notes: 1 – Estimated peat thickness from PSRA [7]

The preferred borrow pit locations and estimated extractable volumes have been calculated based on the following assumptions:

- Borrow pit to be sited within the borrow pit search areas.

- Preference given to sites with the most favourable rock types.
- Borrow pit slope heights to be no more than 15m high and assumed 45 degree (1:1) side slopes – this dictates the overall potential size for the borrow pit in theory, however the actual profile of borrow pits is likely to different.
- Volume calculated to include for a 1.3 bulking factor and also 20% wastage, then rounded down to the nearest 1000m^3.

The location of the eight potential borrow pit search areas is shown on Figure A.1 and Figure A.2, and individual drawings for the preferred borrow pits are shown on Figures A.3 to A.10 in Appendix A.

Figure 3.1: Photograph of existing excavation at BP7-H

Source: Photograph taken by Mott MacDonald, 25 September 2020.

Borrow pits have also been sized based on the estimated aggregate volumes required for site construction.

The total estimated aggregate requirement (derived using the AutoCAD Civils 3D model) is 196,000m^3, and proposed borrow pits have been sized such that a potential volume of greater than 300,000m^3 could be made available. Note that this does not include for any rock excavated as part of the construction, which may be suitable for re-use providing it meets the specified requirements.

Note that the aggregate requirement was calculated based on the following assumed earthworks thicknesses:

- turbine hard standings – 1.0m
- turning heads - 0.8m
- substation platform – 1.0m
- batching plant – 2.0m
- Site / construction compounds – 1.0m
- Access tracks and passing places - 0.8m
- Hydro track upgrade – assumed to require a full depth of track make up of 0.8m
- existing windfarm tracks - 0.3m

4 Conclusions and Recommendations

4.1 Conclusions

4.1.1 Quality and Rock Type Properties

The inferred quality of rock is based on a subjective visual assessment of rock outcrops and these descriptions will require to be verified by intrusive ground investigation, sampling and material laboratory testing.

4.1.1.1 Psammite

Psammite, a metamorphosed sandstone is present within the Site, and is noted to be occasionally interbedded with semi-pelite. Psammite is considered to be a suitable rock resource for the construction of the majority of the proposed wind farm infrastructure, including the temporary construction compounds, crane hardstanding areas, new access tracks and track lay-by areas. Where psammite is micaceous, this would not be considered suitable for use as surface wearing course/capping material.

4.1.1.2 Semi-pelite

Semi-pelite, a metamorphic rock with a fine-grained matrix is present across the Site and is noted to be interbedded with psammite. Generally, semi-pelite is considered to be a suitable rock resource for the construction of the majority of the proposed wind farm infrastructure.

Due to its argillaceous nature, its use in construction may be limited to general fill. Laboratory testing will be required to assess suitability. Where semi-pelite is micaceous, this would not be considered suitable for use as surface wearing course / capping material. Where interbedded with other rock types, additional processing may be required to separate out the borrow pit material for different uses during construction.

4.1.1.3 Amphibolite and Hornblende Schist (BP01 only)

Schist, a metamorphic rock with fine grained matrix and visibly foliated crystalline structure is present in BP01. Generally, schist is considered to be a suitable rock resource for the construction of the majority of the proposed wind farm infrastructure.

Due to its argillaceous nature, its use in construction may be limited to general fill. Laboratory testing will be required to assess suitability. Where schist is micaceous, this would not be considered suitable for use as surface wearing course / capping material. Where interbedded with other rock types, additional processing may be required to separate out the borrow pit material for different uses during construction.

4.1.2 Volumes

Based on the estimated aggregate requirement of 196,000m^3 the borrow pits have been sized such that a potential volume of greater than 300,000m^3 could be made available. Note that this does not include for any rock excavated as part of the construction, which may be suitable for re-use providing it meets the specified requirements.

To achieve the demand for aggregate, the preferred borrow pits for extraction would include borrow pits BP2, BP3, BP4, BP6-H, BP7-H, BP8-H based on likely geology and location. These borrow pits could potentially provide suitable aggregate of an estimated 315,000m^3. However, rock suitability is required to be confirmed by site investigation and therefore all eight borrow pit search areas should be investigated for their potential to provide aggregate.

4.1.3 Limitations

It should be noted that the actual locations and extents of extraction areas within each borrow pit may change during the project development i.e. following a detailed intrusive ground investigation at the proposed locations.

The volumes of potential borrow pits may vary, depending on:

- Natural variations in rock material quality;
- The presence and depth of highly and moderately weathered zones;
- Offset of favourable rock type caused by faulting;
- Thickness of overburden;
- Access constraints to borrow pits (i.e. slope gradients);
- Planning consent and environmental constraints; and
- Methods of excavation.

The majority of locations have been chosen based on topography, geological desk based review and their previous use (if relevant).

These limitations above have been mitigated where possible by seeking consent for borrow pits with the potential to yield more material than we anticipate is necessary to allow for some of the above variables.

4.2 Summary

From the information gathered, it is concluded that:

- A total of eight borrow pits has been identified within the Site (as shown on Figure A.1)
- Figures A.3 to A.10 in Appendix A show the proposed boundaries of BP01, BP02, BP03, BP04, BP05, BP06-H, BP07-H and BP08-H.
- The potential rock resources that can be won from within the Site boundary predominantly comprise Psammite and banded Psammite and Semi-Pelite
- BP01 and BP05 are shown on published geological maps to comprise lithologies which may be less favourable for construction purposes. Additional processing may be required in these locations to separate out poorer quality rock from better lithologies.
- Rock is generally visible as outcrop across the Site, with the majority of borrow pit locations chosen with favourable topography and geographical location within the Site.
- Overburden thickness is likely to vary at each borrow pit location.
- Anticipated aggregate volumes are shown on Figures A.3 to A.10, along with indicative sections through the proposed search areas.
- Psammite is considered to be a suitable rock aggregate resource for surfacing and sub-base material for unbound tracks and hardstanding areas such as turbine crane assembly areas and construction compound. It may be suitable for use as concrete aggregate subject to geochemical laboratory testing. Banded Psammite and Semi-pelite, and Amphibolite Hornblende Schist may be suitable for use as a general fill.
- Weathering of the rock, as well as potential faulting, will impact on the geotechnical properties and suitability for re-use during construction. There will be a requirement to manage unsuitable material and extend existing excavations into less weathered 'fresh' and un-faulted rock to obtain sufficient quality for the purposes outlined above.
- Further intrusive investigation is required to determine rock quality and estimate potential volume available for extraction. It is considered that all eight borrow pit locations may not be needed in terms of required material volumes, however, all eight are being proposed as search areas due to the potential for unsuitable rock types being encountered during

investigation and due to the significant site extents. For those borrow pits to be opened during construction, it is not anticipated that the full search areas will be required to be exploited.

4.3 Recommendations

Subject to consent an intrusive ground investigation should be undertaken to investigate the nature of the rock (i.e. rock type and quality) and determine resource quantities at each of the eight potential borrow pit locations.

The ground investigation should comprise rotary cored boreholes in addition to trial pits, to determine the thickness of overburden i.e. depth to ‘fresh’ (unweathered) rock and practicable depth of excavation. In addition, consideration should also be given to the stability of slopes formed by borrow pit workings, particularly in fractured rock strata and overlying superficial materials around the margins of any borrow pit.

An engineering geologist should inspect the borrow pit during construction to ascertain depth to competent material. It is also recommended that samples of rock are obtained during the ground investigation for geotechnical and aggregate laboratory testing to establish rock parameters for use during construction.

5 References

[1] ERSI, “Digital Aerial Photography”.

[2] British Geological Survey (BGS), “BGS Onshore GeoIndex Viewer,” [Online]. Available: http://mapapps2.bgs.ac.uk/geoindex/home.html. [Accessed February 2021].

[3] British Geological Survey (BGS), “Onshore GeoIndex - Hydrogeology Viewer”.

[4] British Geological Survey (BGS), “Superficial Geology Map Sheet 73W Invermoriston,” 2012.

[5] British Gelogical Survey (BGS), “Solid Geology Map Sheet 73W - Invermoriston,” 1993.

[6] Mott MacDonald Limited, “Bhlaraidh Wind Farm, Borow Pit Assessment Report, Rev C,” June 2012.

[7] Mott MacDonald Limited, “Bhlaraidh Wind Farm Extension, Peat Stability Risk Assessment (PSRA) Report,,” March 2021.

[8] BAM Ritchies, “Ground Investigation Report, Bhlaraidh Wind Farm,” September 2015.

A. Figures

A.1 Borrow Pit Search Areas

A.2 Borrow Pit Search Areas and Solid Geology

A.3 Borrow Pit BP01

A.4 Borrow Pit BP02

A.5 Borrow Pit BP03

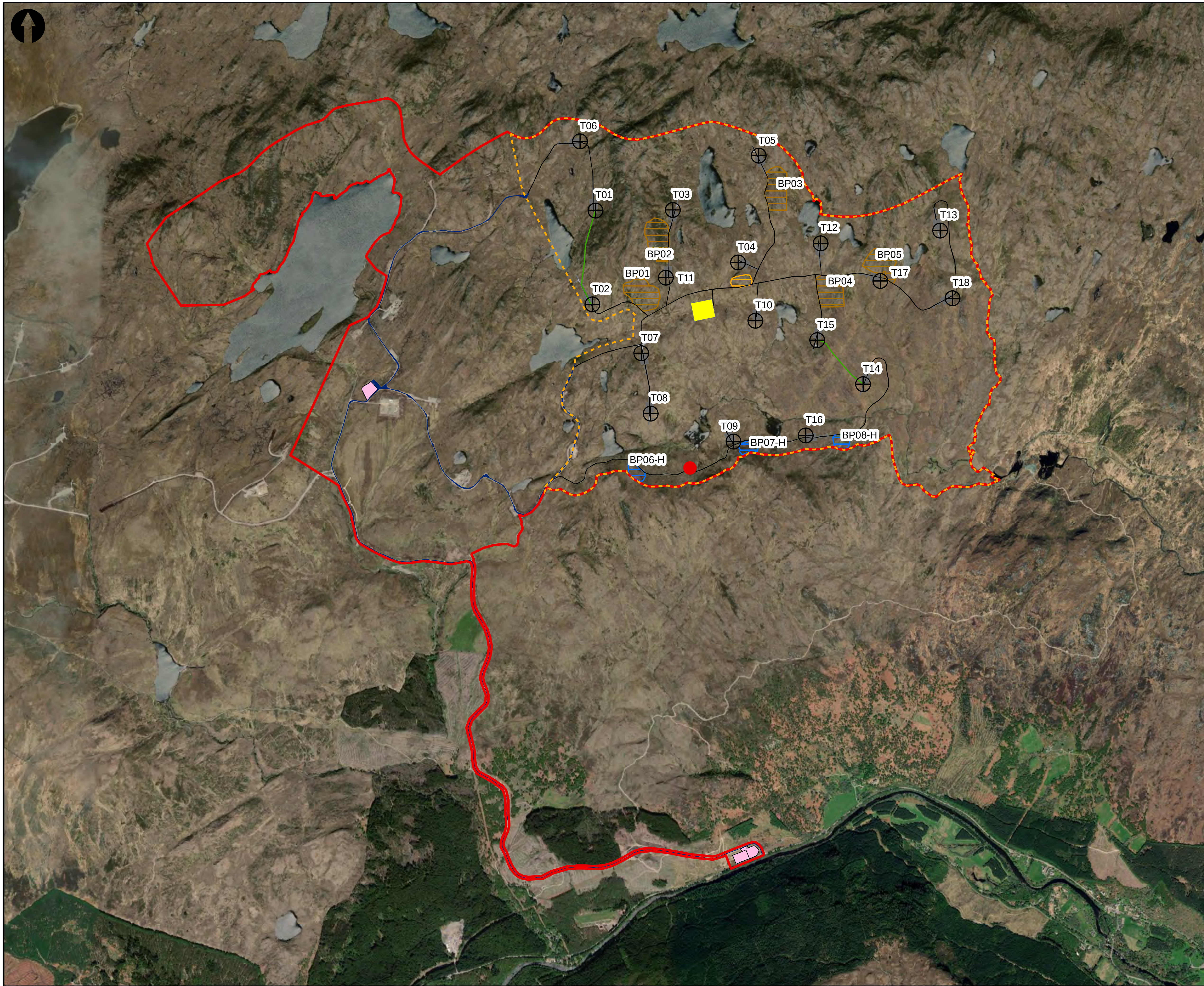
A.6 Borrow Pit BP04

A.7 Borrow Pit BP05

A.8 Borrow Pit BP06-H

A.9 Borrow Pit BP07-H

A.10 Borrow Pit BP08-H



Location Map

Key to Symbols

- Turbine Development Area
- Site Boundary
- Bhlaraidh Extension Turbine
- LiDAR
- Proposed Cross Country Cable Route
- Access route via existing wind farm track
- New Track
- Bhlaraidh Extension Substation
- Batching Plant Serch Area
- Borrow Pits Search Area
- Hydro Borrow Pits Search Area
- Hardstanding Area
- Turning_Heads
- Temporary_Construction_Compound

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02	20/05/21	SEY	For Information	AT	--

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Title

Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)
Figure A.1 - Borrow Pit Search Areas
Overview

Designed	S Eyers-Young	Eng Check	A Tourish
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GIS Check	J Lawie	Approved	--

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Location Map

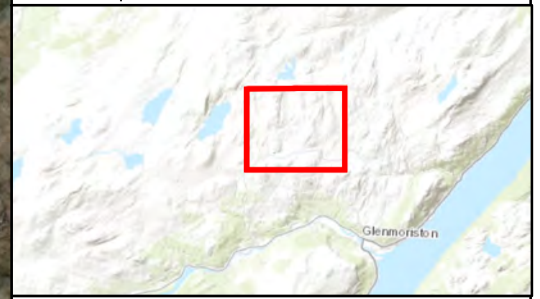

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Figure A.1 - Borrow Pit Search Areas
Turbine Development Area

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GIS Check	J Lawie	Approved	--

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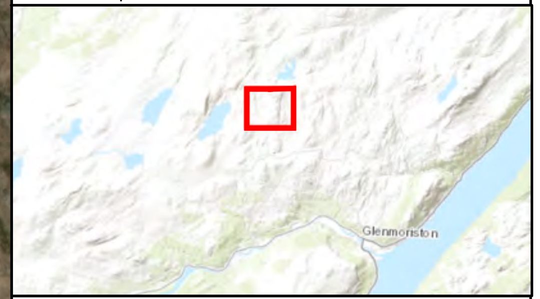

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Figure A.1 - Borrow Pit Search Areas

Page 1

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Location Map

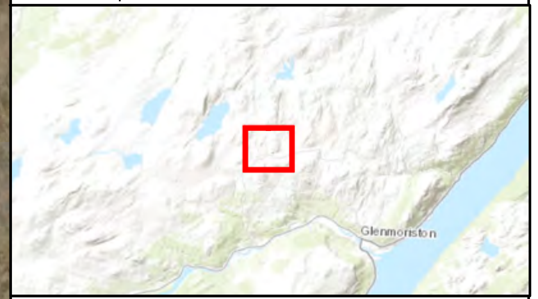

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Figure A.1 - Borrow Pit Search Areas
Page 2

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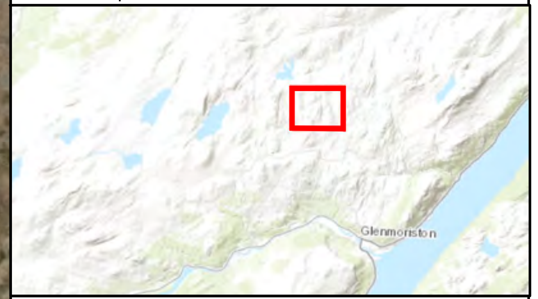

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Figure A.1 - Borrow Pit Search Areas
Page 3

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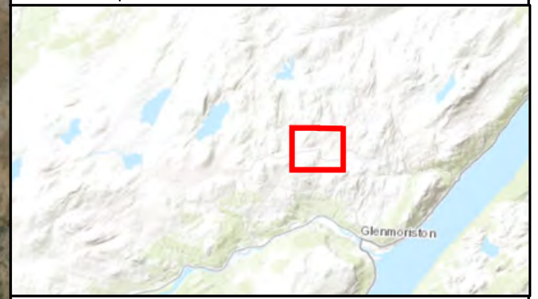

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Figure A.1 - Borrow Pit Search Areas
Page 4

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GIS Check	J Lawie	Approved	--

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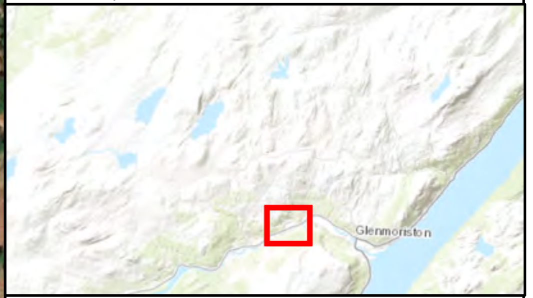

Key to Symbols

- Turbine Development Area
- Site Boundary
- Bhlaraidh Extension Turbine
- LiDAR
- Proposed Cross Country Cable Route
- Access route via existing wind farm track
- New Track
- Bhlaraidh Extension Substation
- Batching Plant Serch Area
- Borrow Pits Search Area
- Hydro Borrow Pits Search Area
- Hardstanding Area
- Turning_Heads
- Temporary_Construction_Compound

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

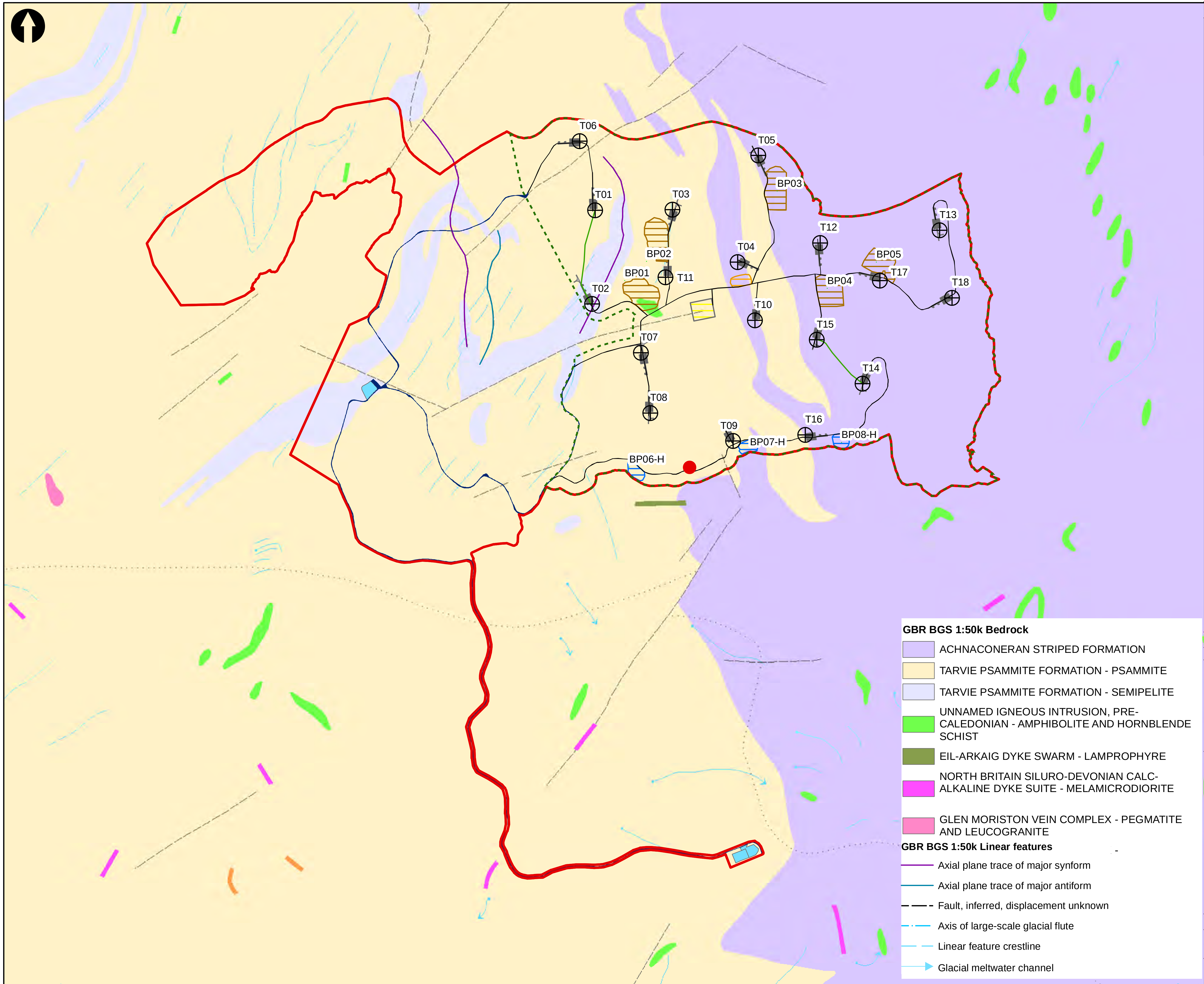
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)
Figure A.1 - Borrow Pit Search Areas
Page 5

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

Scale at A3	Status	Rev	Security
1:5,500	FI	02	STD

0 100 200 m

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



GBR BGS 1:50k Bedrock

- ACHNACONERAN STRIPED FORMATION
- TARVIE PSAMMITE FORMATION - PSAMMITE
- TARVIE PSAMMITE FORMATION - SEMIPELITE
- UNNAMED IGNEOUS INTRUSION, PRE-CALEDONIAN - AMPHIBOLITE AND HORNBLENDE SCHIST
- EIL-ARKAIG DYKE SWARM - LAMPROPHYRE
- NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE - MELAMICRODIORITE
- GLEN MORISTON VEIN COMPLEX - PEGMATITE AND LEUCOGRANITE

GBR BGS 1:50k Linear features

- Axial plane trace of major synform
- Axial plane trace of major antiform
- Fault, inferred, displacement unknown
- Axis of large-scale glacial flute
- Linear feature crestline
- Glacial meltwater channel

Location Map

Key to Symbols

- Turbine Development Area
- Site Boundary
- Bhlaraidh Extension Turbine
- LiDAR
- Proposed Cross Country Cable Route
- Access route via existing wind farm track
- New Track
- Bhlaraidh Extension Substation
- Batching Plant Search Area
- Borrow Pits Search Area
- Hydro Borrow Pits Search Area
- Hardstanding Area
- Turning_Heads
- Temporary Construction Compound

Rev	Date	Drawn	Description	Ch'k'd	App'd
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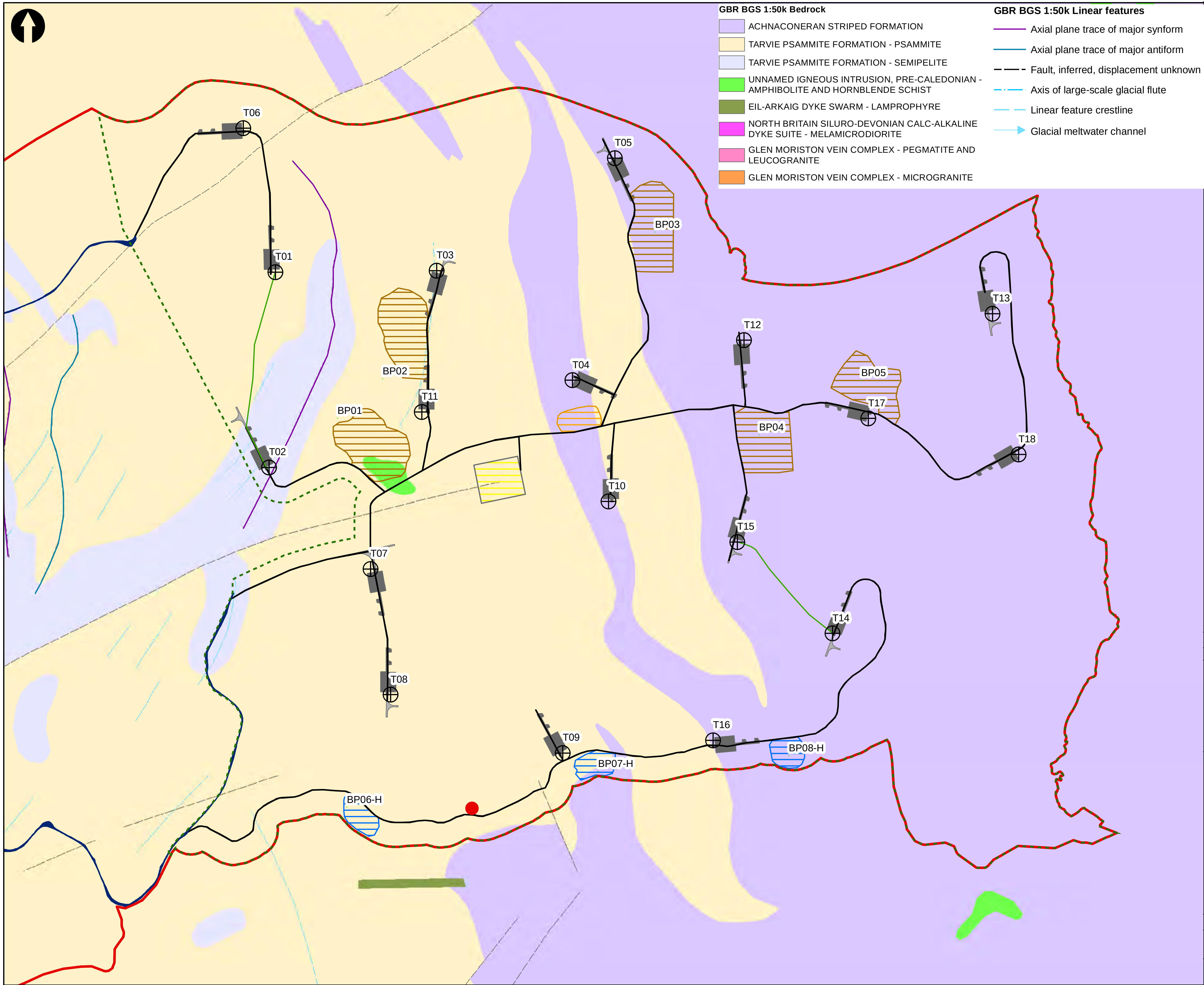
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)
Figure A.2 - Borrow Pit Search Area and Solid Geology Overview

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

Scale at A3	Status	Rev	Security
1:25,000	FI	02	STD

0 490 980 m

Drawing Number
MMD-100410845-DR-BPAR-GIS-002



Location Map

Key to Symbols

Turbine Development Area

Site Boundary

Bhlaraidh Extension Turbine

LiDAR

Proposed Cross Country Cable Route

Access route via existing wind farm track

New Track

Bhlaraidh Extension Substation

Batching Plant Search Area

Borrow Pits Search Area

Hydro Borrow Pits Search Area

Hardstanding Area

Turning_Heads

Rev	Date	Drawn	Description	Ch'k'd	App'd
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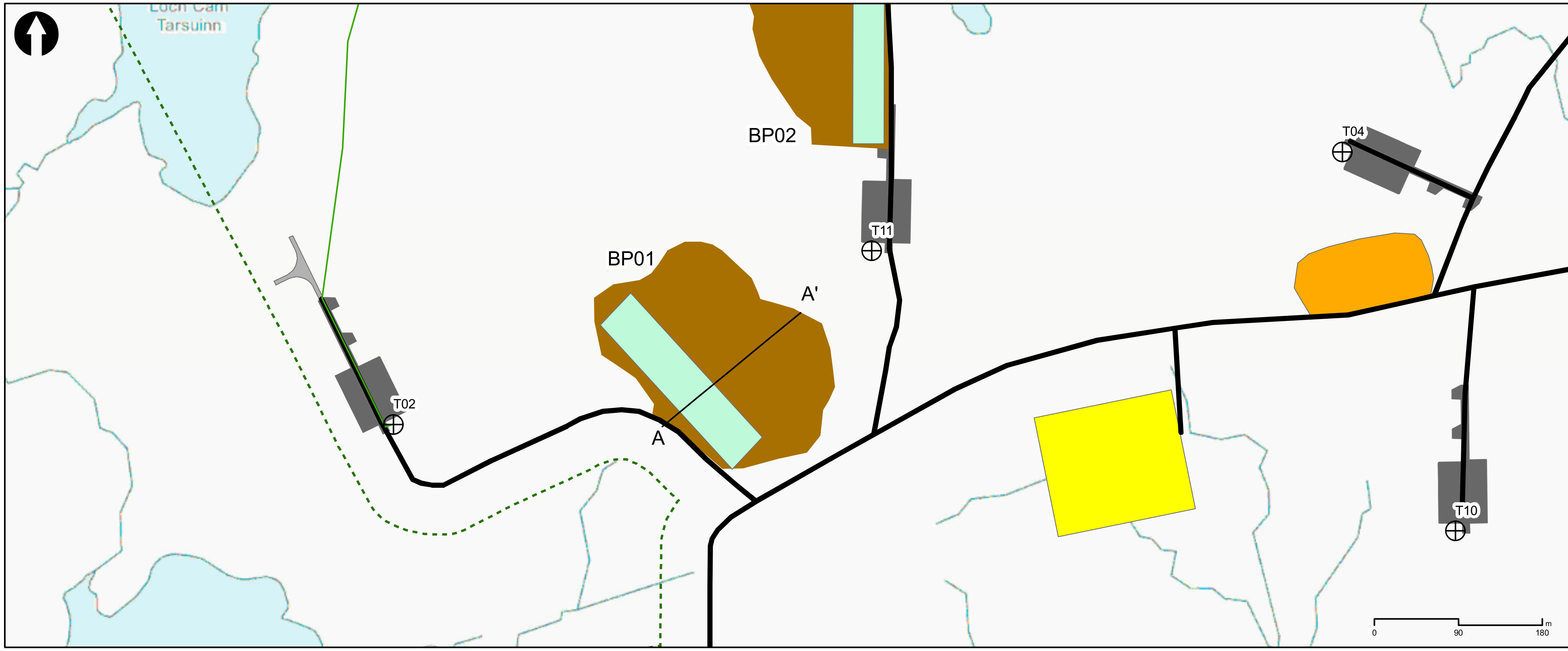
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)
Figure A.2 - Borrow Pit Search Area and Solid Geology
Turbine Development Area

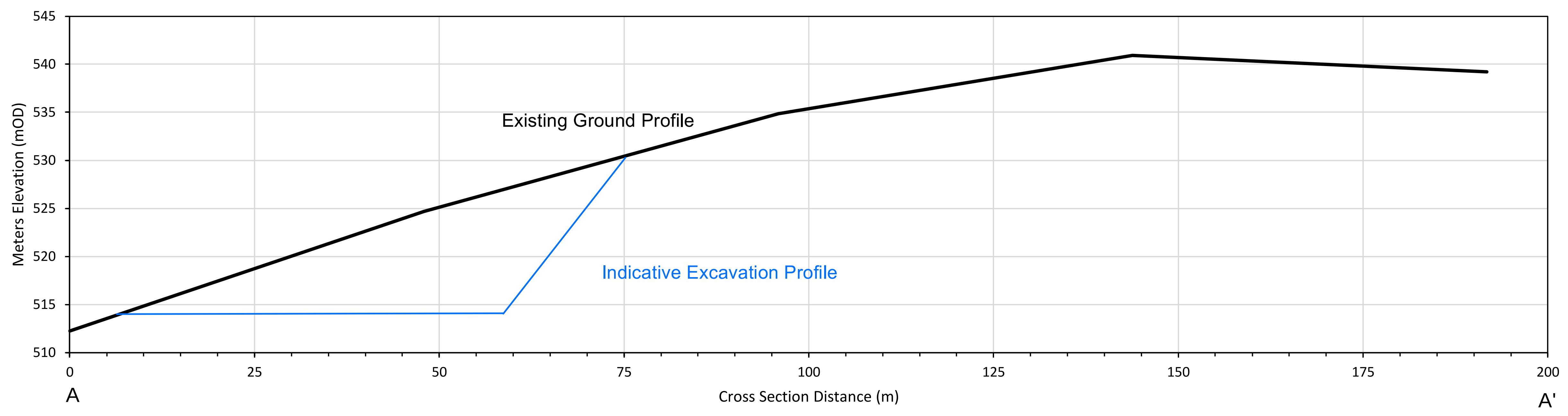
Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	J Lawie	Approved	--

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

0 230 460 m

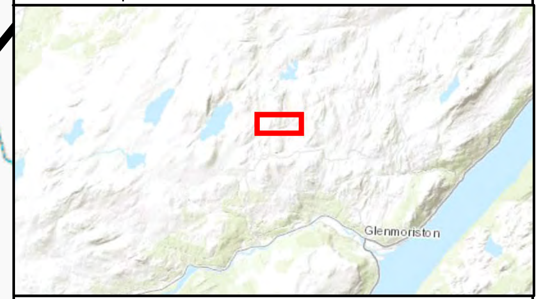
Drawing Number
MMD-100410845-DR-BPAR-GIS-002





	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP1	0.5	0.5	210	53	513	15	1.0	7980	273	49,140	49,000	50,960	50,000	Psammite and Amhiolite & Hornblende Schist

Location Map



Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- Proposed Cross Country Cable Route
- New Track
- Bhlaraidh Extension Substation
- Batching Plant Search Area
- Borrow Pits Search Area
- Hardstanding Areas
- Turning Heads

Rev	Date	Drawn	Description	Ch'k'd	App'd
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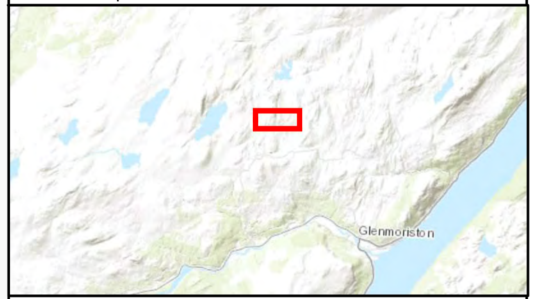
Figure A.3 - Borrow Pit BP01
Borrow Pit Appraisal Report (BPAR)
Bhlaraidh Wind Farm Extension

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	-	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	01	STD

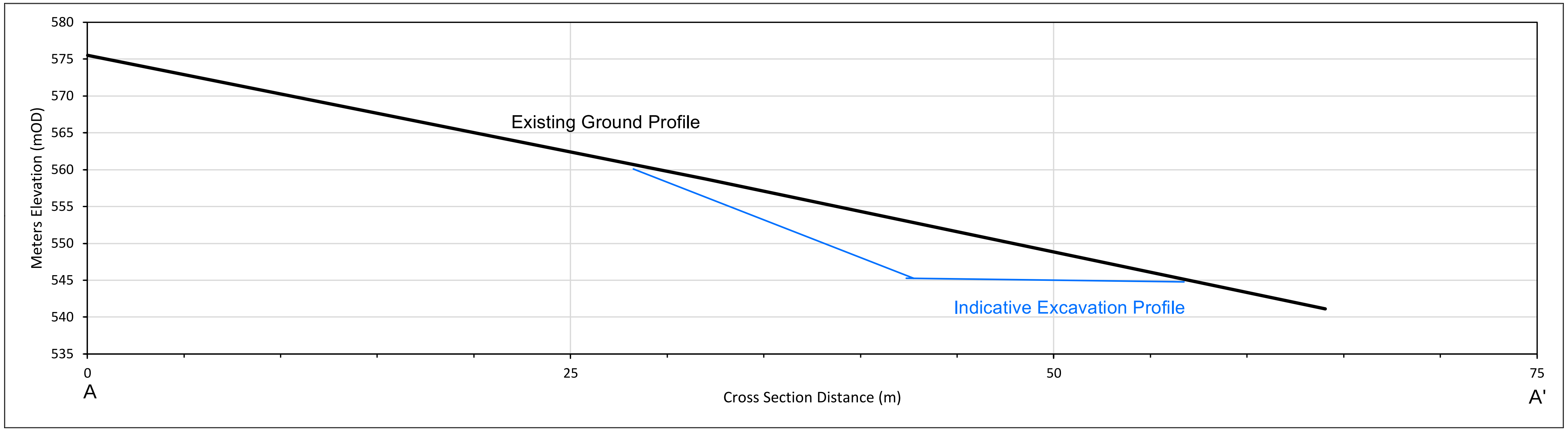
Drawing Number
MMD-100410845-DR-BPAR-GIS-009

Location Map



Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- Proposed Cross Country Cable Route
- New Track
- Bhlaraidh Extension Substation
- Batching Plant Search Area
- Borrow Pits Search Area
- Hardstanding Areas
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP2	0.5	0.5	210	35	545	15	1.0	4200	147	30,870	30,000	31,200	31,000	Psammite

Rev	Date	Drawn	Description	Ch'k'd	App'd
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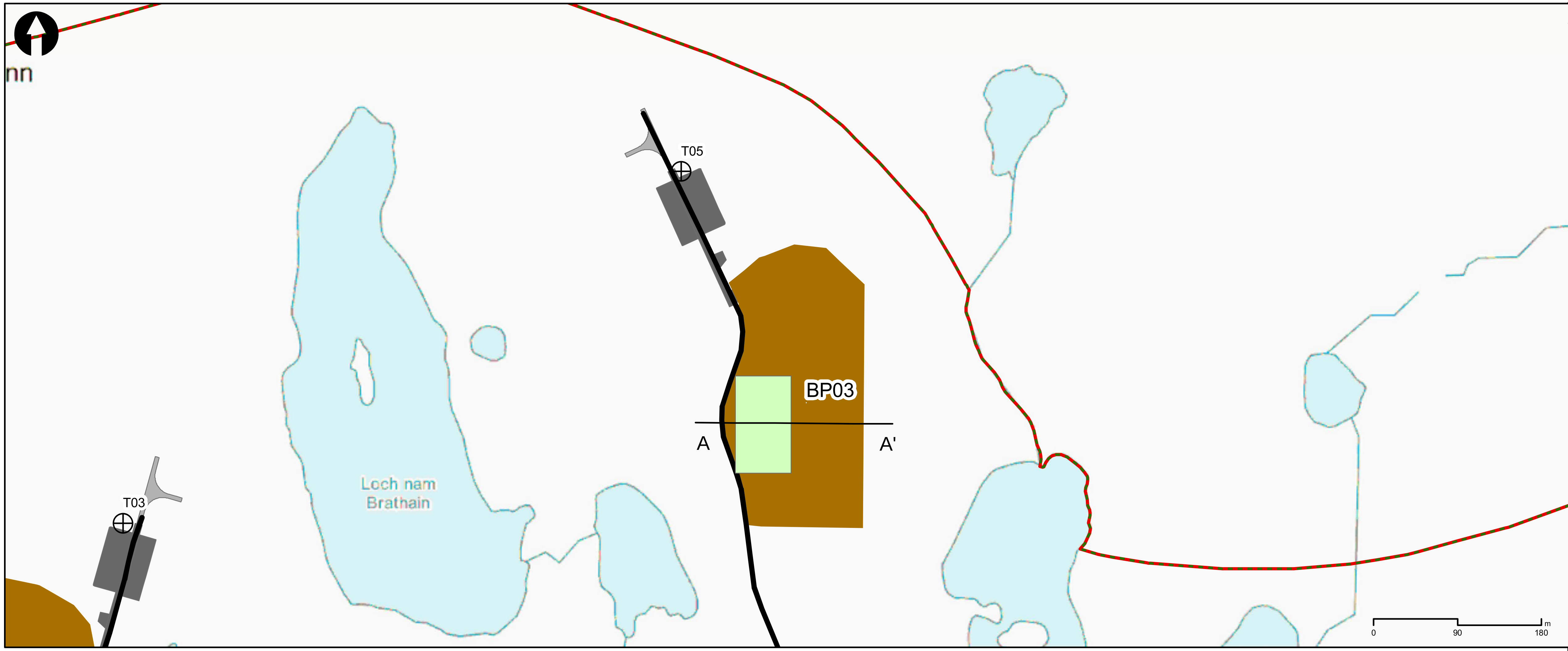
Figure A.4 - Borrow Pit BP02
Borrow Pit Appraisal Report (BPAR)
Bhlaraidh Wind Farm Extension

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

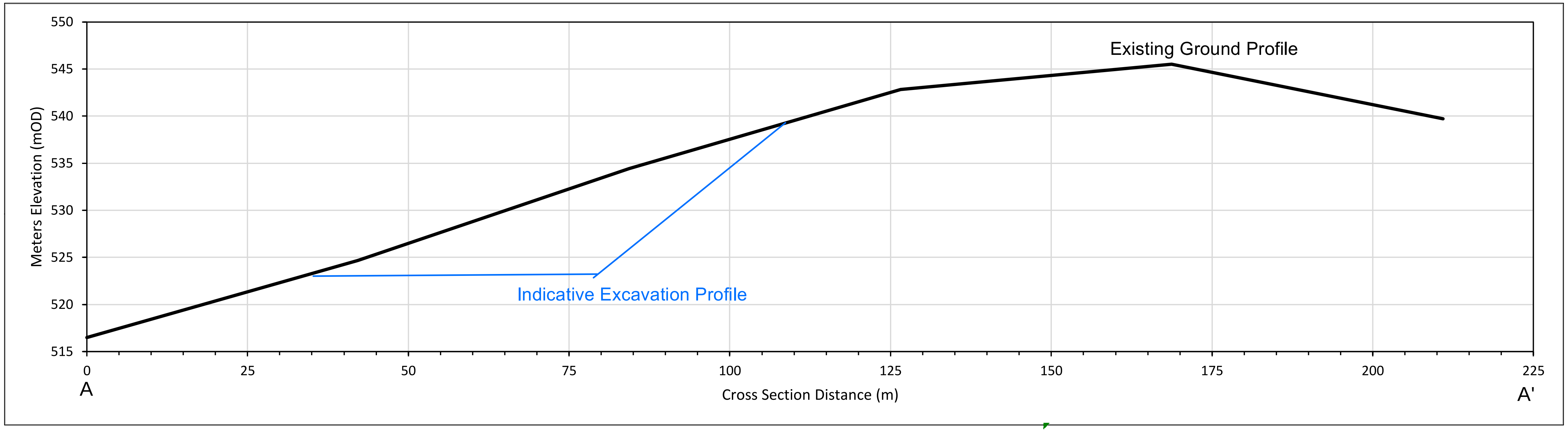
Drawing Number
MMD-100410845-DR-BPAR-GIS-003



Location Map

Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- New Track
- Borrow Pits Search Area
- Hardstanding
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP3	0.5	0.5	105	60	524	15	1.0	4725	322	33,810	33,000	34,320	34,000	Psammite and Semi-Pelite

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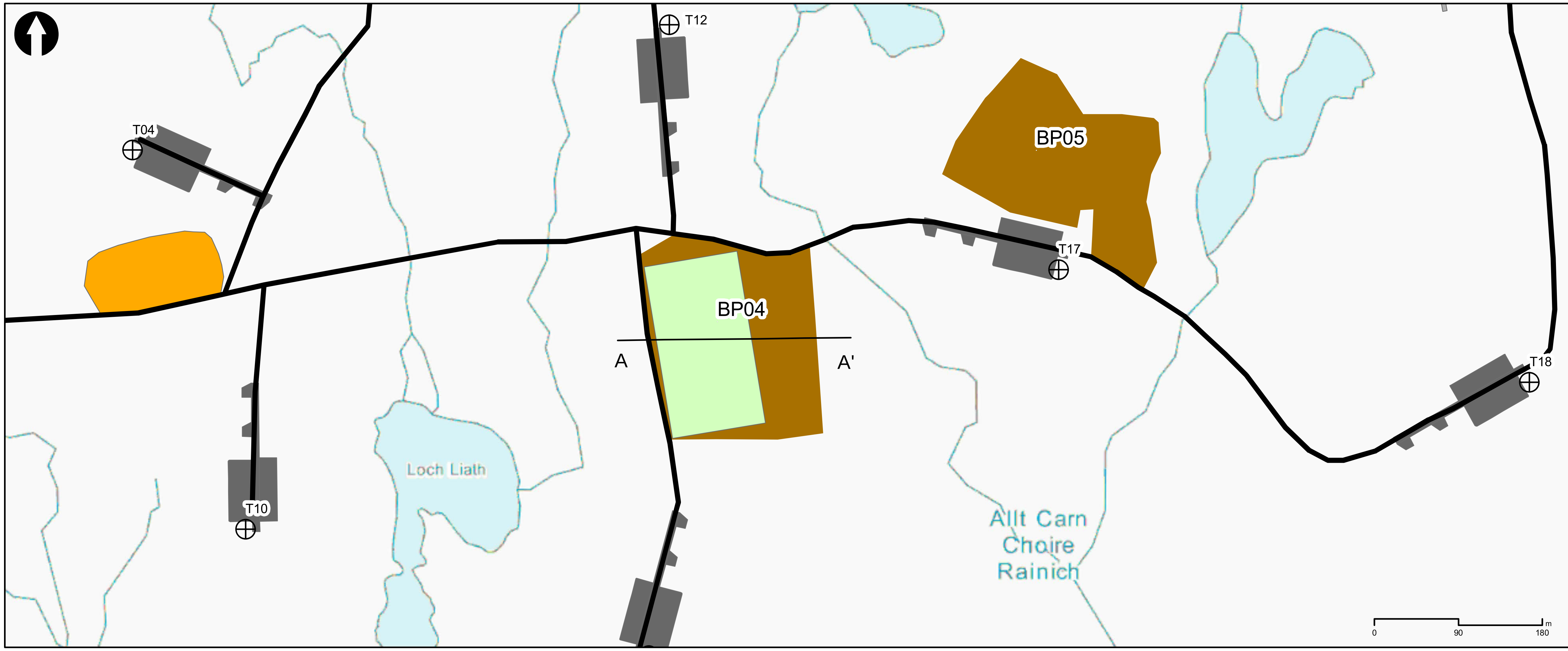
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

Figure A.5 - Borrow Pit BP03

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

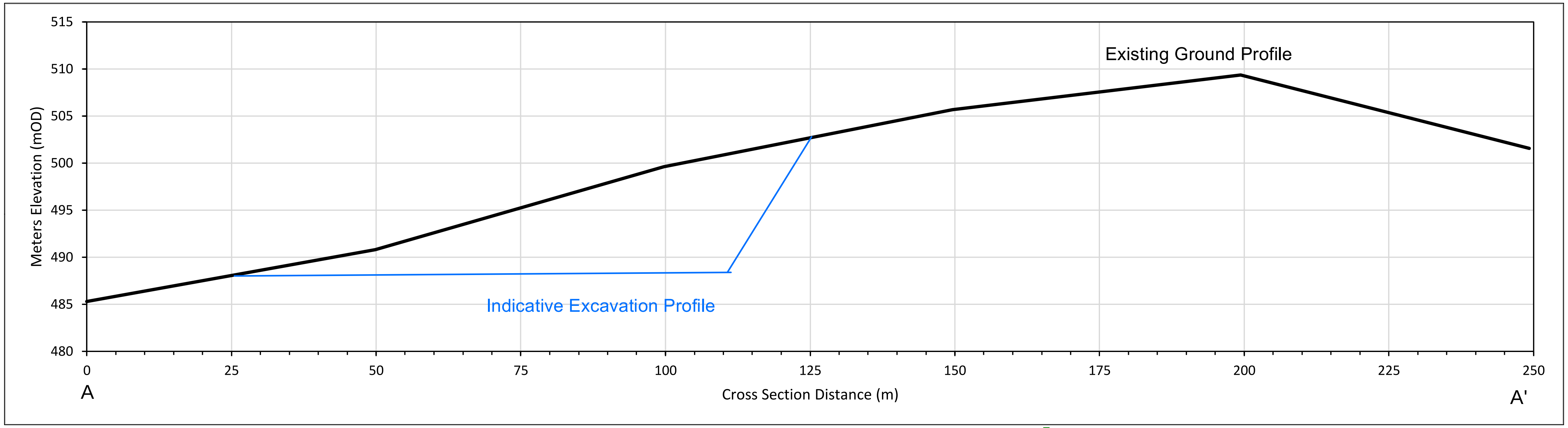
Drawing Number
MMD-100410845-DR-BPAR-GIS-004



Location Map

Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- Track Option
- Batching Plant Search Area
- Borrow Pits Search Area
- Hardstanding
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP4	1	0.5	185	100	489	15	1.5	15725	584	108,017	108,000	112,320	112,000	Psammite and Semi-Pelite

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

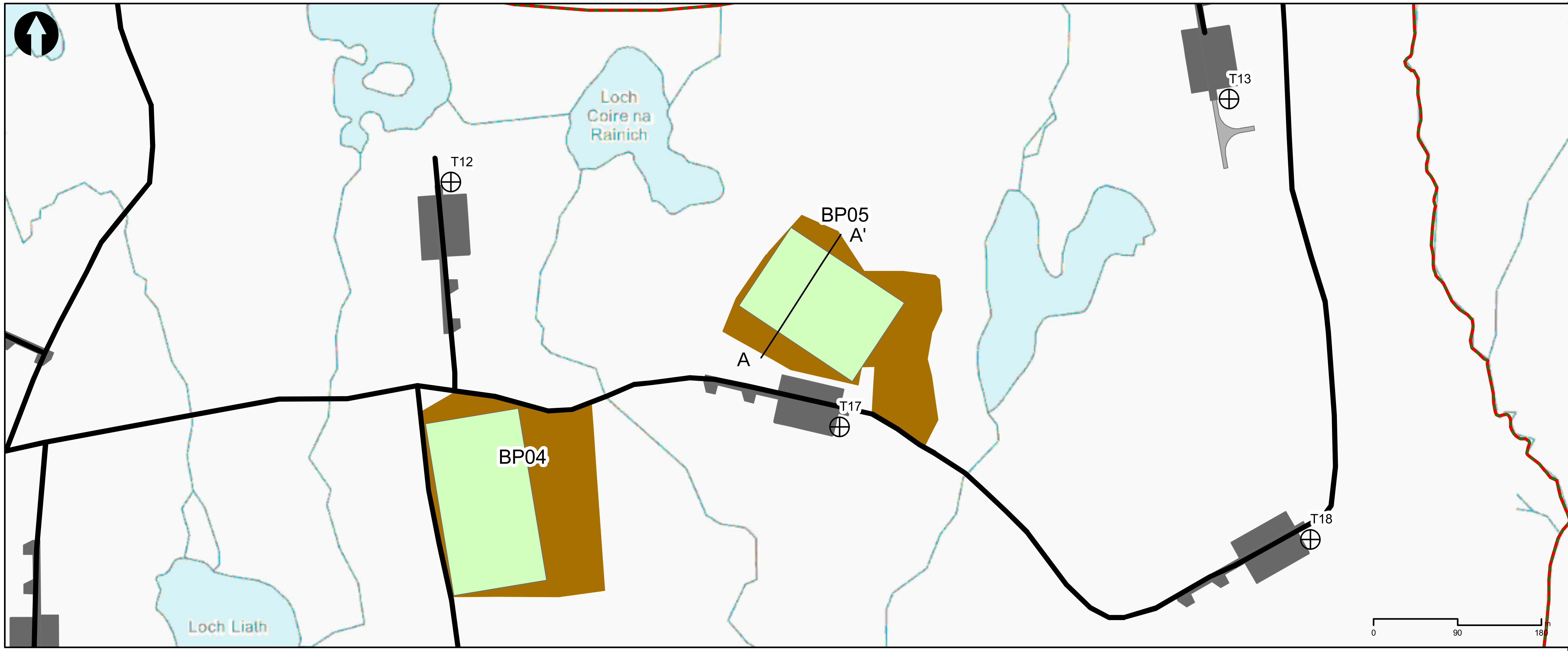
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

Figure A.5 - Borrow Pit BP04

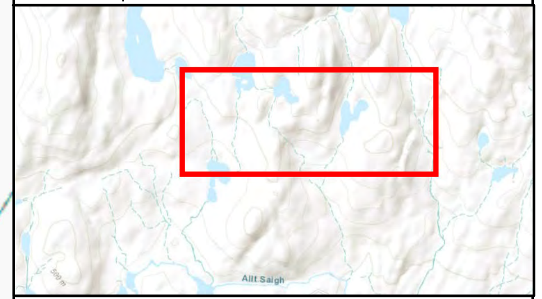
Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

Drawing Number
MMD-100410845-DR-BPAR-GIS-005

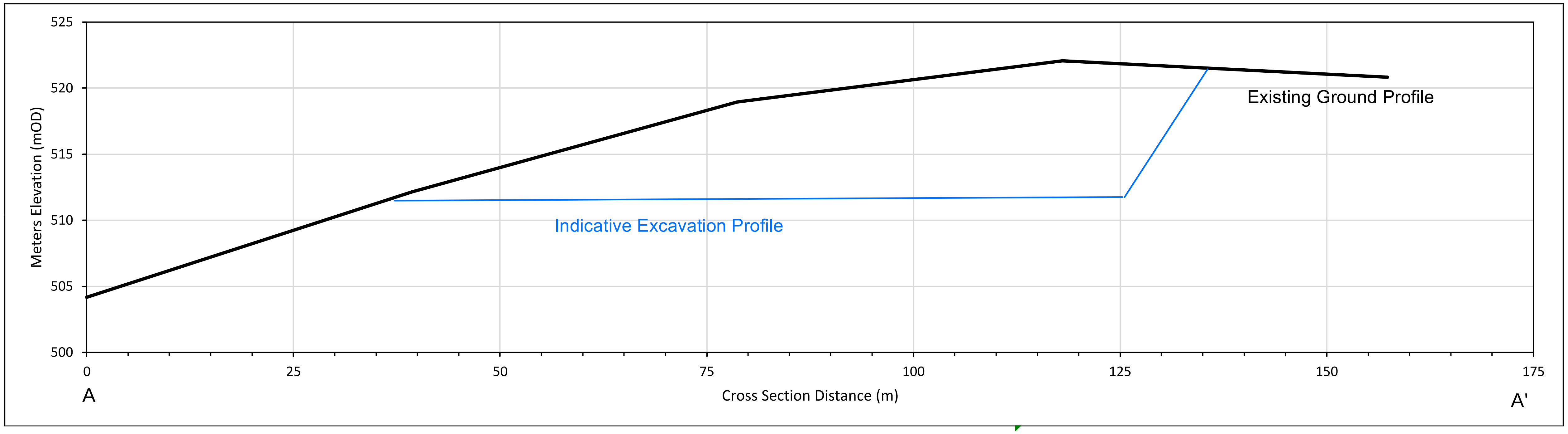


Location Map



Key to Symbols

- BP_IDs
- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- Track Option
- Batching Plant Search Area
- Borrow Pits Search Area
- Hardstanding
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP5	0.5	0.5	140	100	513	15	1.0	11900	602	84,280	84,000	87,360	87,000	Psammite and Semi-Pelite

Rev	Date	Drawn	Description	Ch'k'd	App'd
01	25/05/21	SEY	For Information	AT	--

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Title

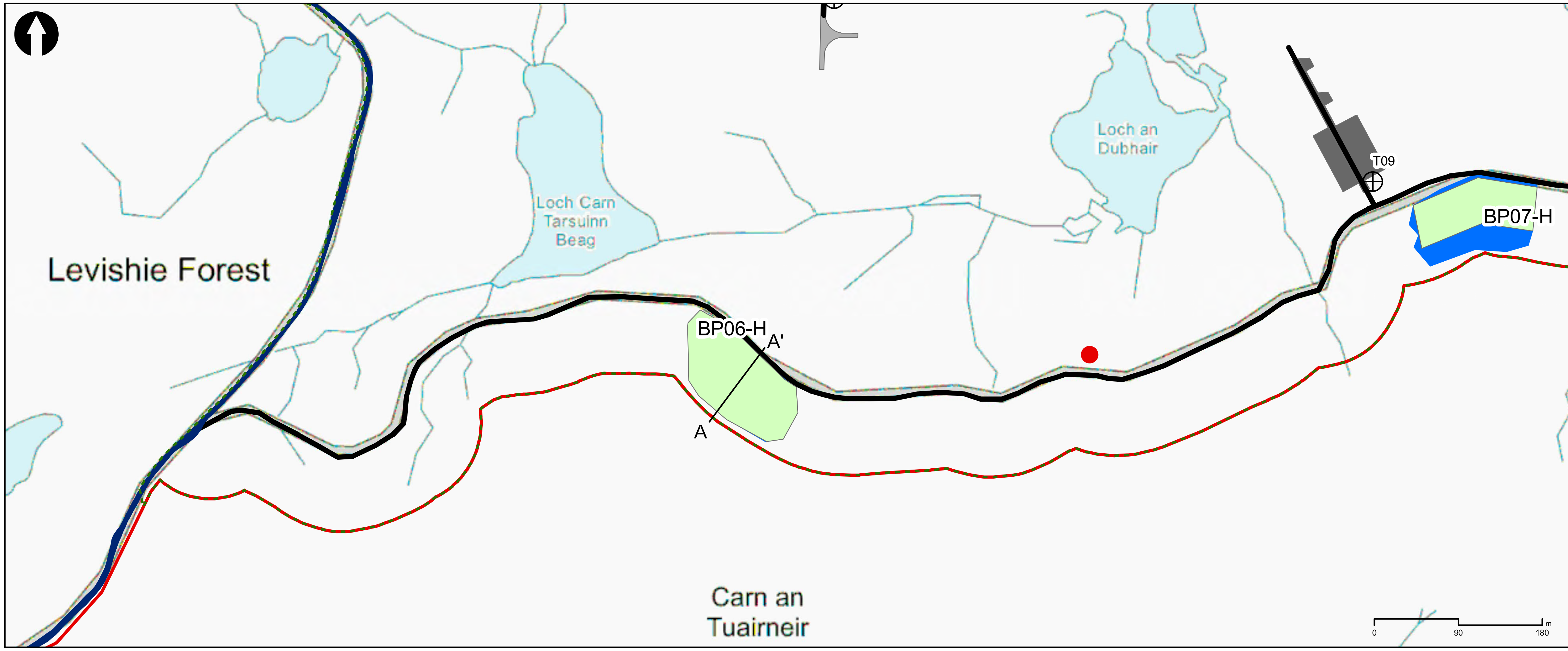
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

Figure A.7 - Borrow Pit BP05

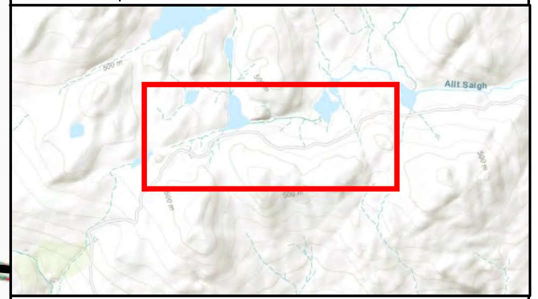
Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	-	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	01	STD

Drawing Number
MMD-100410845-DR-BPAR-GIS-010

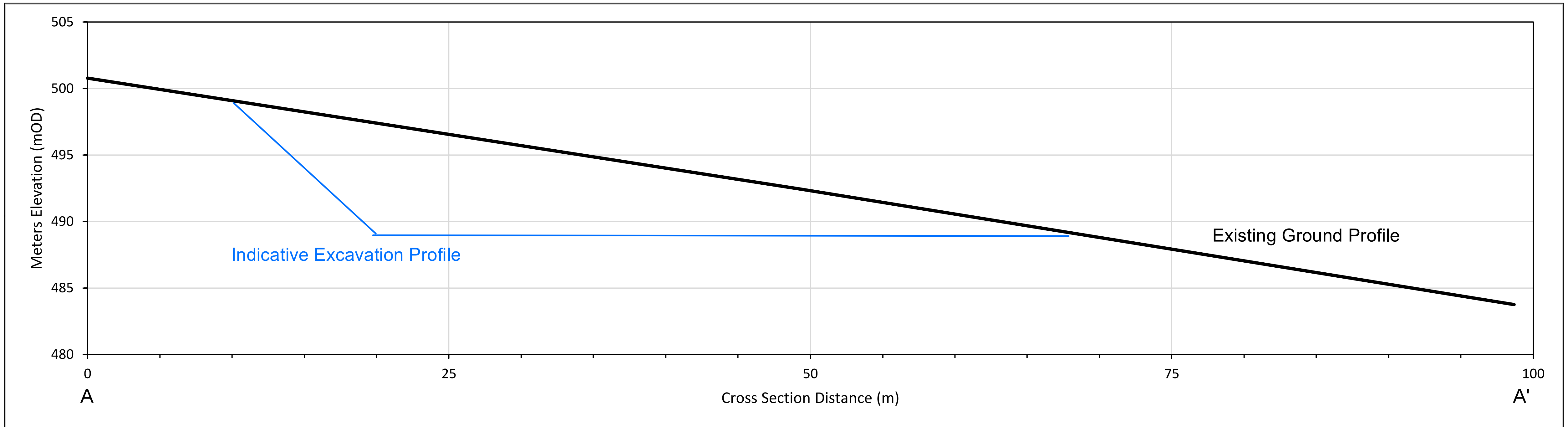


Location Map



Key to Symbols

- BP_IDs
- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- LiDAR
- Access route via existing wind farm track
- New Track
- Hydro Borrow Pits Search Area
- Hardstanding
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP6-H	0.5	0.5	140	72	489	13	1.0	8260	360	50,400	50,000	52,000	52,000	Psammite

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

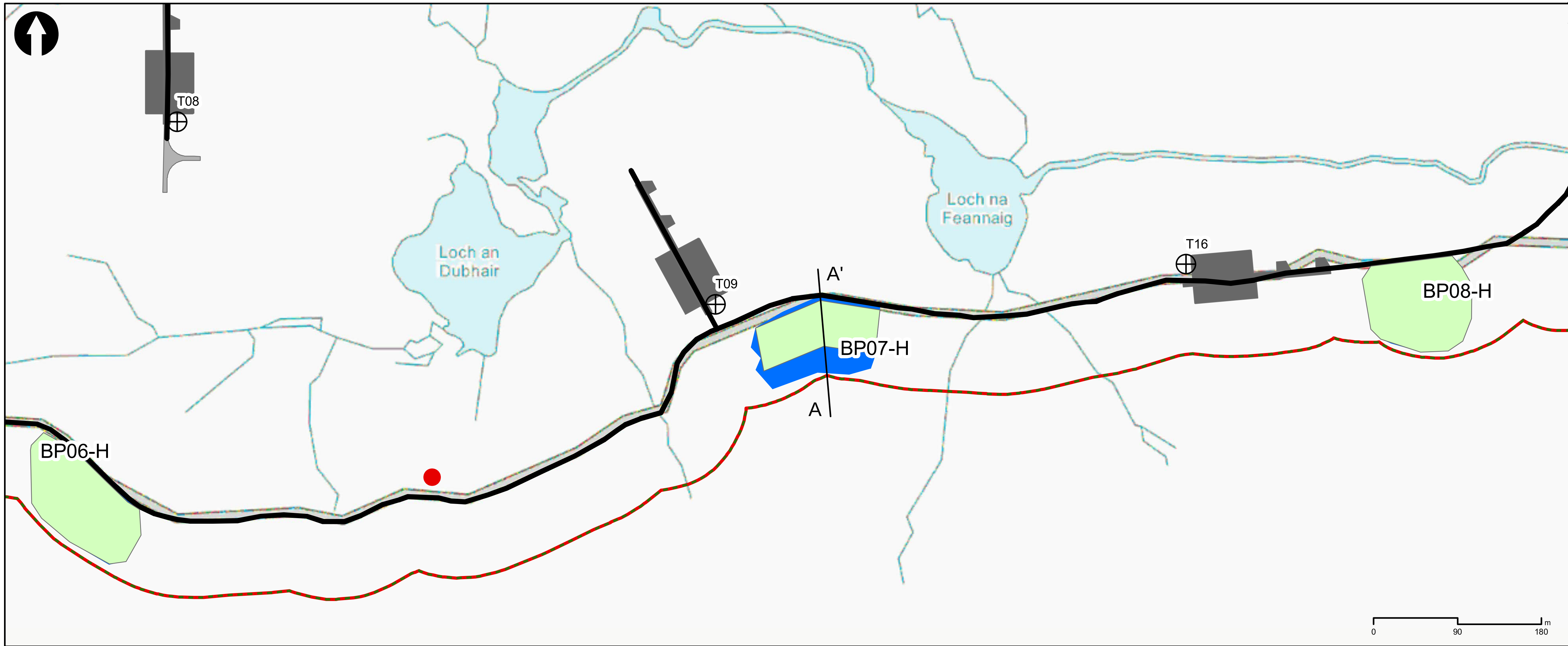
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

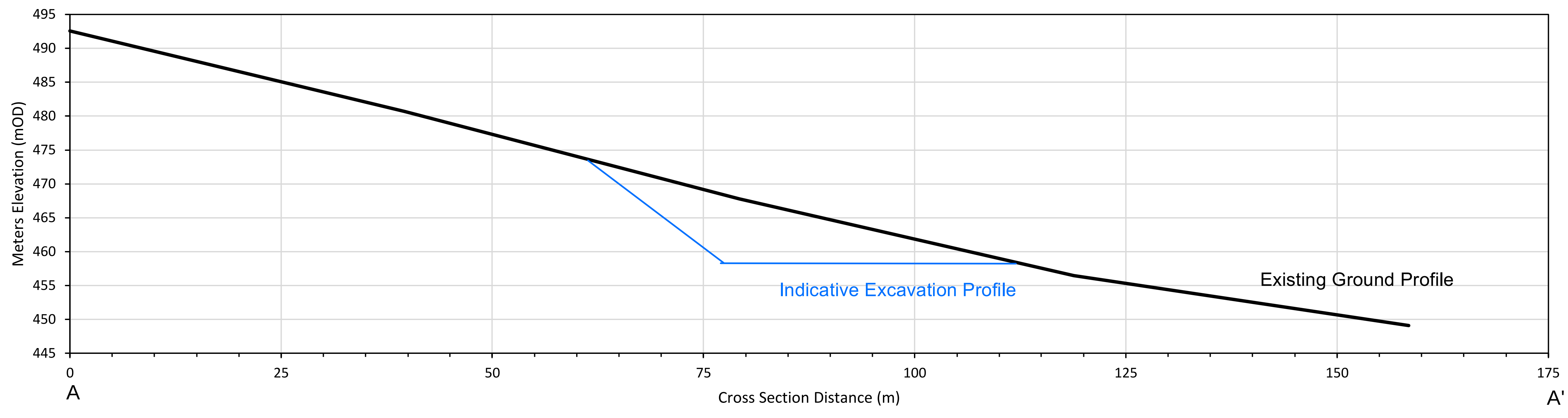
Figure A.6 - Borrow Pit BP06-H

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

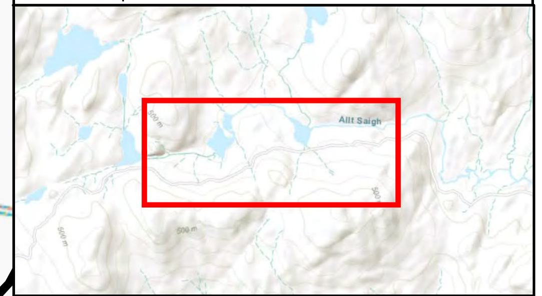
Drawing Number
MMD-100410845-DR-BPAR-GIS-006





	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP7-H	0.5	0.5	140	50	457	15	1.0	4900	252	35,280	35,000	36,400	36,000	Psammite

Location Map



Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- LiDAR
- New Track
- Hydro Borrow Pits Search Area
- Hardstanding
- Turning_Heads

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

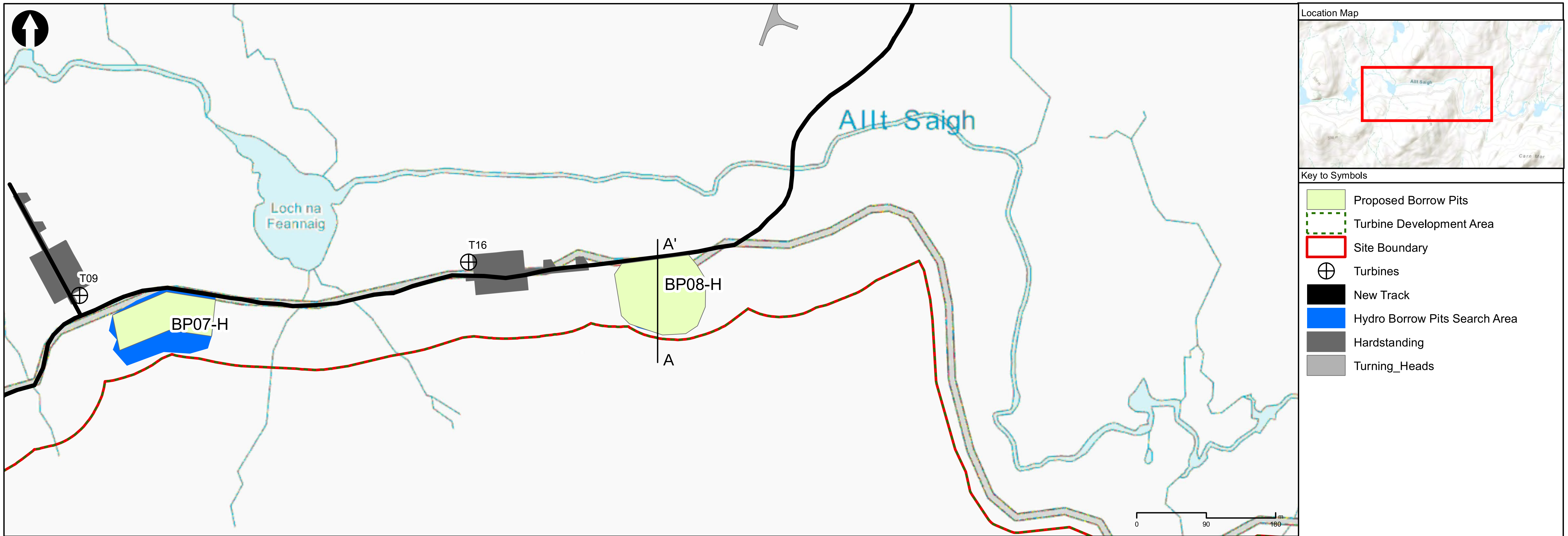
Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

Figure A.7 - Borrow Pit BP07-H

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

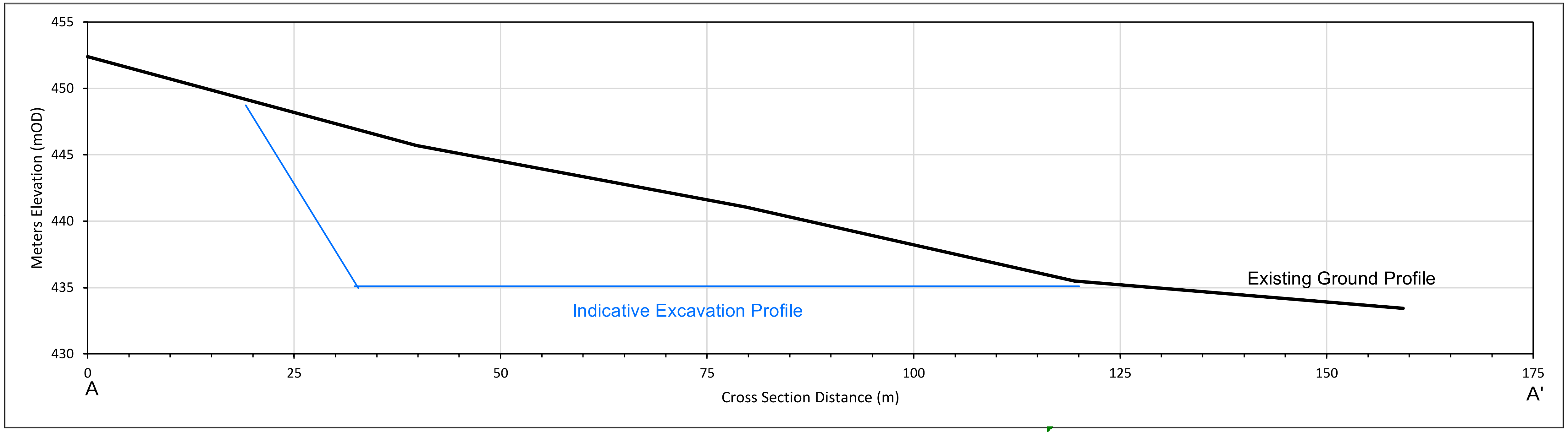
Drawing Number
MMD-100410845-DR-BPAR-GIS-007



Location Map

Key to Symbols

- Proposed Borrow Pits
- Turbine Development Area
- Site Boundary
- Turbines
- New Track
- Hydro Borrow Pits Search Area
- Hardstanding
- Turning_Heads



	Assumed Peat Depth (m)	Assumed Soil Depth (m)	Plan Length (m)	Plan Width (m)	Assumed Road / Base of Pit Level (mAOD)	Max Depth (m)	Assumed Depth of Superficials (m)	Base Area (m2) (assumed 45 degree side slopes)	Assumed Cross-sectional Area Excluding Overburden (m2)	In-situ Volume (m3)	In-situ Volume (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Volume Assuming 20% Wastage and 1.3 bulking factor (m3)	Geology
BP8-H	0.2	0.5	105	95	435	12	0.7	8715	473	49,655	49,000	50,960	50,000	Psammite and Semi-Pelite

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

Bhlaraidh Wind Farm Extension
Borrow Pit Appraisal Report (BPAR)

Figure A.8 - Borrow Pit BP08-H

Designed	S Eyers-Young	Eng Check	A Tourish
Drawn	S Eyers-Young	Coordination	S Eyers-Young
GIS Check	K Young	Approved	--

Scale at A3	Status	Rev	Security
1:5,000	FI	02	STD

Drawing Number
MMD-100410845-DR-BPAR-GIS-008

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