Energiekontor UK Ltd

Ballach Wind Farm

Environmental Impact Assessment Scoping Report

August 2024

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1 INTRODUCTION

Introduction

1.1 Energiekontor UK Ltd (the Applicant) is evaluating the potential of land located approximately ("the Site") for the development of a wind farm of up to 36 wind turbines, including associated development such as crane pads, access tracks, a substation and temporary construction compound ("the Proposed Development").

Purpose and Structure of the Scoping Report

1.2 The purpose of this Scoping Report is to formally request a Scoping Opinion from The Highland Council ("the Council") in accordance with Regulation 12 of Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the EIA Regulations"). Scoping is used to help identify where there are potential interactions between a project and the environment. It allows an Applicant to be clear which of these are considered to be the likely significant effects, upon which an Environmental Impact Assessment (EIA) should focus.

1.3 This Scoping Report provides an outline of relevant environmental receptors that may be effected by the Proposed Development, describes any mitigation available or foreseen at this stage and describes the information that it is envisaged will be submitted as part of a future EIA Report (EIAR). This approach enables consultees to comment upon the appropriateness of the baseline as it is known at this stage, the decision to scope in or out of further assessment, and the methodology used both to do this and the methodology which would be used in any further assessment.

1.4 Comments on the scope of the proposed EIA are invited. Should consultees be in a position to identify or provide additional relevant information concerning the existing environment or any specific local issues, this would be welcomed.

1.5 By virtue of the nature, size and location of the proposed development, it is anticipated that significant effects upon the receiving environment, particularly if unmitigated, are likely. As such, the Applicant is committed to providing an EIA in line with the guidance outlined within Section 2.

1.6 Therefore, this report comprises the following sections:

- Section 1: Introduction;
- Section 2: EIA Regulatory Framework;
- Section 3: The Site and its Context;
- Section 4: The Proposed Development;
- Section 5: Likely Significant Environment Effects;

- Section 6 – 14: Subject-specific chapters; and
- Section 15 Content and Structure of the Proposed EIAR

Introduction to the Proposed Development

1.7 The Proposed Development is set out within Section 4 to the extent of project design and known parameters at this stage and broadly comprises 36 turbines of up to 230m tip height, on a site of 1296 hectares, approximately 4km northwest of Kilmorack.

1.8 The proposed development at this stage has been subject to a detailed acquisition and initial design and constraints analysis process.

1.9 Energiekontor have sought specialist advice and survey up to this stage from competent experts, and will seek to do so throughout the EIA process. The environmental evidence collected to date as provided within the contents of this report, and the proposed methodologies detailed within Sections 6-14, have been provided by the following companies:

- Landscape and Visual: WSP
- Ecology and Ornithology: Wildlife Consulting
- Cultural Heritage - WSP

Energiekontor UK Ltd

1.10 Energiekontor UK Ltd is a wind energy development company with offices in Leeds, Edinburgh and Glasgow. The company was formed in 1999 and develops onshore wind farms throughout the United Kingdom. The company has built seven wind farms in the UK with many more in the development process.

1.11 Energiekontor UK Ltd is part of the Energiekontor Group. The parent company, Energiekontor AG, was established in 1990 in Bremerhaven in Northern Germany. It has since grown to become one of the leading wind energy companies in Europe, having built more than 100 wind farms across the continent.

2 EIA REGULATORY FRAMEWORK

What is EIA?

2.1 EIA is a statutory process that is governed by UK and European law. It aims to improve the environmental design of a development proposal and provides decision-makers with sufficient information about the environmental impacts of a proposal.

2.2 An Environmental Impact Assessment Report (EIA Report), prepared during the EIA process, provides environmental information about a proposed development, including a description of the proposal, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

The EIA Process

2.3 The EIA process usually follows the following stages:

- Screening may be the first stage of the EIA process where the relevant authorities need to decide whether EIA is required.
    - Once it has been agreed that EIA is required, scoping is undertaken to define what should be assessed as part of the EIA and reported in the EIA Report.
    - With the scope set, relevant information on the environmental baseline conditions is collected. This information is then used initially to understand the dynamics of the likely environmental effects and to inform the design of the project to minimise the potential for significant adverse effects.
    - The formal assessment process is then undertaken on the design parameters to define the significant effects of the project.
    - Any significant adverse effects that are identified during the formal assessment process are then reviewed against the design to consider whether alterations could be made to minimise the effect. Should this occur, the formal assessment process is reiterated.
    - Where significant adverse effects cannot be minimised through alterations to the design itself, mitigation measures are considered. Monitoring may also be considered to measure the actual significance of the effect during and post-construction to allow management of mitigation where appropriate.

2.4 Once the EIA is completed, the EIAR is submitted to the planning authority for consideration with the planning application. Therefore, the aim is to assist the Competent Authority (in this case The Highland Council) to form an option as to the likely environmental effects of the proposed development. The Scoping process therefore is focused upon assessing the likely significant effects and propose mitigation measures to

reduce the residual effects upon the environment where applicable. The Scoping process should also identify those environmental issues which do not require further consideration.

Screening – Is EIA Required?

2.5 Development projects that are described within Schedule 1 of the EIA Regulations will always require EIA and are referred to as 'Schedule 1 Developments'. Development projects listed in Schedule 2 that are located in a 'sensitive area', or exceed one of the relevant criteria or thresholds given in Schedule 2 are referred to as 'Schedule 2 Developments'. Not all Schedule 2 Developments will require EIA as only a development project that is likely to have significant environmental effects by virtue of its size, location or nature will require such assessment. A development project that requires EIA is referred to as 'EIA development'.

2.6 In this case, the Proposed Development (as described in Section 4) is of a type described within Schedule 2 as an installation for the harnessing of wind power for energy production. It is not located within a 'sensitive area' as defined by the EIA Regulations; however, the project would exceed both of the applicable thresholds as it involves more than two wind turbines with hub heights of more than fifteen metres. The requirement for EIA is therefore determined on the basis of whether the project would be likely to give rise to significant effects on the environment by virtue of its size, nature or location.

2.7 The scale, nature and location of the Proposed Development are such that, to allow the environmental impacts of the project to be appropriately considered, Energiekontor UK Ltd has taken the decision to voluntarily undertake EIA. Therefore, no Screening Opinion will be sought from the Council.

General Approach to Scoping

2.8 Scoping is an exercise conducted at an early stage in the EIA process and is designed to ensure that the environmental studies provide all the relevant information on the impacts of the project, in particular focusing on the significant effects.

2.9 The findings of this exercise define the 'scope' of the environmental information to be provided and the terms of reference for the environmental studies to be undertaken. The scope of the work however remains flexible and can be amended should new issues or information arise while undertaking the project.

2.10 The project team benefits from significant experience and technical expertise in environmental assessment and development of such projects and will ensure that the EIA will be carried out in accordance with the EIA Regs. The potential environmental impacts during construction, operation and decommissioning will be identified and assessed in the EIA Report, based upon the recommendations of the technical EIA team, consultation with statutory consultees, other interested parties and local communities. Topic assessments will be undertaken using best practice methodology, following industry guidelines whenever appropriate and carried out by specialists with relevant professional experience.

2.11 Schedule 4 of the EIA Regulations states the information to be included within the EIA. Each assessment will consider these criteria and assess them whenever appropriate to the proposed development. This also highlights that the emphasis of the EIA process should be on assessing likely significant effects, rather than every environmental effect associated with a development.

2.12 Impartial professional consultants (as set out in Section 1) will assess the likely significant environmental effects identified. These specialist assessments will generally incorporate:

- Site visits;
- Collection of baseline data regarding the site and surroundings;
- Identification of the likely significant effects of the proposed development; and
- Recommendations on how these effects could be avoided or reduced.

2.13 For each topic the proposed methodology to be used within technical topics is set out within the this Scoping Report. Cumulative effects will be assessed within each EIA Report chapter as appropriate, at a scale appropriate to that subject and in line with best practice guidance currently available. It is essential that the methodology used for assessing the significance of environmental effects is set out clearly and transparently within an EIA Report and is justifiable.

2.14 Significance is generally determined through a combination of the sensitivity of a receptor or resource to an effect and the magnitude of the change resulting from the proposed development, however where this differs the full methodology is explained within the relevant section as appropriate.

2.15 Significant effects are more likely to be predicted where important resources, or numerous or sensitive receptors, could be subject to impacts of considerable magnitude. Effects are unlikely to be significant where low value or non-sensitive resources, or a small number of receptors, are subject to minor impacts. The assessment of significance of an environmental effect resulting from the proposed development will have regard to the following:

- Sensitivity, importance or value of the resource or receptor;
- Extent and magnitude of the effect;
- Duration of the effect;
- Nature of the effect;
- Performance against environmental quality standards; and
- Compatibility with environmental policies.

2.16 The methods for predicting the nature and magnitude of any potential impacts vary according to the subject area. Quantitative methods of assessment can predict values

that can be compared against published thresholds and indicative criteria in Government guidance and standards. However, it is not always possible to ascribe values to environmental assessments and thus qualitative assessments are used. Such assessments rely on previous experience and professional judgement. The methodologies used for assessing each topic area will be described within the individual chapters of the EIA Report and will follow best practice guidelines where applicable.

2.17 In addition to those items explained above, the EIA Report will either include discussion of, or scope out via section 5 of this Scoping Report, the following items:

- A description of the development, including description of the location, its physical characteristics, land-use requirements during construction and operation, a description of characteristics of the operational phase, and an estimate of the types and quantities of expected residues and emissions;
- A description of reasonable alternatives, including development design, size, scale, and a justification of the project choices made;
- A description of the baseline environmental situation and an outline of the likely evolution thereof without implementation of the proposed development;
- An assessment of the environmental baseline for each environmental topic scoped into the EIA, with reference to those items specified within Schedule 4 (5) of the EIA Regulations;
- A description of mitigation and monitoring measures (where applicable); and
- A description of any expected adverse impacts in relation to the vulnerability of the proposed development to risks of major accidents and/or disasters which are relevant to the project.

2.18 Consultation and Stakeholders

2.19 The Applicant recognises the importance of consultation and community involvement throughout the project development process in line with "PAN 3/2010 Community Engagement". PAN 1/2017: Environmental Impact Assessment Regulations also reinforces the importance of public involvement in the Scoping process and makes it clear that the EIA process is intended to ensure that consultation bodies and the public have opportunity to express their opinion on both the proposed development and the EIA Report.

2.20 The Applicant has held informal pre-application discussions with several bodies including an informal introductory meeting with The Highland Council, The Applicant has also held pre-Scoping discussions with NatureScot.

2.21 Where applicable, these points have been addressed within the scope of work outlined below, and where the proposed scope varies from what has been suggested by regulators, this has been justified as appropriate.

3 THE SITE AND ITS CONTEXT

The Site and Surroundings

3.1 The Site is located approximately 4km northwest of Kilmorack within the Erchless and Farley estates and lies entirely within the administrative boundary of the Highland Council. The present land use is open moorland with limited forestry found within the Site boundary.

3.2 The topography of the Site reaches a high point of 490m AOD at Beinn name Fitheach in the west. The northern boundary is bound by the Allt Goibhre. Access to the site is taken utilising the estate track to the south which runs from the A831 at Erchless Castle.

3.3 A number of watercourses cross the Site with a few scattered lochans. This includes Loch Ballach, Loch nan Eun and associated drainage channels. Other watercourses which lie within the Site boundary include Allt an Torta Dhuinn, Allt Tobar nan Cat and Allt a Chrochadair.

3.4 There are no environmental designations within the site boundary. In terms of other environmental designations within 10km of the site, these include:

- Glen Strathfarrar NSA:
- Strathpeffer WPA and
- Wild Land Area 24: Central Highlands

3.5 Approximately 3km northwest of the site, sits the operational Fairburn Wind Farm (20 turbines, 100m to tip). 5km to the northwest of the site the proposed Fairburn Wind Farm Extension (14 turbines, 200m to tip) which is currently in the scoping stage.

4 THE PROPOSED DEVELOPMENT

Introduction

4.1 This section describes the various elements proposed as part of the project and provides details of what processes will take place at the various stages of the project's lifecycle (e.g. construction, operation, decommissioning).

The Proposed Development

4.2 Energiekontor UK Ltd is investigating the potential for a wind farm development on the Site, consisting of the erection, 35-year operation and subsequent decommissioning of up to 36 wind turbines, with a mix of tip heights up to 200m and 230m to blade tip, as shown in **Figure 4.1**. It is likely that the wind farm would provide up to approximately 237.6 MW of generating capacity. The principal elements of the Proposed Development are described in further detail below.

Wind Turbines

4.3 The turbines would be of a typical modern design comprising a three bladed rotor hub mounted on a nacelle (containing a gearbox and a generator), tower and foundation.

4.4 Final turbine selection would be made following the grant of planning permission following a tendering and procurement exercise. The EIA will therefore be undertaken on the basis of a candidate turbine design consisting of:

- A horizontal axis type with a rotor consisting of three blades, each up to approximately 77.5m in length (giving a total rotor diameter of up to approximately 155m);
- A nacelle (cover housing) height of approximately 122.5m and 152.5m;
- A maximum height to vertical blade tip of 200m or 230m;

4.5 It is also assumed that turbines would generate power for all wind speeds between 4m/s and 25m/s; and that at wind speeds greater than 25m/s (gale force). the turbines would shut down for self-protection.

Associated Development

4.6 The principal items of associated development include:

- **Site tracks**: to provide access for construction and maintenance vehicles from the site entry point to the substation and wind turbines. These would be installed at the commencement of the construction phase and would remain until the end of the decommissioning phase. They would have a 5.0m running width with local widening on corners and would be surfaced with coarse aggregate. Depending

on localised ground conditions, they would either be cut into, or floated above, the ground.

- **Temporary construction compound/storage area:** to provide a secure area for site office facilities and storage of materials and components. To be constructed adjacent to the site track, with an 80m x 40m hardcore base, surrounded by a security fence and locked gates. The fence and gates would be removed at the end of the construction phase and the hardcore base retained but allowed to re-vegetate.

- **Crane hardstandings and outrigger pads:** to provide a level and firm base for the cranes at the location of each turbine. Each would be a maximum of 55 m x 25m and surfaced with coarse aggregate.

- **Transformer housings:** the transformers to step up the voltage exported from each turbine (from 690V to 33kV) would either be placed within the wind turbines themselves, or in a small secure external transformer housing placed next to each wind turbine tower, depending on the final turbine choice.

- **High voltage and control cables:** to form power and control circuits linking each turbine to the on-site substation, cables would be placed in trenches (dimensions to be determined by ground conditions but typically 0.5m wide x 1m deep) routed alongside the tracks.

- **Substation building:** a 15m long by 10m wide single storey building which will house the switchgear and control equipment plus secure storage space.

- **Energy Storage Compound**- The energy storage equipment would be housed within ISO shipping containers with a 2.4m high palisade fence in a compound 17.5m by 31.9m. Battery containers will be positioned a minimum of 2.5m apart to facilitate access to all sides. Battery energy storage equipment will be factory assembled and delivered to site in standard 12.2m long x 2.4m wide ISO shipping containers.

4.7 Access to the site will be taken form the A831 to the south of the site, where the existing site tracks will be upgraded to accommodate access.

Grid Connection

4.8 A grid connection would be required to feed the electricity generated by the wind farm into the distribution network for the operational period of the project. The grid connection would be subject to a separate design and consent process which would be led by the local Distribution Network Operator.

Construction Phase

4.9 It is estimated that it would take approximately 18 months to construct the Proposed Development. Construction works would include:

- Temporary and permanent highway modifications to enable vehicles to access the Site from the local and strategic highway network;
- Construction of permanent new site tracks required to access the wind turbine positions. These would be used by civil engineering plant and construction equipment;
- Construction of a secure site compound/storage area for site office facilities and storage of materials and components;
- Installation of hardstandings and outrigger pads for the support of the cranes that would be used for the erection of the turbines;
- Construction of foundations for the support of the turbine structures;
- Wind turbine delivery and erection;
- Installation of transformers in separate housings alongside each wind turbine (if required);
- Installation of on-site high voltage cabling, communication cabling and earthing;
- Installation of the Supervisory Control and Data Acquisition system;
- Construction of the site substation;
- Commissioning of site mechanical and electrical equipment; and
- Reinstatement and landscaping including the removal of temporary site offices, and the reseeding of verges and areas around turbine bases.

4.10 The construction works would mainly follow the order detailed above but many activities may be carried out concurrently to reduce the overall length of the construction programme. There would be construction phasing, with civil engineering works progressing in some areas of the Site whilst turbines were being erected elsewhere. To minimise disruption to land use, site restoration would be undertaken as early as possible in development areas.

4.11 A detailed programme of works would be produced by the construction contractor prior to the commencement of works on Site.

4.12 Should planning permission be granted, it is likely that construction hours would be restricted by means of a planning condition imposed by the Council.

4.13 Construction material would typically be transported by road from source or seaport. Large loads such as wind turbine components (rotor blades, tower sections and nacelles) would be transported to the Site by low loader using a designated route.

Decommissioning Phase

4.14 At the end of the operational period, the wind farm would be decommissioned. This would involve the complete removal of the wind turbines, transformers, substation, switchgear and other equipment over a period of up to 12 months. The removal of the wind farm components would essentially be the reverse of the construction process.

4.15 Energiekontor UK Ltd would provide a decommissioning bank guarantee or insurance bond to ensure that sufficient funds are available at any time during the lifetime of the wind farm to enable all decommissioning works to take place.

4.16 The removal of the wind turbines at the end of the operational life of the wind farm would be the reverse of the erection process, involving similar cranes and procedures. The components would be removed off-site to be re-used elsewhere, dismantled and recycled or disposed of as appropriate.

4.17 The decommissioning of the turbine foundations would involve removing the upper part of the reinforced concrete foundation. This could be achieved by conventional construction equipment (e.g. excavator mounted pneumatic hammers etc.).

4.18 To achieve the removal of the upper section, which is up to 1.2 m deep, a 600 mm wide trench would need to be excavated around the approximately 4m diameter upstand to facilitate access for removal of the concrete. All other parts of the foundation would remain in place and no other disturbance of the ground around the turbine would be required.

4.19 Once the upstand has been removed, the disturbed area would be reinstated by backfilling with site-derived materials to an agreed method statement, leaving the remaining portion of the foundation approximately 1.2m below ground level.

5 LIKELY SIGNIFICANT EFFECTS

Introduction

5.1 The following section discusses potentially significant effects which without mitigation, are likely to result in significant effects and therefore should be subject to EIA. By establishing the extent of potential impact and the likeliness of significant effects, the topic can be scoped into the EIA Report or scoped out as appropriate.

5.2 EIA involves the compilation, evaluation and presentation of any likely significant (both positive and negative) environmental effects resulting from a proposed development, to assist the Competent Authority when considering and determining an application. Early identification of potentially adverse environmental effects also leads to the identification and incorporation of appropriate mitigation measures into the project design to avoid, reduce, and if possible, remedy identified significant adverse environmental effects.

5.3 The EIA Regulations require consideration, throughout assessments, of all likely significant environmental effects; direct / indirect; secondary; cumulative; positive / negative; short / medium / long-term; or permanent / temporary.

5.4 For all environmental topics considered, the Scoping Analysis is split into the following headings:

- Introduction;
- Baseline Conditions;
- Likely Significant Effects During Construction;
- Likely Significant Effects During Operation;
- Design and Mitigation;
- Inclusion or Exclusion from the EIAR; and
- Proposed Scope of Assessment.

5.5 The EIA Regulations have a requirement to discuss likely significant effects in relation to decommissioning. Unless otherwise stated, it is assumed that decommissioning effects would be very similar to the detail included for construction effects.

6 LANDSCAPE AND VISUAL

Introduction

6.1 This section describes the methodology to be used within the Landscape and Visual Impact Assessment (LVIA) and provides an overview of the baseline conditions and the datasets to be used to inform the LVIA. An outline of the likely significant effects and design considerations that may be needed to provide mitigation and enhancement of the Proposed Development are also described.

6.2 The LVIA process will take account of national and local planning policy in relation to wind farm development, in particular National Planning Framework (NPF) 4 (2023), the Highland-wide Local Development Plan (HwLDP) (2012), the Inner Moray Firth Local Development Plan (IMFLDP) (2015), the proposed IMFLDP 2 (2024), and The Highland Council's (THC) Onshore Wind Energy Supplementary Guidance (OWESG) which was adopted in November 2016 and its Addendum (2017).

6.3 Where required, the following technical assessments will be included as part of the scope of the LVIA:

- Night-time Lighting Assessment; and
- Wild Land Assessment.

6.4 This section is supported by **Figures 6.1 – 6.6** and should be read in conjunction with **Chapter 4**.

6.5 Consultees are requested to confirm the scope of this assessment and in particular comment on other known wind farm developments which should be included in the assessment (**Table 6.1**), the proposed viewpoint locations (**Table 6.2**) and matters that are proposed to be scoped out of this assessment (paragraph 6.32).

Baseline Conditions

Site Description

6.6 The Proposed Development is located in an undesignated area of the *Rugged Massif - Inverness* Landscape Character as defined by the NatureScot Landscape Character Assessment (2019), approximately 5.5km south-west of Muir of Ord in the Highlands.

6.7 The topography of the Site gradually rises from the north along Gleann Goibhre to the south / south-west and reaches a high point of 493m AOD at Beinn nam Fitheach in the south-west. The northern boundary is formed by Gleann Goibhre and the Site is crossed by a number of watercourses. The Site is remote from settlements with the closest residential property located over 2.5km to the south-east at Breakachy Farm and Farley. A Right of Way (Scottish Hill Track 279) passes through the eastern and southern parts of the Site

connecting to Struy and the A831 in the south. Part of the Beauly - Deanie North Overhead Line passes through the southern Site boundary, north of the A831.

Landscape Designations

6.8 The southwestern boundary of the Site is located adjacent to the Central Highlands Wild Land Area (WLA). None of the proposed turbines, however, are located within the WLA. There are a number of other designated landscapes within 45km including National Scenic Areas (NSAs) and Special Landscape Areas (SLAs). Other Designated Landscapes within the Study Area are shown on **Figure 6.4** and include:

6.9 National Landscape Designations (within 45km):

- Cairngorms National Park, located 43km to the south-east of the Site;
- Glen Strathfarrar National Scenic Area (NSA), located 8km to the south-west of the Site;
- Glen Affric NSA, located 23km to the south-west of the Site;
- Wester Ross NSA, located 35km to the north-west of the Site;
- Dornoch Firth NSA, located 42km to the north-east of the Site; and
- Kintail NSA, located 43km to the south-west of the Site.

6.10 Local Landscape Designations (within 20km):

- Strathconon, Monar and Mullardoch Special Landscape Area (SLA), located 7.5km to the south-west of the Site;
- Ben Wyvis SLA, located 14.5km to the north of the Site; and
- Loch Ness and Duntelchaig SLA, located 15km to the south-east of the Site.

Wild Land Areas

6.11 There are eight WLAs within the 45km Study Area, the most relevant to the Proposed Development is the Central Highlands WLA, located adjacent to the south-west.

Landscape Character

6.12 The Site is located within the *Rugged Massif – Inverness* Landscape Character Type (LCT) as illustrated in **Figure 6.3**.

6.13 The key characteristics of the *Rugged Massif – Inverness* as noted by NatureScot[1] are:

- *"Parallel ranges of massive mountains of irregular landform divided by deep glaciated valleys.*
- *Mainly broad, sometimes rounded rugged summits connected by long ridges and relatively few individual mountain peaks, particularly in the east.*

[1] NatureScot 2019 Landscape Character Assessment - LCT 220 - Rugged Massif - Inverness - Final pdf.pdf (nature.scot)

- *Steep terrain with many mountain-side burns and occasional lochans in corries and depressions.*
- *Landcover of rock outcrops, glacial debris, deer-grazed heather and rough grassland create a smooth surface with mottled texture, with alpine habitats on high land to the west.*
- *Almost uniform texture and cover from lower to upper levels in the east makes the size of the hills difficult to perceive.*
- *Tracts of Caledonian pinewoods and occasional small patches of open birch woodland add colour, texture and seasonal diversity.*
- *Largely uninhabited, few signs of human activity or human artefacts in the interior, and sparse archaeological evidence.*
- *Hill ranges combine to create a fairly even undulating skyline and a sense of enclosure when viewed from straths.*
- *Views from the hill tops at the edges of the massif offer expansive views of the adjacent straths and surrounding landscape character types.*
- *A sense of remoteness and wildness which is particularly strong within the interior."*

Visual Amenity

6.14 The visual assessment would draw upon the ZTV, site visits and viewpoint analysis and would assess the potential visual effects on views and visual amenity likely to be experienced by receptors (people) within the landscape as follows:

- Views from residential properties and settlements;
- Views experienced whilst travelling through the landscape (road / rail users, walkers, horse riders and cyclists for example); and
- Views from tourist and recreational destinations including hill summits.

Settlements and Residential Properties

6.15 The assessment of visual effects likely to be experienced from settlements includes consideration of residential areas, the public realm, and public open spaces within the settlement boundaries that would be frequented by people. Settlements included in the LVIA would be those defined in the HwLDP and IMFLDP / Proposed IMFLDP 2.

6.16 Settlements within 10km overlapped by the ZTV in **Figures 6.1 and 6.2** include:

- Muir of Ord;
- Beauly;
- Contin;
- Jamestown;
- Kiltarlity;
- Struy;
- Kirkhill; and
- Conon Bridge (located just beyond 10km).

6.17 Marybank, Strathpeffer, Dingwall, Garve and Inverness are all located outwith the ZTV.

6.18 There are no residential properties within 2km of the proposed turbine locations.

Transport Routes

6.1 Transport routes within 10km of the Proposed Development that are overlapped by the blade tip ZTV in **Figures 6.1 and 6.2** are listed as follows:

- A831;
- A832
- A833;
- A862;
- A835;
- A834;
- B9169;
- B9164; and
- Railway line connecting from Conon Bridge, Muir of Ord, Beauly and towards Inverness.

6.2 Other key transport routes beyond 10km overlapped by the ZTV include the A9.

Recreational Routes

6.3 National recreational routes within 45km of the Proposed Development that are overlapped by the blade tip ZTV in **Figure 6.5** are listed as follows:

- North Coast 500 / Highland / Moray Firth Tourist Route;
- Great Glen Way;
- Affric Kintail Way;
- John O'Groats Trail; and
- Sustrans Cycle Route 1.

6.4 A number of local recreational routes including Core Paths, Rights of Way / Scottish Hill Tracks are scattered throughout the study area, the most relevant is Scottish Hill Track 279 that passes through the eastern and southern parts of the Site connecting to Struy, and Core Path RC30.01 Orrin Dam track located 2km to the north of the Site.

Recreational and Tourist Destinations

6.5 Recreational and tourist destinations included in the LVIA would include those features that appear as prominent landmarks or landscape features, locations associated with passive recreation such as walking, and where there is a clear relationship between the feature / destination and the landscape. Gardens and Designed Landscapes (GDL) would be included where these are open to the public, as well as National Trust gardens / land and Historic Environment Scotland visitor sites. The assessment would exclude

locations for team sports and other recreational / tourist destinations where the focus of activity is not on the landscape or is indoors – for example museums, libraries, and gift shops. The assessment would make general reference to areas that might be used for hunting / stalking activities but would exclude specific assessment as the primary focus would be the activity, rather than the landscape.

6.6 Other recreational destinations would also include golf clubs, campsites and caravan parks, landmark and popular hill summits (Munros and Corbett's), and Forestry and Land Scotland walking and cycling trails.

Future Baseline

6.7 Further change to the baseline landscape is likely as a result of new applications and/ or eventual decommissioning or repowering of existing wind farms and their associated grid connections, occurring over the next 10-20 years.

6.8 Forestry felling and re-stocking is also likely to change the nature of available views across this landscape from various receptors within the study area.

Cumulative Developments

6.9 Drawing from NS guidance[2], the baseline of all other cumulative wind energy development, above 50m to blade tip height, within the 45km Study Area has been collated. Turbines below 50m to blade tip height within 10km have also been included. This includes all existing and consented wind energy development, and planning applications. In accordance with the NS guidance, projects at scoping stage have not been included except those within 10km of the Proposed Development which would be included in the wirelines.

6.10 In total, 42 other wind energy developments are included in the assessment as listed in **Table 6.1** and illustrated in **Figure 6.6**. As of 5 April 2024, this includes 24 existing wind farms, 12 consented developments and six applications in the Study Area.

Table 6.1 Wind Energy Development Included in the CLVIA

Reference[3]	Name	Distance (m)[4]	Number of turbines	Blade tip Height (m)
EXISTING WIND ENERGY DEVELOPMENTS WITHIN 45KM				
E01	Auchmore	2,062	1	80
E02	Auchmore 2	2,168	1	80

[2] Guidance: Assessing the Cumulative Landscape and Visual Impacts of Onshore Wind Energy Developments, NatureScot (March 2021).

[3] The reference number in the table relates to that used in the figures.

[4] Measured from the nearest turbine of each wind energy development.

Reference[3]	Name	Distance (m)[4]	Number of turbines	Blade tip Height (m)
E03	Fairburn	3,616	20	100
E04	Corriemoillie	18,816	17	125
E05	Lochluichart	19,142	17	125
E06	Foulis Farm	19,293	1	67
E07	Lochluichart Extension	20,865	6	125
E08	Corrimony	22907	5	100
E09	Novar Extension	24,500	16	100.5
E10	Novar	24,743	34	61
E11	Bhlaraidh	24,794	32	125 / 135
E12	Farr	31,488	40	100
E13	Dunmaglass	31,788	35	120
E14	Glen Kyllachy	32,264	20	110
E15	Moy	33,945	20	124.9
E16	Coire na Cloiche	34,408	13	99.5
E17	Corriegarth	34,894	23	121
E18	Beinn Tharsuinn	36,392	17	80
E19	Beinn nan Oighrean	37,312	2	99.5
E20	Millenium	40,433	26	115 / 125
E21	Stronelairg	41,204	66	125 / 135
E22	Tom na Clach	41,684	13	125
E23	Beinneun	43,578	25	133.5

Reference[3]	Name	Distance (m)[4]	Number of turbines	Blade tip Height (m)
E24	Beuinneun Extension	44,027	7	136
CONSENTED WIND ENERGY DEVELOPMENT WITHIN 45KM				
C01	Belladrum Kiltarlity	8,735	1	60.7
C02	Kirkan	18,963	17	175
C03	Lochluichart Extension II	21,643	5	133
C04	Bhlaraidh Extension	24,557	15	132
C05	Aberarder	32,200	12	130
C06	Corriegarth II	34,559	14	149.9
C07	Strathrory	34,565	7	149.9 / 160 / 180
C08	Dell	39,697	14	130.5
C09	South Millenium	40,801	10	132
C10	Cloiche	41,527	36	149.9
C11	Bunloinn	46,303	10	200
C12	Meall Buidhe	46,398	9	149.5
APPLICATION WIND ENERGY DEVELOPMENT WITHIN 45KM				
A01	Abhainn Dubh	18218	13	149.9
A02	Loch Laith	21,804	13	180 / 200
A03	Tomchrasky	36,595	14	185
A04	Dell 2	39,882	9	180 / 200
A05	Tom na Clash Extension	42,913	7	149.9
A06	Culachy	45,169	8	200

Reference[3]	Name	Distance (m)[4]	Number of turbines	Blade tip Height (m)
SCOPING WIND ENERGY DEVELOPMENT WITHIN 10KM				
S01	Fairburn Extension	594	14	200
S02	Tarvie	9,479	5	200

Likely Significant Effects during Construction

6.11 The landscape, visual and cumulative effects that could arise as a result of the Proposed Development during construction are identified as follows:

- Direct localised and temporary effects on the host landscape character, characteristics and landscape elements, primarily as a result of wind turbine installation during construction;
- Indirect and temporary effects related to the visibility of the turbines and their effect on surrounding landscape character and locally designated landscapes and perceptual characteristics / special landscape qualities, primarily as a result of wind turbine installation during construction; and
- Temporary effects on views and visual amenity, primarily as a result of visibility of wind turbine installation during construction, experienced by visual receptors (groups of people) with visibility of the Proposed Development, on specific views and on their visual amenity/experience of the landscape.

Likely Significant Effects during Operation

6.12 The landscape and visual effects that could arise as a result of the Proposed Development during operation are identified as follows:

- Direct localised and long-term effects on the host landscape character, characteristics and potentially the landscape elements are likely to be significant within ~2-3km. Night-time effects resulting from aviation warning lights are also likely to be significant subject to a Lighting Strategy;
- Indirect and long-term effects related to the visibility of the turbines and their effect on surrounding landscape character and locally designated landscapes and perceptual characteristics / special landscape qualities. Night-time effects resulting from aviation warning lights are also likely to be significant subject to a Lighting Strategy; and
- Long-term effects on views and visual amenity resulting from visibility of the proposed wind turbines within ~5-10km distance, subject to detailed viewpoint analysis. Views of the proposed aviation warning lights and adverse effects on night-time views within ~5-10km distance, subject to detailed viewpoint analysis and a Lighting Strategy.

Potential impacts during decommissioning

6.13 The landscape and cumulative landscape effects of the Proposed Development during decommissioning are unlikely to be significant and would largely reverse the effects of turbine construction and operation. The visual and cumulative visual effects during decommissioning would lead to a reduction in the operational effects on views and visual amenity resulting from no visibility of the proposed wind turbines.

Design and Mitigation

6.14 As set out in **Chapter 4**, the 'scoping layout' of the Proposed Development represents up to a maximum of 36 turbines within the site boundary; each with a 200 / 230m height to blade tip. The EIA process will lead to further refinement of this layout as site constraints become known and are assessed in more detail.

6.15 The design strategy for the Proposed Development will be underpinned by a number of design objectives which will be developed and enhanced through the EIA process. Current design objectives include, but are not limited to, the following:

- maximise the production of renewable energy generation, in the context of the Scottish Ministers having declared a climate emergency and ambitious targets having been set in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, and National Planning Framework 4 approved in February 2023;
- respect the environmental assets and constraints including watercourses, areas of deep peat and topography, nature conservation interests, landscape, archaeological interests and other environmental qualities of the site and its surroundings; and
- comply with industry best practice in terms of turbine spacing to ensure safety and maximise wind yield.

6.16 From a landscape perspective there are a number of landscape objectives that reflect the Site constraints and surroundings as follows:

- Notwithstanding that landscape and visual impacts are to be expected as a result of onshore wind farm development, the effects of the Proposed Development should be localised and/ or appropriate design mitigation should be applied to reduce the effects on key landscape and visual receptors including the Glen Strathfarrar NSA, Strathconon, Monar and Mullardoch SLA, Central Highlands WLA and views from the nearby settlements and transport routes;
- There will be significant landscape and visual effects on the landscape character of the Site and localised surroundings. Additional forms of mitigation will be considered in the form of landscape management to address these effects as follows:
  - Critical design review of the 'scoping layout' and the subsequent development of a landscape-led revised design strategy and 'application layout', underpinned by the above high-level objectives. In particular, the design review will consider:
  - visibility of aviation warning lights and the potential options for further mitigation in the form of a Lighting Strategy or other alternatives;

- likely landscape effects and visibility of turbines from within other designated landscapes and visual receptors resulting in a need for further mitigation in terms of turbine scale and layout; and
- likely cumulative landscape effects and visibility including landscape change and compatibility with other schemes, in particular the relationship with the existing Auchmore and Fairburn wind farms.

6.17 The Applicant is also proposing to implement nature positive measures as part of the Proposed Development. This is likely to include peatland habitat management and measures to increase landscape capacity, biodiversity and landscape improvements.

Inclusion or Exclusion from EIA

6.18 The selection of receptors to include in the assessment is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely to be significant do not require assessment under the EIA Regulations.

6.19 The assessment will identify landscape and visual effects separately, as detailed in the approach to the assessment set out further below. The assessment will focus on the identification and, wherever appropriate, the mitigation of potential significant landscape and visual effects.

6.20 The primary form of mitigation for landscape and visual effects arising from large scale wind farm development is through iterative design of the layout of the turbines and associated infrastructure, with reference to key views, viewpoints, and receptors. Design evolution will be set out in detail in the design strategy that will form part of the EIA Report and will demonstrate how the design of the Proposed Development has sought to avoid, reduce or minimise landscape and visual effects wherever feasible.

6.21 Further mitigation will be considered where relevant and appropriate, and the residual effects taking account of the implementation of this mitigation will be presented in the assessment.

Proposed Scope of Assessment

Zone of Theoretical Visibility and Viewpoint Analysis

6.22 The Zone of Theoretical Visibility (ZTV) analysis is used to assist the design and further define the scope of the assessment and are used to indicate the areas from where it may be theoretically possible to view all or some of the proposed turbines. The ZTVs have been calculated using ReSoft WindFarm computer software to produce an area of potential visibility of any part of the proposed turbines, calculated to turbine blade-tip and hub-height, or other selected infrastructure. The ZTV does not however take account of built development and vegetation, which can significantly reduce the area and extent of actual visibility in the field and as such provides the limits of the visual assessment Study Area. As a result, there may be an over-estimate of the theoretical visibility with roads, tracks and footpaths in the wider setting which, although shown as falling within the ZTV, have restricted viewing opportunities since they are heavily screened or filtered by banks,

walls and vegetation. The ZTVs therefore provide a starting point in the assessment process and accordingly tend towards giving an over-estimated or maximum theoretical visibility of the proposed turbines.

6.23 A preliminary ZTV map has been produced and is calculated to show the area of theoretical visibility of the proposed turbines based on an indicative 36 turbine layout of up to 200m / 230m turbine height as follows:

- **Figure 6.1** illustrates the ZTV calculated to blade tip height at 1:350,000 scale across the 45km LVIA Study Area and provides an overview of the theoretical extent of visibility. This figure also illustrates the viewpoint locations and cumulative wind farms; and
- **Figure 6.2** illustrates the same ZTV as above but presented at 1:120,000 scale at A0 paper size.

6.24 For the avoidance of doubt, areas outwith the coloured areas of the ZTV would have no view of the Proposed Development and landscape and visual receptors within these areas are consequently scoped out of the LVIA.

Confirmation of LVIA Study Area

6.25 The LVIA Study Area for the Proposed Development (**Figures 6.1 - 6.2**) is based on a 48,169m radius circle that allows a minimum of 45km distance from an indicative 36 turbine layout in accordance with NS guidance[5]. It represents an over-estimated or maximum theoretical visibility of the Proposed Development. As illustrated in **Figures 6.1 - 6.2** much of the area between 30-45km includes areas of either have no visibility or very limited visibility of the Proposed Development at long distance. For these reasons it is proposed to reduce the LVIA Study Area to 30km distance from the Proposed Development and to focus the assessment of likely and potential significant effects on receptors within this area and the extent of the blade tip ZTV.

6.26 The detailed LVIA study area would be defined by the potential threshold for significant effects based on the viewpoint analysis and would include local / regional level receptors such as local LCTs, local landscape designations, main settlements, transport routes, 'B' and 'C' class roads, core paths / local recreational routes and local attractions. The viewpoint analysis and field survey will be used to confirm if a receptor can be scoped out and viewpoint analysis used to identify a conservative distance or 'threshold' for significant landscape and visual effects.

Confirmation of Cumulative LVIA Study Area

6.27 In accordance with NS guidance[6] on cumulative assessment, information on existing and consented wind farms and other planning applications for other wind farm developments would be sourced from within a 'search area' of 60 km in order to inform the cumulative assessment of effects on landscape and visual receptors within the 45km radius LVIA Study

[5] Scottish Natural Heritage, February 2017. Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2

[6]

Area. As noted in paragraph 6.25 above, it is also proposed to reduce the cumulative search area to 30km in line with the LVIA Study Area.

6.28 The current cumulative situation within 45km is however indicated in **Table 6.1** and illustrated in **Figure 6.6**, showing the locations of wind farms that are operational, under construction, consented or which are at application stage and where the turbines are greater than 50m to blade tip. In line with NS guidance[7], scoping stage wind farms have not been included except those within 10km which would be included on viewpoint wirelines.

Viewpoint Selection and Visualisations

6.29 A range of viewpoints have been proposed (as illustrated on **Figures 6.1 and 6.2**) and consultees are requested to confirm the viewpoint selection set out in **Table 6.2**, including requests to scope out viewpoints or recommend additional / alternative locations.

6.30 Visualisations would be prepared for each viewpoint to accord with NS guidance[8] and THC guidance[9].

Table 6.2 Proposed LVIA Viewpoints

ID	Viewpoint Name	Visualisation Technique	Receptor and Viewpoint Type	Illustrated Night-time viewpoint
1	Core Path RC30.01 to Orrian Dam	180 (2x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – walkers along Core Path up the River Orrin valley	-
2	Torgormack / Drumindorsair	90-degree FoV – Baseline photograph, wireline and photomontage	Specific - residents	-
3	Fairburn Estate	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – Visitors to Fairburn GDL	-
4	Beinn a'Bhathaich Ard (Corbett)	360 (4x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – walkers, WLA, SLA	-
5	Struy (A831)	90-degree FoV – Baseline photograph, wireline and photomontage	Representative – road users, residents	-

[7] NatureScot, 2021. Guidance: Assessing the Cumulative Landscape and Visual Impacts of Onshore Wind Energy Developments.

[8] Scottish Natural Heritage, February 2017. Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2

[9] Highland Council, 2016. Visualisation Standards for Wind Energy Developments.

ID	Viewpoint Name	Visualisation Technique	Receptor and Viewpoint Type	Illustrated Night-time viewpoint
6	Beauly (A862)	90-degree FoV – Baseline photograph, wireline and photomontage	Illustrative – residents, road users	
7	Muir of Ord (A832)	90-degree FoV – Baseline photograph, wireline and photomontage	Illustrative – residents, road users, NC 500	-
8	Contin Village Shop (A835)	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – residents (illustrative of road users)	Yes
9	Contin Village Shop (A835)	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – residents (illustrative of road users)	Yes
10	Jamestown	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – residents	-
11	Barlvaird / Newmore	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – residents	-
12	A835 / B9169	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users	-
13	A832 west of Tore	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users	-
14	Great Glen Way near Ladycairn	180 (2x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – walkers from elevated and open view from the Great Glen Way	-
15	Height of Brae	180 (2x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – residents	-
16	Sgurr a'Choire Ghlais (Munro)	360 (4x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – walkers, WLA, SLA	-
17	Meall a'Mhadaibh	360 (4x90) degree FoV – Baseline photograph, wireline and photomontage	Specific – walkers, NSA	Yes

ID	Viewpoint Name	Visualisation Technique	Receptor and Viewpoint Type	Illustrated Night-time viewpoint
18	Knockbain	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users, visitors	-
19	A9 Cromarty Firth	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users, NC 500	-
20	Ben Wyvis	270 (3x90) degree FoV – Baseline photograph and wireline	Specific – walkers, WLA, SLA	-
21	A9 Kessock Bridge	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users, Sustrans Cycle Route 1	-
22	A96, Arturlie Junction	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users,	-
23	Cnoc Fyrish	180 (2x90) degree FoV – Baseline photograph and wireline	Specific – walkers	-
24	B817, Alness	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – road users	-
25	Chanonry Point	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – scenic point, car park users, walkers	-
26	Invergordon	90-degree FoV – Baseline photograph, wireline and photomontage	Specific – residents, visitors on picnic area	-

Other Technical Guidance

6.31 The assessment will be undertaken in accordance with the methods outlined in best practice guidance documents but not limited to the following:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Landscape Institute and IEMA (May 2013), hereafter referred to as GLVIA 3;
- *Siting and Designing Windfarms in the Landscape*, Version 3a, SNH (August 2017);
- Guidance: *Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments*, NatureScot (March 2021);

- *Visual Representation of Wind Farms* Version 2.2, SNH (February 2017);
- *Visualisation Standards for Wind Energy Developments,* Highland Council, July 2016;
- Guidance: *General pre-application and scoping advice for onshore wind farms,* NatureScot (2023);
- University of Newcastle for SNH: *Visual Assessment of Windfarms: Best Practice*, Commissioned Report F01AA303A, 2002;
- *Residential Visual Amenity Assessment: Technical Information Note*, Landscape Institute, 15 March 2019;
- *Visual Representation of Development Proposals* Technical Guidance Note 06/19, Landscape Institute, September 2019;
- Guidance: *Spatial Planning for Onshore Wind Turbines – natural heritage considerations*, Version 3a, SNH, June 2015;
- L*andscape Sensitivity Assessment Guidance*. NatureScot, April 2022.
- *Guidance for Assessing the Effects on Special Landscape Qualities* – Working Draft, SNH, 9 November 2018.
- *The Special Qualities of the National Scenic Areas*: SNH Commissioned Report No. 374, SNH, 2010;
- *Annex 14 to the Convention on International Civil Aviation* – Volume I Aerodrome Design and Operations, Eighth Edition (ICAO, July 2018);
- CAP393, *The Air Navigation Order 2016*, SI 2016 No.765;
- CAP 764: *Policy and Guidelines on Wind Turbines* (Civil Aviation Authority, CAA);
- Safety & Airspace Regulation Group. Policy Statement: L*ighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level* (CAA, 2017);
- *Guidance Notes for the Reduction of Obtrusive Light,* GN01:2011 (Institute of Lighting Professionals, 2011); and
- *Night-time Photography* (Institute of Lighting Professionals, 2019).

Potential effects proposed to be scoped out of further assessment

6.32 As a result of the characteristics of the Site, baseline receptors and the Proposed Development, it is considered that some receptors would not be significantly affected in the context of the EIA Regulations. These receptors / effects can therefore be scoped out from further assessment in the EIA Report as follows:

- LVIA Wider and Detailed Study Area:

  Limit wider LVIA Study Area for the landscape, visual and cumulative assessment to 30km as a result of the blade tip ZTV in **Figure 6.1**.

  The detailed LVIA study area would be defined by the potential threshold for significant effects based on the viewpoint analysis and would include local / regional level receptors such as local LCTs, local landscape designations, main settlements, transport routes, 'B' and 'C' class roads, core paths / local recreational routes and local attractions. The viewpoint analysis and field survey will be used to confirm if a

receptor can be scoped out and viewpoint analysis used to identify a conservative distance or 'threshold' for significant landscape and visual effects.

- Cumulative Assessment:

  Limit the cumulative baseline of all operational and consented wind energy development and other applications for wind energy development to within 30km of the Site to match the LVIA Wider Study Area; and

- Exclude other scoping stage and pre-application schemes in line with NS guidance apart from those within 10km which will be included on the viewpoint wirelines.

- Receptors outwith the ZTV

  All receptors within the Study Area that are outwith the blade tip ZTV would have no view of the Proposed Development and should be scoped out.

- National Scenic Areas

  NSAs within 45km are illustrated on **Figure 6.4**. The ZTV illustrates that except for Glen Strathfarrar NSA, there would be no visibility of the Proposed Development from the remaining four NSAs within the Study Area. Effects on the Special Landscape Qualities of these NSAs are therefore scoped out of the assessment. Effects on the SLQs of the Glen Strathfarrar NSA will be included in the assessment.

- Cairngorms National Park

  The CNP is located over 43km to the south-east of the Proposed Development. The ZTV illustrates no visibility of the Proposed Development from the National Park. Effects on the SLQs of the CNP are therefore scoped out of the assessment.

- Highland SLAs

  Highland SLAs within 45km are illustrated on **Figure 6.4**. The ZTV illustrates that except for the Strathconon, Monar and Mullardoch SLA, there would be very limited to no visibility of the Proposed Development from the remaining eight SLAs within the Study Area. Effects on the Special Landscape Qualities of these SLAs are therefore scoped out of the assessment on the basis there would be no significant effects. Effects on the SLQs of the Strathconon, Monar and Mullardoch SLA will be included in the assessment.

- Wild Land Areas Assessment

  Due to the proximity of the Central Highlands WLA to the Site, a '*high-level*' Wild Land Assessment on this WLA will be included in the assessment. All other WLAs are scoped out of the assessment due to intervening distance, very limited visibility and other wind farms located between the WLAs and the Site. In accordance with NPF4, it states that "*buffer zones around wild land will not be applied, and effects of development out with wild land areas will not be a significant consideration*".

- Night-time Landscape Assessment

  A proportionate night-time visual assessment would be undertaken in accordance with NS guidance[10] which would be focused on assessing night-time effects on views and visual amenity. It is proposed that night-time effects on landscape character and designations that do not include dark skies, for example, within their key characteristics or SLQs is scoped out.

[10] NatureScot, General pre-application and scoping advice for onshore wind farms, September 2020

- Residential Visual Amenity Assessment

  There are no inhabited residential properties within 2km of the proposed turbines and, in accordance with the Landscape Institute guidance[11], a Residential Visual Amenity Assessment (RVAA) is excluded from the assessment.

Assessment Methodology

6.33 LVIA and cumulative assessment forms one of the key components of the EIA process when assessing proposed wind farm developments. The assessment will be undertaken in accordance with Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and IEMA, 2013). An overview of the LVIA methodology, including cumulative assessment, is provided below with the detailed methodology to be provided as an appendix to the completed EIAR.

Landscape Effects

6.34 Landscape Effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows:

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the Proposed Development may influence in a significant manner."

6.35 The landscape effects occurring during the construction, operational and decommissioning periods may therefore include, but are not restricted to, the following:

- Changes to landscape elements: the addition of new elements (wind turbines) or the removal of existing elements such as trees, vegetation and buildings and other characteristic elements of the landscape character type;
- Changes to landscape qualities: degradation or erosion of landscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of landscape character types/areas or contribute to the landscape value;
- Changes to landscape character: landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall landscape character within a particular area; and
- Cumulative landscape effects: where more than one wind farm may lead to a potential landscape effect.

[11] Residential Visual Amenity Assessment, Landscape Institute Technical Guidance Note 02/19,

Visual Effects

6.36 Visual Effects are concerned wholly with the effect of the development on views, and the general visual amenity, and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows:

"*An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views.*"

6.37 Visual effects are identified for different receptors (people) who would experience the view(s) at their places of residence, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:

- Visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view(s); and
- Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

Determining the Significance of Effects

6.38 Essentially, the level of landscape and visual effect (and whether this is significant) is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change likely to result from the Proposed Development. The LVIA includes an iterative design and assessment process that takes account of design improvements and mitigation. Further assessment is then undertaken of any remaining, residual effects that could not otherwise be mitigated or 'designed out'. In accordance with the relevant EIA Regulations, it is important to determine whether the effects, assessed as a result of the Proposed Development, are likely to be significant.

6.39 A matrix is used to guide the assessment process and is shown in **Table 6.3**, below. Significant landscape and visual effects are highlighted in bold, shaded in dark grey and relate to all those effects that result in a '**Substantial**', '**Substantial to Major**', '**Major**' or a '**Major to Moderate**' level of effect. In some circumstances, 'Moderate' levels of effect (shaded light grey in **Table 6.3**) have the potential to be considered as significant, subject to the assessor's opinion. Such exceptions are also highlighted in **bold** and will be explained as part of the assessment where they occur. White or un-shaded boxes indicate a non-significant effect.

6.40 The type of effect will also be described and may be direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral, or adverse .

Table 6.3 Evaluation of Landscape and Visual Effects

Magnitude of Change	**Landscapes and Visual Sensitivity**			
	High	**Medium**	**Low**	**Very Low**
High	**Substantial**	**Major**	Moderate	Not used
High - Medium	***Substantial to Major***	***Major to Moderate***	*Moderate to Minor*	
Medium	**Major**	Moderate	Minor	
Medium - Low	***Major to Moderate***	*Moderate to Minor*	*Minor*	
Low	Moderate	Minor	Negligible	
Low – Very Low	*Moderate to Minor*	*Negligible*	*Negligible*	
Very Low	Minor	Negligible	Negligible	
Zero	None / No View			

Cumulative Landscape and Visual Impact Assessment

6.41 The assessment of cumulative effects is essentially the same as for the assessment of the 'solus' landscape and visual effects, in that the level of landscape and visual effect is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change. Cumulative assessment however considers the magnitude of change posed by multiple developments.

6.42 The Cumulative LVIA (CLVIA) will assess the following types of cumulative effects:

- Cumulative landscape effects: where more than one wind energy development may have an effect on a particular area of landscape character or landscape designation.
- Cumulative visual effects: the cumulative or incremental visibility of similar types of development that may combine to have a cumulative visual effect. These can be further defined as follows:
  - Simultaneous or combined: where two or more developments may be viewed from a single fixed viewpoint simultaneously, within the viewer's field of view and without requiring them to turn their head.
  - Successive or repetitive: where two or more developments may be viewed from a single viewpoint successively as the viewer turns through 360°.
  - Sequential: where a number of developments may be viewed sequentially or repeatedly at increased frequency, from a range of locations when travelling along a route within the study area.

6.43 The CLVIA will adopt the same study area as the LVIA. Cumulative wind energy development for inclusion in the CLVIA are listed in **Table 6.1**. This cumulative database will be updated as required as part of the consultation process and prior to completion of the assessment.

6.44 The cumulative assessment will accord with NatureScot guidance[12] and will be prepared to ensure that, as well as the effects of the Proposed Development (LVIA), the 'additional' cumulative effects and the 'combined' cumulative effects (CLVIA) will also be also reported as follows:

6.45 **Scenario 1** (the main cumulative assessment) would consider: Existing + Consented + the Proposed Development - the additional and combined cumulative effects of the Proposed Development and existing (including schemes under construction) and consented wind energy developments will be assessed.

6.46 Further, the cumulative assessment will take account of the timescales for the operation of the existing and consented developments.

6.47 In addition, a short assessment will also be undertaken for **Scenario 2** which takes into account the additional and combined cumulative effects of the Proposed Development and existing and consented wind energy developments and live applications (including schemes at planning appeal). This Scenario is less certain given the unknown decisions on live application wind farms.

Glen Strathfarrar NSA Assessment

6.48 The assessment of effects on the SLQs of the Glen Strathfarrar NSA will be guided by the NatureScot, Working Draft 11 '*Guidance for Assessing the Effects on Special Landscape Qualities*' (SNH, November 2018).

6.49 LVIA Viewpoint 15 is located within the NSA which will be used to inform the assessment. In addition, the WLA assessment will examine the views from other hilltops and any lower lying locations within the ZTV. The assessment will also take account of all other cumulative wind farm development shown on **Figure 6.6**.

6.50 The Applicant would also like NS to confirm which of the SLQs included in the NSA description should be assessed.

6.51 Only one of the five SLQs for the NSA are proposed to be included in the assessment, as follows:

- *A sense of peace and tranquillity.*

6.52 The remaining four qualities are proposed to be excluded from the assessment given the Proposed Development would not be visible from much of the Highland glen. The ancient

[12] NatureScot, March 2021. Guidance: Assessing the Cumulative Landscape and Visual Impacts of Onshore Wind Energy Developments.

Caledonian pine forest, fast-moving river within the glen and the contrasts in colour, light and views through the glen would not be directly affected by the Proposed Development.

Night-time Lighting Visual Assessment

6.53 Aviation warning lights attached to turbine hubs and towers are required on all proposed wind turbines ≥150 m in accordance with Article 222 of the UK Air Navigation Order (ANO) (2016), subject to any proposed lighting mitigation strategy.

6.54 A proportionate night-time assessment of the proposed aviation lighting will be undertaken in accordance with NatureScot's *General Pre-application and Scoping Advice for Onshore Wind Farms*, Annex 2 (2023). The assessment will be supported by maps indicating the ZTV of any proposed aviation warning lights and four night-time viewpoints. The proposed night-time viewpoints, listed in **Table 6.2**, have been selected as representative of locations where there are likely to be people at night, including settlements and roads.

6.55 A night-time ZTV of the turbine lighting positions would accompany the visualisations which would aid the assessment. The extent of the study area is likely to be restricted to 10-15km from the outer turbine positions according to the technical criteria of the proposed candidate light fixtures.

Wild Land Assessment

6.56 Due to the proximity of the Central Highlands WLA to the Site, a 'high-level' Wild Land Assessment on this WLA will be included in the assessment. In accordance with NPF4, it states that "*buffer zones around wild land will not be applied, and effects of development out with wild land areas will not be a significant consideration*".

6.57 The assessment will be guided by the NatureScot, Assessing Impacts on Wild Land Areas – Technical Guidance, 2023; and the published WLA description of Wild Land Area 24: Central Highlands, 2017. It is noted that the study areas for the wild land assessments "*may be more limited than the whole of the LAs to better reflect the extent of likely effects*" and is therefore proposed that the study area for WLA 24 is limited up to 20km given there is none to very limited visibility (blade tip) from the WLA beyond this distance. The WLA assessment will also consider "*how the wild land qualities are experienced across the WLA*" as it will look at the whole of the WLA within the wider LVIA study area.

6.58 LVIA Viewpoints 4, 16 and 20 are located within the WLA which will be used to inform the Wild Land Assessment. In addition, the WLA assessment will examine the views from all Munros and Corbett's within the WLA. The wild land assessment will also take account of all other cumulative wind farm development shown on **Figure 6.6**.

6.59 The Applicant would also like NS to confirm which of the WLA 24 qualities included in the WLA descriptions should be assessed. In previous WLA assessments NS have agreed that some of the qualities should be excluded as they only relate to physical characteristics that cannot be affected by Proposed Developments beyond the WLA boundary for example.

6.60 Two of the four qualities for WLA 34 are proposed to be included in the assessment, as follows:

- *An extensive and awe-inspiring range of large scale, high and rugged mountains;* and
- *An extensive, remote mountain interior with strong qualities of sanctuary and solitude*.

6.61 The remaining two qualities relating to "*deep glens with steep, arresting side slopes*" and the "*native woodland*" are proposed to be excluded from the assessment given neither of these areas within the WLA descriptions would be directly affected by the Proposed Development.

7 NOISE

Introduction

7.1 This section of the Scoping Report focuses on the likely direct and indirect effects of noise and vibration associated with the construction, operation and decommissioning phases of the Proposed Development. It is based upon a desk-based review of potentially noise sensitive receptors (NSRs) and their relationship to the proposed development.

Baseline Conditions

7.2 The Site is located within a rural location where background noise levels are anticipated to be relatively low. The closest property is 2 Farley - (NH 46797 45338) to the proposed development is approximately 2km southeast from the closest proposed turbine.

7.3 As set out previously within this Scoping Report (see Table 6.1), there are also a number of operational wind farm developments within the vicinity of the proposed development.

Likely Significant Effects during Construction

7.4 Noise emitted during the construction phase would be temporary and short term in nature and can be minimised through careful construction practices.

7.5 Theoretical likely significant effects during construction are centred around noisy activities in the vicinity of noise sensitive receptors, such as the construction or widening of access roads, drilling, or blasting associated with potential rock movement during construction, the formation of borrow pits, and the noise associated with heavy goods vehicles and general construction movements.

7.6 Given the site is likely to be accessed from the south, a number of properties are likely to require to be assessed for construction noise once the final turbine and infrastructure layout is known.

Likely Significant Effects during Operation

7.7 For operational noise, the EIA Report will assess the maximum sound power level for the candidate turbine type in order to assess a worst case scenario. If the modelling exercise shows that sound power levels will need to be reduced to achieve acceptable noise levels at sensitive locations, then the EIA Report will examine possible mitigation measures which may include the use of quieter turbines, increasing standoff distances, installing measures to monitor and, if necessary, using noise reduced modes in certain wind conditions.

7.8 Like all wind-related noise, operational noise from turbines increases with wind speed. The EIA Report will therefore compare the existing background noise levels with the calculated predicted noise levels over the range of wind speeds expected at the Site using the methodology set down in ETSU-R-97. The wind farm will be designed to fully comply with

the requirements of ETSU-R-97 and, whilst noise associated with the operation of the proposed wind turbines may be audible at some locations under certain conditions, the noise generated would be within the ETSU-R-97 and would be deemed acceptable.

Design and Mitigation

7.9 For operational noise, the proposed turbine layout will be designed to comply with the noise limits established in accordance with ETSU-R-97. The distance of the nearest turbine from the closest residential properties (2km) is likely to mitigate any significant effect from the operation of the wind farm and it is predicted that the ETSU-R-97 simplified day time limit of 35dB would apply.

7.10 For construction noise, it is unlikely that any form of mitigation will be required unless any major site access track works are required in the very close vicinity of residential properties which would normally be avoided. Mitigation measured would be incorporated into site design by avoiding track proximity to residential properties, following good practice in construction techniques including avoiding work out of normal day-time construction hours wherever possible.

7.11 There are a range of turbine makes and models that may be appropriate for the Proposed Development. The final selection of turbine is likely to follow a competitive tendering exercise once consent for the Proposed Development has been granted. The final turbine model may therefore differ from that on which the assessment is based. However, the final choice of turbine will be required to comply with the noise limits established in the ETSU-R-97 assessment.

Inclusion or Exclusion from the EIAR

7.12 Given the potential for access track works and deliveries in relative proximity to residential properties, effects are not currently known and cannot fully be discounted. Therefore, construction noise has been scoped in.

7.13 It is likely that an operational ETSU-R-97 simplified noise assessment would be required in accordance with industry guidance. Further consultation would be undertaken with the Environmental Health Officers at The Highland Council to agree methodology.

Proposed Scope of Assessment

Matters to be scoped in

Construction Noise

7.14 Noise emitted during the construction and decommissioning phase will be temporary and short term in nature and can be minimised through careful construction practices. The effective control of these impacts can be achieved by way of a suitable planning condition.

7.15 Should consent be granted, construction and decommissioning noise can be controlled through the use of two legislative instruments which address the effects of environmental noise with regard to construction noise, vibration, and nuisance:

- The Environmental Protection Act 1990 (EPA)[13]; and
- The Control of Pollution Act 1974 (CoPA)[14].

7.16 The CoPA provides two means of controlling construction noise and vibration. Section 60 provides the Local Authority with the power to impose at any time operating conditions on the development site. Section 61 allows the Developer to negotiate a set of operating procedures with the Local Authority prior to commencement of site works.

7.17 A construction noise assessment will be undertaken using data provided in British Standard (BS) 5228: Part 1: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites - Noise' and the calculation methodology provided in ISO9613-2:1996 'Acoustics - Attenuation of sound during propagation outdoors' -Part 2: General method of calculation' . Impacts will be assessed using criteria contained within BS5228-1:2009+A1:2014 and, where appropriate, mitigation measures will be proposed.

Operational Noise

7.18 The Scottish Government's Planning Advice Note PAN1/2011 'Planning and Noise'[15] refers to the 'Onshore Wind Turbines' web based document which in turn states that ETSU-R-97 '*The Assessment of Rating of Noise from Windfarms*'[16] should be used by Planning Authorities '*to assess and rate noise from wind energy developments until such time that an update is available.*' The web based document also refers to the Institute of Acoustics '*A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*'[17] (IOA GPG) as a source, which provides:

> *'significant support on technical issues to all users of the ETSU-R-97 method for rating and assessing wind turbine noise, and should be used by all IOA members and those undertaking assessments to ETSU-R-97. The Scottish Government accepts that the guide represents current industry good practice.'*

7.19 ETSU-R-97 details a methodology for establishing noise limits for proposed wind farm developments and these limits should not be exceeded. ETSU-R-97 states that noise limits should be set relative to existing background noise levels at the nearest receptors and that these limits should reflect the variation in both turbine source noise and background noise with wind speed. Separate noise limits apply for quiet daytime and for night-time periods. Quiet daytime limits are chosen to protect a property's external amenity, and night time limits are chosen to prevent sleep disturbance indoors, with windows open.

13 Environmental Protection Act 1990

14 Control of Pollution Act 1974

15 Scottish Government, Planning Advice Note PAN 1/2011: 'Planning and Noise'

16 ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97)

17 Institute of Acoustics 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (2013)

7.20 ETSU-R-97 recommends that wind farm noise for the quiet daytime periods should be limited to 5 dB(A) above the prevailing background or a fixed minimum level within the range 35 - 40 dB $L_{A90,10min}$, whichever is the higher. The precise choice of criterion level within the range 35 – 40 dB(A) depends on a number of factors, including the number of dwellings in the neighbourhood of the wind farm (relatively few dwellings suggest a figure towards the upper end), the effect of noise limits on the number of kWh generated (larger sites tend to suggest a higher figure) and the duration and level of exposure to any noise. These factors will be taken into account with justification for deriving suitable noise limits included in the noise assessment.

7.21 An exception to the setting of both the quiet daytime and night time fixed minimum limit occurs where a property occupier has a financial involvement with the proposed development. In that case the fixed minimum limit can be increased to 45 dB $L_{A90,10min}$ or the prevailing background noise L_{A90} plus 5 dB, whichever is the greater for both the quiet daytime and night-time periods.

7.22 A background noise survey will likely be required for situations where predicted wind turbine noise levels at the nearest noise sensitive properties is limited to an $L_{A90,10min}$ of 35dB(A) up to wind speeds of 10m/s at 10m, as the protection of the amenity of those properties can be controlled through a simplified noise condition as detailed in ETSU-R-97.

7.23 Consultation will be undertaken with the Council's Environmental Health Department prior to the commencement of the noise assessment in order to agree the overall assessment methodology.

7.24 A stand-alone and cumulative noise assessment will be undertaken in order to consider the consented, operational and proposed wind farms within the vicinity of the proposed development. The assessment will be undertaken in accordance with ETSU-R-97 and the IOA GPG.

Matters to be scoped out

Decommissioning Noise

7.25 Noise associated with decommissioning cannot be accurately determined at this stage given decommissioning technology may be very different in 35 years' time. In addition, should the proposed development be consented, there is the possibility that an extension of consent may be granted to operate the proposed development for longer.

Vibration

7.26 Given the nature of construction activities proposed and the relative distances from residential receptors, the risk of ground borne vibration impacting on residential receptors is considered very low, as such a vibration assessment will not be undertaken.

Low-Frequency Noise

7.27 A study[18], published in 2006 by acoustic consultants Hayes McKenzie on the behalf of the Department of Trade and Industry (DTI), investigated low frequency noise from wind farms. This study concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines.

7.28 In February 2013, the Environmental Protection Authority of South Australia published the results of a study into in infrasound levels near wind farms[19]. This study measured infrasound levels at urban locations and rural locations with wind turbines close by, and rural locations with no wind turbines in the vicinity. It found that infrasound levels near wind farms are comparable to levels away from wind farms in both urban and rural locations. Infrasound levels were also measured during organised shutdowns of the windfarms; the results showed that there was no noticeable difference in infrasound levels whether the turbines were active or inactive.

7.29 Bowdler et al., (2009)[20] concluded that:

> *"...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms generally has adverse effects on wind farm neighbours".*

7.30 More recently during a planning Appeal (PPA-310-2028, Clydeport Hunterston Terminal Facility, approximately 2.5 km south-west of Fairlie, 9 Jan 2018), the health impacts related to low frequency noise associated with wind turbines were considered at length by the appointed Reporter (Mr M Croft). The Reporter considered evidence from Health Protection Scotland and the National Health Service. In addition, he also considered low frequency noise surveys undertaken by the Appellant and the Local Authority both of which demonstrated compliance with planning conditions and did not identify any problems attributable to the turbine operations; some periods with highest levels of low frequency noise were recorded when the turbines were not operating.

18 Hayes McKenzie (2006). 'The measurement of low frequency noise at three UK windfarms', Hayes Mckenzie, The Department for Trade and Industry, URN 06/1412, 2006.

19 Environment Protection Authority (2013). 'Infrasound levels near windfarms and in other environments'. Available Online At: http://www.epa.sa.gov.au/xstd_files/Noise/Report/infrasound.pdf

20 Bowdler et al (2009). 'Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects'. Acoustics Bulletin, Vol 34 No2 March/April 2009, Institute of Acoustics.

7.31 The Reporter concluded that:

- The literature reviews by bodies with very significant responsibilities for the health of local people found insufficient evidence to confirm a causal relationship between wind turbine noise and the type of health complaints cited by some local residents.
- The NHS's assessment is that concerns about health impact are not supported by good quality research.
- Although given the opportunity, the Community Council failed to provide evidence that can properly be set against the general tenor of the scientific evidence.

7.32 It is therefore not considered necessary to carry out specific assessments of low frequency noise and that it should be scoped out.

Amplitude Modulation

7.33 In its simplest form, Amplitude Modulation (AM), by definition, is the regular variation in noise level of a given noise source. This variation (the modulation) occurs at a specific frequency, which, in the case of wind turbines, is defined by the rotational speed of the blades, i.e. it occurs at the rate at which the blades pass a fixed point (e.g. the tower), known as Blade Passing Frequency.

7.34 A study[21] was carried out in 2007 on behalf of the Department for Business, Enterprise and Regulatory Reform (BERR) by the University of Salford, which investigated the incidence of noise complaints associated with wind farms and whether these were associated with AM. The study defined AM as aerodynamic noise from wind turbines with a greater degree of fluctuation than normal at blade passing frequency. Its aims were to ascertain the prevalence of AM on UK wind farm sites, to try to gain a better understanding of the likely causes, and to establish whether further research into AM is required.

7.35 The study concluded that AM had occurred at only a small number (4 of 133) of wind farms in the UK, and only for between 7% and 15% of the time. It also stated that, the causes of AM are not well understood, and that prediction of the effect was not currently possible.

7.36 This research was updated in 2013 by an in-depth study undertaken by Renewable UK[22], which has identified that many of the previously suggested causes of AM have little or no association to the occurrence of AM in practice. The generation of AM is based upon the interaction of a number of factors, the combination and contributions of which are unique to each site. With the current state of knowledge, it is not possible to predict whether any particular site is more or less likely to give rise to AM, and the incidence of AM occurring at any particular site remains low, as identified in the University of Salford study. The report includes a sample planning condition to address AM, however that has not yet been validated or endorsed by UK Government.

21 University of Salford (2007). 'Research into aerodynamic modulation of wind turbine noise'. Report by University of Salford, The Department for Business, Enterprise and Regulatory Reform, URN 07/1235, July 2007.

22 Renewable UK (2013). 'Wind Turbine Amplitude Modulation: Research to improve understanding as to its Cause and effects', Renewable UK, 2013.

7.37 In 2016, the IOA proposed a measurement technique to quantify the level of AM present in any particular sample of windfarm noise[23]. In August 2016 a report written by WSP/Parsons Brinkerhoff was published by the Department of Business, Energy & Industrial Strategy (BEIS, formerly The Department of Energy & Climate Change) who have published guidance24. The report sough to build on the conclusions of the IOA study in order to define an appropriate assessment method for AM, including a penalty scheme and an outline planning condition.

7.38 In November 2017, an article entitled 'A planning condition for wind farms' was published in Vol 42 No 6 of the Acoustics Bulletin magazine. The article was written collaboratively by a number of noise consultants and suggested a noise planning condition which included consideration of AM. The authors noted in the article that:

> *'Whilst local authorities and developers have waited for a planning condition that could be applied to newly consented wind farms, or to those already consented but with a suspensive condition, the report Wind Turbine AM Review (WTAMR) by WSP/Parsons Brinckerhoff for DECC arguably did not provide that. In addition there have been a number of comments on WTAMR that we consider should be addressed.'*

7.39 The article then went on to propose a draft condition but noted that: 'This approach is proposed based on the current state of understanding but may be subject to modification in light of new research and further robust information.' And 'As various people before us have discovered, the derivation of a penalty is not easy. There is not sufficient reliable research to be confident that a penalty system would always provide a fair indication of the impact of AM.'

7.40 At the time of writing there has been no official response to those recommendations from the IOA Noise Working Group and, as yet no endorsement from any Scottish Government Minister or Department. The recommendation to impose a planning condition and the associated penalty scheme is at odds with the advice from the IOA GPG which currently states (paragraph 7.2.10):

> *'The evidence in relation to "Excess" or "Other" Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM.'*

7.41 At time of writing there is no agreed methodology which can be used to predict the occurrence of AM or an agreed methodology which can be used to determine whether the effects of AM, should it occur, are likely to be significant. On that basis it is considered therefore that amplitude modulation should be scoped out.

23 Institute of Acoustics, (2016) A Method for Rating Amplitude Modulation in Wind Turbine Noise

24 BEIS, (2016), Review of the evidence on the response to amplitude modulation from wind turbines

8 TERRESTRIAL ECOLOGY

Introduction

8.1 This section presents the approach to be used in assessing the potential effects of the surveys being employed to define the ecological baseline conditions on the site and adjacent areas in order to allow a robust assessment of potential effects from the Proposed Development on ecological features.

8.2 It describes the methods of assessments and indicates any areas which are to be scoped out of that assessment. It also reviews the designated sites in proximity to the site and addresses what impacts will be considered for those sites.

8.3 The fundamental approach to the ecology assessment detailed within the EIA Report for the proposed development will be to:

- Identify the ecological baseline of the Proposed Development and adjacent areas;
- Evaluate the nature conservation value and/or the legal or planning status of identified receptors;
- Assess the risk of the Proposed Development to adversely impact upon features assessed as being above a threshold; and to
- Present appropriate mitigation or compensation strategies, if required.

Survey Methodology

Survey Areas

8.4 The habitat survey area is based on the site boundary and comprises all land within the site boundary, as illustrated in Figure 8.1. The protected species survey area comprises all accessible land within 200m of the site boundary (see Figure 8.1).

Developable Area Description

8.5 The Developable Area predominantly lies on heathland with areas of bog and small areas of marshy grassland, located to the south of the Orrin Reservoir in Ross-shire. There are several lochs and smaller lochans located within and adjacent to the Developable Area. Similar moorland habitats lie to the north, south, east and west of the Developable area. Access to the site is via an existing track through Erchless Forest (coniferous woodland) from the south.

Desk Study

Designated Sites

8.6 Information about statutory and non-statutory sites will be sought during the desk study undertaken as part of the ecological assessment and internationally designated nature conservation sites (Special Areas of Conservation; SACs; and Ramsar sites) and nationally designated sites (Special Site of Scientific Interest (SSSIs) within 5 km of the Development identified. Special Protection Areas (SPAs) are designated for their ornithological interest and are included in the ornithology Section 9.

8.7 Data relating to non-statutory sites designated for ecology within 2 km of the Development site will be considered for the assessment. These include:

- Woodland listed on the Ancient Woodland Inventory (AWI);
- Local Wildlife Sites (LWS)[25]; and
- Scottish Wildlife Trust (SWT) reserves.

8.8 Strathglass Complex SAC lies approximately 1.5km southwest of the access track and 4.5km from the developable area at its closest point. The SAC is designated on account of its bog, heathland, grassland, scree and woodland habitats, as well as its mountain willow scrub, alpine rock plants, lochs, tall herb communities and its otter population. Glen Strathfarrar SSSI shares the same boundary as the SAC. The SSSI is notified on account of its native pinewood habitat and its dragonfly, lichen, vascular plant and breeding bird assemblages. There are no other known statutory sites designated for their ecological interest within the 5km area of search.

8.9 To date no known non-statutory sites designated for their ecological interest or areas of woodland listed on the AWI are located within 2 km of the Developable area.

Background Records

8.10 Background records of non-avian protected species shall be obtained from the Highland Biological Recording Group.

8.11 These searches will be limited to legally protected animals considered to be potentially sensitive to onshore windfarm developments, as well as local conservation priorities, and therefore will include:

- Conservation of Habitats and Species Regulations 2010 – Schedule 2 'European Protected Species';

[25] Local Wildlife Site is a generic name for a variety of non-statutory designated sites; other common examples include: Sites of Importance for Nature Conservation (SINCs); Sites of Scientific Interest (SSI); Biological Heritage Sites (BHSs).

- Wildlife and Countryside Act 1981 (as amended) (WCA) – Schedule 5 animals[26] and Schedule 8 plants; and

- Protection of Badgers Act 1992 – Badgers.

Baseline Survey Methodology

Phase 1 Habitat Survey and National Vegetation Classification

8.12 The habitats within the site were mapped using Phase 1 Habitat Survey and the National Vegetation Classification (NVC) system. The NVC has been used to identify habitats of high conservation value and ground water dependent terrestrial ecosystems (GWDTEs). It is noted that Turbine 1 on the scoping layout lies slightly outwith the coverage of the NVC (Figure 8.3). This area will be covered at a later date and will inform the evolution of the design of the layout.

8.13 Target notes are also provided where appropriate.

8.14 A preliminary peat probing exercise has also been undertaken across all land within the site boundary, with the exception of the existing access track.

Bats

8.15 All bat species found in the UK are legally protected under 'The Conservation (Natural Habitats &c.) Regulations 1994' (as amended 2007 and 2009), which transposes the 'EC Habitats Directive 1992' into UK legislation. Bat species are listed on Annex IV of the Directive (bat species appearing in Annex II and afforded greater protection are not present within Scotland).

8.16 Any features with the potential to support roosting, foraging and commuting bats will be recorded during the protected species survey.

8.17 The following surveys will be undertaken to assess bats at Ballach:

- Roost potential: visual assessment of the potential of features to support roosting bats; and

- Remote monitoring: full spectrum bat detector units will be deployed for a minimum of ten consecutive nights on three occasions between May to September 2022. Remote monitoring has been designed in accordance with current best practice guidance[27],[28].

Otter

8.18 Otter are European Protected Species and the places which they use for shelter/rest are offered European level protection under Annex IV of the Habitats Directive. Recent

[26] excluding those only protected from sale and possession under Parts 5(a) and 5(b)

[27] Collins, 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. Bat Conservation Trust.

[28] NatureScot et al. 2019. Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

amendments to the Habitats Directive (Amendment No. 2 (Scotland) Regulations 2007 – S.I. 2007/80) strengthened the legal protection and effectively removed otter from the provisions of the WCA and the Nature Conservation Scotland Act (2004) (NCSA). Protection therefore rests with the amended Habitats Regulations, removing many of the defences previously available under the WCA and making non-compliance with a derogation licence a criminal offence.

8.19 The survey area for the otter survey is defined with regard to specified standards, which are set out within the Scottish Natural Heritage (SNH) (now NatureScot) publication; Otters and Development[29]. The survey area comprises all suitable habitat within the Developable Area and an additional buffer of 250m upstream and downstream of any crossing where access allows.

8.20 In the present study, all water bodies, and watercourses, including field drains and ditches, will be surveyed for signs indicative of the presence of otter, including:

- Otter spraint;
- Footprints;
- Potential resting areas - namely underground holts (e.g. beneath the roots of bankside trees) or above ground couches (e.g. in reedbeds);
- Slides or other well-used access points to watercourses;
- Feeding remains e.g. fish carcasses; and
- Otter sightings.

Water Vole

8.21 The Water Vole survey area mirrors that described for otter above.

8.22 The survey methodology adopted follows that described in the Water Vole Conservation Handbook (Strachan and Moorhouse 2006)[30]. All watercourses and standing waterbodies in the survey area are identified using an Ordnance Survey (OS) map, aerial photography and field survey. All riparian zones, watercourses and standing waterbodies within the survey area are surveyed for evidence of water vole. Where possible, all bodies of water are surveyed from the channel/bed to give the best possible view of any potential bankside habitat. The survey comprises searching for field signs as described in Strachan and Moorhouse (2006), and this includes burrows, latrines, footprints and feeding stations.

8.23 American mink are well known as predators of water vole. As such, presence of this species is also recorded in conjunction with the water vole survey.

[29] Scottish Natural Heritage (Undated). Otters and Development. Scottish Wildlife Series. http://www.snh.org.uk/publications/on-line/wildlife/otters/default.asp.

[30] Strachan, R. and Moorhouse, T. (2006). Water Vole Conservation Handbook. Second Edition. Wildlife Conservation Research Unit, University of Oxford.

Pine Marten

8.24 The pine marten receives full protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

8.25 Certain methods of killing or taking pine martens are illegal under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

8.26 It is an offence to intentionally or recklessly:

- kill, injure or take a pine marten;
- damage, destroy or obstruct access to a nest or den – i.e. any structure or place which such an animal uses for shelter or protection; and
- disturb such an animal when it is occupying a nest or den for shelter or protection (except when this is inside a dwelling house).

8.27 Searches for pine marten dens and other evidence of the presence of this species (such as scats), will be searched for during the protected species survey.

Wildcat

8.28 The wildcat is a European protected species and is fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

8.29 It is an offence to deliberately or recklessly:

- capture, injure, kill or harass a wildcat
- disturb a wildcat in a den or any other structure or place it uses for shelter or protection
- disturb a wildcat while it is rearing or otherwise caring for its young
- obstruct access to a den or other structure or place wildcats use for shelter or protection or otherwise deny the animal use of that place
- disturb a wildcat in a manner or in circumstances likely to significantly affect the local distribution or abundance of the species
- disturb a wildcat in a manner or in circumstances likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young

8.30 It is also an offence to:

- damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly)
- keep, transport, sell or exchange, or offer for sale or exchange any wildcat (or any part or derivative of one) obtained after 10 June 1994.

8.31 Searches for wildcat dens and other evidence of the presence of this species (such as scats), will be searched for during the protected species survey.

Badger

8.32 Badgers are legally protected from intentional cruelty, such as badger-baiting and from the results of lawful human activities, including housing, road or other developments, under the Protection of Badgers Act 1992 (PBA), which was amended by the Nature Conservation (Scotland) Act 2004. The PBA consolidates all previous legislation including the Badgers Act 1973 (as amended) and the Badgers (Further Protection) Act 1991.

8.33 Badgers are afforded full protection from wilful or attempted killing, injuring and interference with the badger's sett. The PBA defines a badger sett as: 'any structure or place, which displays signs indicating current use by a badger'. Badgers are also given protection from killing or taking by certain means under Schedule 6 of the WCA.

8.34 The badger survey area comprises all suitable habitat within the Development site. Within this area field signs including badger setts, badger paths, latrine sites, evidence of foraging and dung pits are searched for, and this approach was based on methodologies described by Harris, et al. (1989)[31] and is summarised as follows:

- All hedgerows, field boundaries, paths and other linear features within the survey area are walked to locate badger field signs. In addition, all areas of woodland and scrub are systematically searched for evidence of badger activity;
- Badger paths are identified through the observation of field signs including prints, badger hairs on barbed wire or vegetation, dung pits and scratching posts;
- The interiors of fields are surveyed in addition to their boundaries, where they exhibit evidence of badger foraging or where badger paths pass through them; and
- Other areas offering the potential to contain badger setts (identified during survey, from Ordinance Survey (OS) maps, aerial photography and Phase 1 Habitat maps) are actively searched where practicable.

Amphibians and Reptiles

8.35 Amphibians and reptiles receive varying degrees of protection under UK legislation. Great-crested newts are listed on Annexes II and IV ('European Protected Species') of the EC Habitats Directive and Appendix II of the Bern Convention. The directive is transposed into UK law through the 'Conservation (Natural Habitats, &c.) Regulations 1994', which lists great-crested newts under Schedule 2, and the WCA, however the land at the Ballach site is located outwith (north of) the known distribution of great-crested newt.

8.36 No specific surveys are planned for reptile species. However, a 'watching brief' will be maintained during other surveys and any reptile sightings will be recorded.

[31] Harris, S., Cresswell, P. & Jeffries, D. (1991) Surveying for Badgers. Mammal Society.

Habitat Survey Results Summary

NVC Results

8.37 A number of the recorded NVC communities are considered to have conservation value at a European level (Annex 1) or at a national level (Scottish BAP). A summary of habitats which have conservation designations assigned to them can be found in Table 8-1.

Table 8-1: Summary of conservation value

Phase 1	NVC Code	Annex 1 Code	Scottish BAP
J4	Non-NVC	-	-
Unimproved acid grassland (B1.1)	U4	-	Lowland dry acid grassland
	U5	-	Nardus stricta-Galium saxatile grassland
Dry heath (D1.1)	H12	H4030	Upland heathland
	H21	H4030	Upland heathland
Wet heath (D2)	M15	H4010	Upland heathland
	M16	H4010	Upland heathland
Blanket bog (E1.6.1)	M3	H7120	Blanket bog
	M17	H7120	Blanket bog
	M19	H7120	Blanket bog
Wet modified bog (E1.7)	M25	H7120	Blanket bog/purple moor grass & rush pasture
Acid/neutral flush (E2.1)	M4	H7140	Uplands flushes, fens & swamps
	M6	-	Uplands flushes, fens & swamps
Basic flush/spring (E2.2)	M10	H7230	Uplands flushes, fens & swamps
Bryophyte dominated spring (E2.3)	M32	-	Uplands flushes, fens & swamps

Groundwater Dependent Terrestrial Ecosystems (GWDTE) Results

8.38 GWDTEs are classified according to SEPA (2017), defining each NVC community on their potential dependency on groundwater. Groundwater dependency is often linked to wetlands that contain flora that is dependent upon the chemical composition of the water fed from a groundwater source. SEPA defines the habitats with regard to their potential for groundwater dependency, therefore not all communities listed may be truly groundwater dependent.

8.39 Table 8-2 lists the NVC communities that have a potential for groundwater dependency. The table categorises each habitat type according to whether they are likely to be moderately or highly groundwater dependent as defined by SEPA (2017). In total, there are two communities listed as moderate and four communities listed as having high potential for groundwater dependency.

Table 8-2: Potential GWDTE recorded on site

NVC code	NVC community name	GWDTE potential
M15	*Trichophorum germanicum - Erica tetralix wet heath*	Moderate
M25	*Molinia caerulea - Potentilla erecta mire*	Moderate
M6	*Carex echinata – Sphagnum fallax mire*	High
M10	*Carex dioica – Pinguicula vulgaris mire*	High
M16	*M16 Erica tetralix-Sphagnum compactum wet heath*	High
M32	*Philonotis fontana-Saxifraga stellaris spring*	High

8.40 Several communities were assessed as being dependent on groundwater dependent within the survey area. All M10 and M32 communities were assessed as groundwater dependent due to evidence of groundwater arising from a springhead or percolating through the ground which creates permanently basic conditions for calcicolous plant species to grow. In addition, M6a sub-communities within the survey area are all maintained from springheads and are therefore groundwater dependent. All communities considered to be groundwater dependent are illustrated in Figure 8.4.

Peat Condition Assessment

8.41 A total of 87 mapped polygons have been selected for the peatland condition assessment. While the polygons represent distinct NVC communities, many of these communities will function together as hydrologically connected bog units (mesotopes). The use of the polygons rather than mesotope allows for greater accuracy for assessing peatland condition due to their smaller size.

8.42 Of the 87 polygons, 42 are classified as near natural, 24 are classified as modified, 10 are classed as drained and 11 are categorised as actively eroding. The polygons selected for the Peat Condition Assessment are illustrated on Figure 8.5.

Peat Probe Results

8.43 A preliminary peat probing exercise was conducted over the developable area in May 2024, to augment the previous peat probing previously undertaken by Atmos. In total, peat depth was sampled at 1,189 sample points. Of those, peat depth was shallow (<50cm) at

523 points, or 43.99% of the site. 316 points (26.58%) had a moderate peat depth (defined here as 50cm – 100cm). The remaining 350 points (29.43%) had a peat depth of over 1m.

Assessment Methodology

8.44 The approach taken to assess ecological effects follows the guidance document produced by the Institute of Ecology and Environmental Management (CIEEM)[32]. These guidelines set out the process for assessment through the following stages:

- Describing the ecological baseline in the zone of influence through survey and desk study;
- Assigning a value to "Valued Ecological Receptors" (VERs) - these are the designated sites, habitats and species of highest ecological value present;
- Identifying and characterising the potential effects on these VERs based on the nature of construction, operation and decommissioning activities associated with the Development;
- Describing any mitigation, compensation and/or enhancement measures associated with the Development and assessing residual significance; and
- Identification of any monitoring requirements.

Evaluating Features of Ecological Interest

8.45 Value is defined on the basis of the geographic scale given in Table 8-3. Attributing a value to a receptor is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of a value level. For example, a Special Area of Conservation (SAC) designated under the Habitats Directive is explicitly of European (International) importance. For non-designated receptors, the use of guidelines such as the national guidelines for the selection of Sites of Special Scientific Interest (SSSI) can be helpful in attributing a value to a receptor.

8.46 Note that some receptors, such as legally protected species, may be of insufficient ecological value to warrant consideration within the ecological impact assessment, but are instead considered in the context of legal and policy implications.

Table 8-3: Approach to Valuing Ecological Receptors

Level of Value	Examples
International	An internationally designated site (e.g. SAC), or site meeting criteria for international designations. Species present in internationally important numbers (>1% of biogeographic populations).
National	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation.

[32] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Level of Value	Examples
	Species present in nationally important numbers (>1% UK population). Large areas of priority habitat listed on Annex I of the EC Habitats Directive and smaller areas of such habitat that are essential to maintain the viability of that ecological resource.
Regional	Species present in regionally important numbers (>1% of the Natural Heritage Zone population). Sites falling short of criteria for selection as a SSSI, but of greater than the local criteria below.
Local	Scottish Wildlife Trust Reserves, Local Nature Reserves that do not include features as described above. Areas of semi-natural ancient woodland smaller than 0.25 ha. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species. Receptors falling below local value are not normally considered in detail in the assessment process.

8.47 Part of the process of attributing value to species involves defining the population to be valued and requires professional judgment in order to identify an ecologically coherent population against which effects on integrity can be assessed. For example, for wide-ranging species such as otter, it may be more appropriate to value the otter population in a whole catchment, whereas for more localised species, such as water vole, value may be attributed to groups of related colonies which function as a meta-population.

8.48 Socio-economic, cultural, and secondary/supporting values may be considered, where appropriate, but do not otherwise form a key part of this assessment.

Characterising Potential Ecological Effects

8.49 The magnitude of effects is predicted quantitatively where possible. Where this is not possible, a more qualitative approach is taken. Magnitude can be negative (very high, high, moderate, low or negligible) or positive. High magnitude effects could include large-scale permanent and/or high probability changes that affect the receptor's population or extent. Low magnitude effects would typically be small in scale or possibly temporary in their effect. The criteria used in this assessment for describing the overall magnitude of a potential effect are summarised in Table 8-4.

Table 8-4: Effect Magnitude

Effect Magnitude	Description
Very high negative	Very high effects would result in total or almost complete loss of a population/habitat and would result in a permanent adverse effect on the integrity of the population. The conservation status of the receptor would be affected.

Effect Magnitude	Description
High negative	High effects may include those that result in large-scale, permanent changes in a receptor, and likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of a species population/habitat.
Moderate negative	Medium effects may include moderate-scale permanent changes in a receptor, or larger-scale temporary changes, but the integrity of the population/habitat is not likely to be affected. This may mean that there are temporary changes in the conservation status of the population/habitat, but these are reversible and unlikely to be long-term.
Low negative	Low effects may include those that are small in magnitude, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a population/habitat.
Negligible	No perceptible change in the ecological receptor.
Positive	The changes in the ecological receptor are considered to be beneficial.

8.50 The assessment also takes into account whether the effect is positive or negative, short term (for example only during construction) or long term (throughout the lifetime of the development), reversible or permanent.

8.51 It is also important to consider the degree of confidence in the assessment and to quantify the certainty of the effects on the ecological resource. The following categories are used in this assessment:

- Certain/near certain: probability estimated at 95% or higher;
- Probable: probability estimated above 50% but below 95%;
- Unlikely: probability estimated at above 5% but less than 50%; and
- Extremely unlikely: probability estimated at less than 5%.
- Determining Significance of Potential Ecological Effects

8.52 Having followed this process, the significance of an effect is then determined. The CIEEM Guidelines use only two categories: "significant" or "not significant". A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the value of the receptor and the magnitude of the effect and applying professional judgement as to whether the integrity of the receptor will be affected. This concept can be applied to both designated sites (for example, a SSSI) and to defined populations (for example a regional breeding population).

8.53 The term integrity is used here in accordance with the definition adopted by the ODPM Circular 06/2005 on Biodiversity and Geological Conservation[33] whereby designated site integrity refers to "…coherence of ecological structure and function…that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified". Integrity therefore refers to the maintenance of the conservation status of a habitat or species population at a specific location or geographical scale.

8.54 Effects are more likely to be considered significant where they affect receptors of higher conservation value or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened, effects on receptors of lower conservation value, or where the magnitude of the effect is low.

8.55 In this assessment, an effect that threatens the integrity of a receptor is considered to be significant in terms of the EIA Regulations. Effects assessed as not significant should be considered as not significant in terms of the EIA Regulations. It should be noted that, alongside the criteria provided, professional judgement is applied in determining the significance of potential effect. Mitigation measures and detailed design work avoid and reduce potentially significant effects, but it is also best practice to propose mitigation measures to reduce negative effects that are not significant.

Mitigation, Compensation and Enhancement

8.56 Mitigation, compensation and enhancement measures should be presented in terms of the integrity/conservation status of the ecological resource to which it applies.

8.57 Mitigation measures should be developed during the design process where possible and aim to:

- Avoid negative ecological effects – especially those that could be significant; and
- Reduce negative effects that cannot be avoided.

8.58 Compensation seeks to minimise any remaining significant negative ecological effects that cannot be avoided by a mitigation strategy. Compensation measures often carry a degree of uncertainty and there may also be a time lag between damage and compensation.

8.59 Ideally enhancement measures should also be implemented where possible to achieve net ecological gain.

8.60 Potential significant cumulative effects on any valued ecological receptors identified within the assessment and nearby schemes within 10 km of the Development site will also be addressed.

[33] ODPM Circular 06/2005 provides administrative guidance on the application of the law relating to planning and nature conservation as it applies in England. However, this definition of integrity is equally applicable in Scotland for the purposes of ecological impact assessment.

8.61 The Ecology Chapter will also be accompanied by an outline Habitat Management Plan (HMP), which will be designed in consultation with stakeholders to mitigate any significant effects arising from the development and, where possible, provide ecological enhancement.

9 ORNITHOLOGY

Introduction

9.1 This section of the report sets out the proposed approach to the assessment of potential effects on birds. Original bird surveys were undertaken by Atmos in October 2017 and September 2019 for the site. Given bird data is typically considered by NatureScot as valid for approximately five years it was decided to undertake a year's update survey between 2023-2024 to update the previous baseline.

9.2 This section of the scoping report sets out the survey methodologies and presents a brief summary of key findings to date.

Desk Study

Designated Sites

9.3 Information about statutory and non-statutory sites designated for ornithology will be sought during the desk study undertaken as part of this assessment. In terms of ornithology, internationally designated nature conservation sites (Special Protected Areas (SPAs) and Ramsar sites) within 20km of the Development and nationally designated sites (SSSIs and National Nature Reserves; NNRs) within 5km of the Development will be identified.

9.4 Data relating to non-statutory sites designated for ornithology within 2km of the Development site will be considered for the assessment.

9.5 A summary of known ornithologically designated sites is presented on Table 9-1 below.

Table 9-1: Ornithologically Designated Sites

Site name	Designation	Distance from site (km)	Reason for designation
Glen Strathfarrar	SSSI	1.5km Southwest	Breeding bird assemblage (as well as its ecological features dealt with in Section 8).
Glen Affric to Strathconon	SPA	2km West	Breeding golden eagle.
Inner Moray Firth	SPA and Ramsar	6.3km East	Breeding osprey and common tern; non-breeding cormorant, curlew, bar-tailed godwit, goldeneye, goosander, greylag goose, oystercatcher, red-breasted merganser, redshank, scaup, teal, wigeon

Site name	Designation	Distance from site (km)	Reason for designation
			and its non-breeding waterfowl assemblage.
North Inverness Lochs	SPA	10.9km Southeast	Breeding Slavonian grebe.
Cromarty Firth	SPA, SSSI, Ramsar	12.2km Northeast	Breeding common tern and osprey; non-breeding bar-tailed godwit, curlew, dunlin, greylag goose, knot, oystercatcher, pintail, red-breasted merganser, redshank, scaup, wigeon, whooper swan and its non-breeding waterfowl assemblage.
Ben Wyvis	SPA, SSSI	16.4km North	Breeding dotterel
Achanalt Marshes	SPA, SSSI	17.3km Northwest	Breeding wood sandpiper. Breeding bird assemblage (SSSI only).

9.6 No non-statutory sites designated for ornithology have been identified within 2 km of the Development.

Background Records

9.7 Background bird species of conservation concern (Birds Directive Annex 1, WCA Schedule 1, red and amber listed species) shall be requested from:

- The Royal Society for the Protection of Birds (RSPB); and
- The Highland Raptor Study Group (RSG).

Baseline Survey Methodology

Breeding Bird Survey

9.8 The Breeding Bird Survey (BBS) follows the Brown and Shepherd methodology[34]. This methodology is used to census upland breeding waders and will be adapted to record all other breeding bird species within the survey area. The survey area comprises the Developable Area, the access route (open ground only) plus all accessible land within a 500 m buffer zone (Figure 9.1). Surveys take place between 08:00 and 18:00 hours. Four

[34] Brown, A.F. and Shepherd, K.B. (1993). "A method for censusing upland breeding waders". Bird Study 40: 189-195.

BBS visits were undertaken between April – mid July 2018 and 2019 and BBS surveys are ongoing for the 2024 breeding season.

9.9 The surveyors walk a predetermined transect through 500m × 500m grid squares ensuring that all points within the survey area are approached to within 100m. Surveyors spend 20-25 minutes surveying each 500m × 500m grid square. All species seen or heard will be recorded accurately onto large-scale field maps, using standard British Trust for Ornithology (BTO) Common Bird Census (CBC) notation. This allows for a distinction between different species and between different behaviours – particularly between behaviours indicative of breeding (e.g. singing, alarm calling, aggressive interactions, distraction displays etc.) and those not related to breeding. The breeding bird survey results will be supplemented by records of breeding birds noted during other surveys carried out in the breeding season. If a singing or displaying bird was recorded at a particular location within the survey area on at least one of the four visits, it can be assumed to be holding a territory and/or breeding.

9.10 Criteria used to classify territorial behaviour includes:

- Presence of nest, eggs and/or chicks;
- Alarm calling indicative of nest, young or territory;
- Singing males;
- Displaying or song-flighting;
- Distraction display;
- Birds aggressively defending territories;
- Birds are seen carrying food to nest or young; and
- Birds carrying faecal sacs away from active nests.

Breeding Bird Survey Results (2018 and 2019)

9.11 In the 2018 breeding season four pairs of curlew, 12 pairs of golden plover and single pairs of redshank and common sandpiper were reported within the breeding bird survey area, which excluded the access track.

9.12 In the 2019 breeding season three pairs of curlew, four pairs of golden plover one pair of snipe and one pair of teal were reported within the breeding bird survey area, which excluded the access track.

9.13 A 2019 survey of the access track included a report of four pairs of golden plover, three pairs of snipe, and single pairs of wigeon and common sandpiper as well as an assemblage of common passerine species.

Breeding Raptor and Diver Survey

9.14 In addition to the BBS, walkovers and short Vantage Point (VP) watches of all accessible areas of habitat within 2 km of the site (Figure 9.1) are being carried out on a regular basis between to establish whether or not raptors of conservation concern are breeding within or close to the site, following methodologies detailed in Hardey et al. (2006)[35]. Target species include Birds Directive Annex and WCA Schedule 1 listed raptor species, as well as diver species and Slavonian grebe. This area is extended to 6 km for eagle species. Observations of common raptor species buzzard, sparrowhawk and kestrel are also noted.

Key Breeding Raptor and Diver Survey Results to Date

9.15 Two merlin territories were reported in the raptor and diver survey area in 2018.

9.16 Two merlin territories, two red kite territories and a single buzzard territory were reported in the raptor and diver survey area in 2019, a red-throated diver was also reported as possibly breeding at a loch near the access track, but this is not confirmed.

9.17 There is ongoing consultation with Stuart Benn (Eagle Coordinator for Highland Raptor Study Group) to discuss eagle activity at the site and to update on any nearby known breeding eagle locations, which will be used to inform the assessment for the EIAR.

Flight Activity Surveys

9.18 Vantage point (VP) watches are on-going using the standard NatureScot methodology[36], providing data for the assessment of the flight activity and collision risk of target species: Annex 1/Schedule 1 raptors and owls, wildfowl, waders, grebes, herons, divers, terns and black grouse. Secondary species included all other raptors, all gull species and raven.

9.19 A minimum of 36 hours observation will be carried out from three vantage points for each season (breeding and non-breeding). Vantage point locations and viewsheds are illustrated on Figure 9.2.

9.20 Surveys are being undertaken over a two-year period.

9.21 For each target species flight the following details are being recorded:

- Number of birds;
- Time;
- Duration of flight within the survey area;
- Species, age and sex (when identification of age/sex was possible); and

[35] Hardey, J., Crick, H., Werham, C., Riley, H., Etheridge, B., Thompson, D. 2006. Raptors: a field guide to survey and monitoring. SNH, Inverness.

[36] SNH (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH. Battleby.

- Flying height in three height bands corresponding approximately to below, at or above Rotor Swept Height (RSH) on detection and at 15 second intervals thereafter.

9.22 The flight path of each target species recorded was drawn as accurately as possible onto a large scale map in the field. Each recorded flight path was numbered and cross-referenced to the flight data.

9.23 Secondary species were recorded in 5-minute summaries. During each 5-minute period of the watch, the minimum number of each species attributable to the flight activity observed was recorded, including details of the height (as estimated to the nearest 15 m) and location of the birds relative to the proposed turbine layout.

Key Flight Activity Results to Date

9.24 Between October 2017 and September 2019 the Atmos surveys reported 271 target species flights, comprising 13 target species during the flight activity surveys. The most frequently recorded species was red kite with 144 flights. Secondary species flights are limited low numbers records of raven, buzzard, kestrel and gulls. The Atmos target species flights to date are summarised in Table 9-2 below.

Table 9-2: Target Species Flights (October 2017 – September 2019)

Species	Number of Flights	Peak Number of Birds
Curlew	7	1
Dunlin	2	3
Golden eagle	54	2
Golden plover	23	42
Hen harrier	2	1
Red kite	144	3
Merlin	22	1
Peregrine	1	1
Pink-footed goose	1	30
Snipe	3	1
Unidentified goose	2	100
White-tailed eagle	4	1
Whooper swan	6	7

9.25 The update flight activity surveys commenced in October 2023 and are ongoing. The results of this work as of the end of April 2024 are presented in Table 9-3 below.

Table 9-3: Update Survey Target Species Flights

Species	Number of Flights	Peak Number of Birds
Red kite	42	3
Merlin	2	1
Golden eagle	6	1
Hen harrier	1	1
Peregrine	2	1
Golden plover	12	38
Black grouse	1	3

Black Grouse Lek Surveys

9.26 Black Grouse Lek surveys were conducted using the methods outlined in Gilbert et al. (1998). An initial visit (late-March-April) was undertaken to identify and map suitable habitat, followed by a second visit (during April -mid May) to search for leks within those areas already identified. A third visit (during April -mid May) was then undertaken to count the number of birds present at any lek sites. The black grouse survey area comprises 1.5km from the developable area (Figure 9.1).

Key Black Grouse Survey Results

9.27 Black grouse are present in the survey area, albeit in low numbers. A group of three males have been recorded lekking in the south of the survey area in 2024.

GET Modelling

9.28 A GET model assessment was undertaken by Alan Fielding. The conclusion of this assessment is that there will be an insignificant loss of golden eagle habitat arising from the construction and operation of the Proposed Development and it is unlikely that any loss would create a significant impact on the extent of habitat used by any of the local pairs. It is extremely unlikely that there will be a significant impact on dispersing young eagles.

Assessment Methodology

9.29 Ecological Impact Assessment (EcIA) is based on a number of factors, primarily consideration of the value of a site or feature being assessed, and the anticipated magnitude of the potential effect. SNH and the Institute of Ecological and Environmental Management (CIEEM) have produced guidelines to assist with ecological evaluation and effect assessment (SNH[36], 2006[37]; CIEEM 2018[32]). The assessment of the potential effects of the Development on bird interests is a staged process that involves:

[37] SNH (2006). Guidance: Assessing the significance of impacts from onshore windfarms on birds outwith designated areas. SNH, Battleby.

- Determining the nature conservation value of the bird interests present within the survey area that may be affected by the Development;

- Identifying potential effects based on the nature of the construction, operation and decommissioning of the Development;

- Determining the character and magnitude of the potential effects i.e. the size of the change in the population of the receptor as a result of the Development. This includes consideration of the behavioural sensitivity of the receptor and the duration and reversibility of the potential effect;

- Determining the significance of the effects based on the interaction between the magnitude of the effect and the nature conservation value of the bird interests likely to be affected. Ultimately, this is a consideration of the effects of the Development on the integrity of a defined population;

- Identifying mitigation measures proposed to avoid, reduce or remedy significant adverse effects; and

- Determining the residual effect significance after the proposed mitigation measures have been implemented, including a description of any legal and policy consequences.

9.30 CIEEM guidance emphasises that quantitative effect descriptions should be used wherever possible. For this reason a series of tables are reproduced below to define categories of receptor value and sensitivity, effect magnitude and duration. These can then be used to consistently describe potential effects.

Nature Conservation Value

9.31 The nature conservation value of the bird interests present at the Development site are defined according to Table 4.2 (adapted from Percival 2007)[38].

[38] Percival, S.M. (2007). Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method. In de Lucas, M., Janss, G. &Ferrer, M. (eds.) Birds and Wind Power. Lynx Edicions, Barcelona.

Table 9.3: Target Species Flights

Effect magnitude	Description
Very high negative	Very high magnitude effects would result in total or almost complete loss of a population and would result in a permanent adverse effect on the integrity of the population. The conservation status of the receptor would be affected. Guide >80% population affected
High negative	High magnitude effects may include those that result in large-scale, permanent changes in an ornithological receptor, and likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of a species population at the location(s) under consideration. Guide 21-80% population affected
Moderate negative	Medium magnitude effects may include moderate-scale permanent changes in an ornithological receptor, or larger-scale temporary changes, but the integrity of the population is not likely to be affected. This may mean that there are temporary changes in the conservation status of a species-population at the location(s) under consideration, but these are reversible and unlikely to be long-term. Guide 6-20% population affected
Low negative	Low magnitude effects may include those that are small in nature, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a species population at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required. Guide 1-5% population affected
Negligible	There is no perceptible change in the ornithological receptor. Guide: <1% population affected
Positive	The changes in the ornithological receptor are considered to be beneficial.

9.32 In the case of SPAs / SSSIs, magnitude is assessed in respect of the size of the cited population. For non-designated sites, magnitude is assessed in respect of an appropriate scale: the Peatlands of Caithness and Sutherland Natural Heritage Zone in the case of resident breeding or wintering populations, or the national (UK) population in the case of migratory wintering populations. The difference in assessing the significance of effects on birds from protected sites and birds from populations without specific designation or protection is one of scale. Designated populations receive stronger protection because threats to the integrity of the designated population are considered significant. Effects on bird populations in the wider countryside are considered significant if they threaten the integrity of the regional or national populations.

Significance

9.33 A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the combination of the nature conservation value of the receptor and the magnitude of the effect and applying professional judgement as to whether the integrity of the receptor will be affected. This concept can be applied to

both designated sites (for example, a SSSI) and to defined populations (for example a regional curlew population).

9.34 The term integrity is used here in accordance with the definition adopted by the Circular 06/2005 on Biodiversity and Geological Conservation whereby designated site integrity refers to "…coherence of ecological structure and function…that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified". For non-designated sites/species this can be amended to "the coherence of ecological structure and function, that enables it (in this case, the area being considered; e.g. natural heritage zone) to maintain the levels of populations of species in its/their pre-development condition". Integrity therefore refers to the maintenance of the conservation status of a species population at a specific location or geographical scale.

9.35 Effects are more likely to be considered significant where they affect receptors of higher conservation value or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened and are likely to involve effects on receptors of lower conservation value or where the magnitude of the effect is low. Clearly, effects of negligible magnitude, or effects on receptors of negligible conservation value are not considered to be significant.

9.36 Mitigation measures and detailed design work are required to reduce potentially significant effects, but it is also best practice to propose mitigation measures to reduce negative effects that are not significant. In this assessment, an effect that threatens the integrity of a receptor is considered to be significant in terms of the EIA Regulations. Effects assessed as not significant should be considered as not significant in terms of the EIA Regulations. It should be noted that, alongside the criteria provided, professional judgment is applied in determining the significance of potential effect.

9.37 An assessment will be made of the potential for cumulative effects on any valued ornithological receptors identified in the assessment in combination with other similar developments within 10 km of the Development site.

9.38 Alternative solutions and mitigation will be identified where the assessment indicates that there is a potential significant effect upon important bird species as a consequence of the development. In addition, opportunities to enhance habitats for the benefit of birds will be explored and implemented as part of the development.

9.39 In addition to the above a key focus of the EIAR reporting for ornithology will be the inclusion of a Habitats Regulations Appraisal (HRA) in respect of the SPAs within the 20km search area. The screening of each SPA will be based on the results of the field surveys and background data and the core ranges for SPA species as set out in NatureScot guidance.[39]

[39] SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs): Guidance. SNH. Battleby.

10 TRAFFIC AND TRANSPORT

Introduction

10.1 This chapter of the EIA Report will consider the potential effects associated with increased road traffic generated during the construction phase of the proposed development, including access route(s) and measures to minimise disruption to the local road network and receptors along it

Baseline Conditions

10.2 Initially the turbine components would be transported by sea to a Port of Entry which is anticipated to be the Port of Invergordon.

10.3 From the port, we anticipate turbine components would be brought south via the A9 trunk road to the A9/A835 roundabout west of Tore. From this location several access options have been identified and are being considered further. It is anticipated that a 'preferred' access route will be identified and assessed as part of any forthcoming planning submission.

10.4 Baseline traffic flow information would be obtained via new surveys on relevant roads via an Automated Traffic Counter (ATC) that would be in place for a one-week period.

Likely Significant Effects During Construction

10.5 The most identifiable traffic and transport characteristic associated with wind farm developments is the need to transport the wind turbine components to the site. Turbine components would be transported by sea to a defined Port of Entry (expected to be Port of Invergordon), following which components would then be brought to site by abnormal loads vehicles via an agreed route. It is anticipated that abnormal load components would be delivered via the following route:

- From the Port of Invergordon to the A9 via the B81;
- Southbound on the A9 to the Tore roundabout, then west along the A835 towards Muir of Ord;
- Southbound on the A862 towards Beauly and then west along the A831via Aigas to the site entrance east of Erchless.

10.6 A Swept Path report and model has been provided by AECOM Ltd to assess the capacity of the road network to accommodate the delivery of any abnormal loads associated with the proposed development. The initial findings of this study has informed the proposed abnormal loads route, however third-party land will be required and is subject to further commercial negotiation.

10.7 There is also a need to transport general construction material to the site, such as cabling, aggregates, concrete, pipes, etc. These materials will be transported in standard Heavy Goods Vehicles (HGVs), leading to a temporary increase in traffic volumes on the surrounding road network, dependant on the scale of the proposed development, final material requirements, final sourcing of materials and final construction phasing plan, all of which are unknown at this time. A small quantity of traffic would also be generated via workers travelling to site throughout the construction period.

10.8 Guidance for the assessment of environmental effects associated with traffic is presented within 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA). This document sets out a methodology for identifying significant environmental effects where a proposed development is likely to give rise to changes in traffic flows.

10.9 The guidance also states that in order to determine the scale and extent of potential impacts, the following two rules should be used to identify road links within the study area where a full assessment will be required:

10.10 Rule One: include highway links where flows are predicted to increase by more than 30% or where the number of HGVs is predicted to increase by more than 30%;

10.11 Rule Two: include any other specifically sensitive area where traffic flows are predicted to increase by 10% or more.

10.12 The study area to predicate these rules within can broadly be defined as the main route between Invergordon and Erchless.

Likely Significant Effects during Operation

10.13 Aside from occasional maintenance visits to service the wind farm, the operational phase is not considered to introduce a significant increase in traffic.

10.14 It is therefore likely that no significant effects will occur during the operational phase and for this reason, operational traffic is scoped out of the EIAR.

Design and Mitigation

10.15 It is sometimes possible to mitigate likely significant effects, in this case construction effects, via project design. With regards to traffic & transport this mitigation equates to suitable phasing of the proposed development. Whilst the construction phase is yet to be determined, in any event suitable construction phasing will be considered and proposed subject to a Construction Environmental Management Plan (CEMP), whilst vehicle movements to and from the site would be controlled by a Traffic Management Plan (TMP). Specific details of both plans would likely be issued as post-consent, pre-commencement conditions.

10.16 For construction traffic, there are no known design or mitigation that would prevent potential significant effects at this stage in the project.

Inclusion or Exclusion from the EIAR

10.17 Based on the points outlined above, it is suggested that construction traffic will be scoped into the EIAR, whilst operational traffic is scoped out.

Proposed Scope of Assessment

10.18 It is proposed to discuss the detailed scope of the transport assessment directly with The Highland Council Roads Officer for the area and with Transport Scotland in relation to the A9. It is currently proposed that the assessment would include the following key elements:

- Preparation of an Abnormal Loads Assessment to confirm the proposed route to site from the Port of Delivery to the site access point, which will be from A831 south of the development site boundary, and any potential pinch points on the A9/A835/A831.
- Calculation of increased traffic generation on the surrounding road network during construction of the wind farm based on material and staffing requirements.
- Assessment of the environmental effects of increased traffic generation on the surrounding road network that is likely to be used during construction.
- Assessment of the effects associated with increased traffic through local small settlements including the residential properties along [road name] and the settlements either side of the [road name] corridor.

10.19 It is considered that the effects of operational traffic on existing traffic flows following can be scoped out of the EIA.

10.20 The traffic and transport section of the EIA Report will consider baseline conditions, the transport and traffic impacts and proposed mitigation measures as appropriate. The work will be undertaken in accordance with relevant transportation guidelines and standards, including:

- Institute of Environmental Assessment (now IEMA) (1993) Guidelines for the Environmental Assessment of Road Traffic.
- Institute of Highways and Transportation (1994) Guidelines for Traffic Impact Assessment.

10.21 The assessment of construction traffic would be provided in terms of sensitivity of the road network and the magnitude of effect, in order to then provide a professional judgement of effect and its significance.

10.22 Sensitivity of receptor can generally be considered in terms of assessing the residual capacity of the network under existing road and traffic conditions by examining the capacity of the road compared to its use.

10.23 Magnitude of effect is a product of the existing traffic volumes, the percentage increase and change due to the proposed development, changes in the type of traffic and the temporal distribution of traffic. Significance of effect will be then assessed using IEMA guidelines and professional judgement on a scale of major, moderate, minor and

negligible, or an intermediate category between these. Effects judged to be moderate or major would generally be considered significant, with those falling underneath this not significant.

10.24 It is not anticipated that a formal Transport Assessment (TA) will be required as TAs are not generally considered necessary for temporary construction works. The likely traffic movements associated with the operation of the wind farm are also not considered high enough to warrant a TA.

10.25 Any significant cumulative traffic impacts associated with other developments commencing in tandem with the proposed development would also be considered.

10.26 Where significant effects are identified, measures to prevent, reduce and, where possible, offset those adverse effects will be proposed. Measures likely to be utilised include:

- Instructing abnormal loads and HGVs, including site personnel as appropriate, to use only the approved access route(s) to the Site.
- No parking of construction plant, equipment and vehicles off-site on public highways.
- Establishing a construction traffic management plan for the development which could be secured via a suitably worded planning condition.

11 SOIL, GEOLOGY AND WATER

Introduction

11.1 This section of the report sets out the proposed approach to the assessment of the potential impacts of the proposed development on soils, geology and the water environment during construction, operation and decommissioning of the wind farm.

11.2 This section of the Scoping Report should be read alongside Section 8 for reference to the cross-linkages between the hydrological environment and terrestrial ecology related to groundwater dependant terrestrial ecosystems (GWDTEs) and the assessment methodology linked to them.

Baseline Conditions

11.3 A review of British Geological Survey (BGS) online 'Geology of Britain Viewer' demonstrates that the site is underlain by the Tarvie Psammite Formation, found throughout much of the northern Highlands, predominantly from Loch Linhe to the Dornoch Firth.

11.4 A review of NS' Peat and Carbon Rich Soils map (Figure 11.1) suggests that The SNH Carbon and Peatlands Map shows that the majority of the Site is comprised of Class 1 soils with areas of Class 2 soils present along the northwestern boundary and at the centre of the site. Areas of Class 5 soils are also present, the majority of which are found in the northeastern corner of the site.

11.5 One small lochan, Loch Ballach, lies in the eastern part of the site. Outflow is at the south-eastern corner by way of the Allt an Locha Bhallaich which flows north to south adjacent to the eastern edge of the access track before merging with the Allt Liath along the southern boundary of the survey area.

11.6 A number of watercourses are present throughout the Site, including, Allt an Locha Bhallaich, Allt Beinn nam Fitheach and Allt a' Chrochadair. The majority of these watercourses travel north forming tributaries to the Allt Goibhre located north of the Site.

Likely Significant Effects During Construction

11.7 Construction activities linked to wind farm construction and decommissioning have the potential to affect geology, hydrology and hydrogeology receptors, via for example potential pollution and release of contaminants, peat disturbance, and/or excavations in inappropriate locations.

11.8 The EIAR will establish the potential effects during construction (and decommissioning), assess the significance of potential impacts, and outline appropriate mitigation measures, which may be factored into a Construction and Environmental Management Plan ('CEMP').

Likely Significant Effects during Operation

11.9 Significant effects on geology, hydrology and hydrogeology receptors are far less likely during the operational phase of a wind farm development, however there are still receptors (particularly peat and soils) that will need to be established and identified within the EIAR to assess the potential for likely significant effects.

Design and Mitigation

11.10 The EIA Report will consider, where appropriate, sustainable drainage principles with a view to minimising the potential risk of flooding at the Site and preventing the Proposed Development from causing flooding, groundwater or watercourse pollution. Given the nature of the site, it anticipated that most impacts upon surface water hydrology can be minimised through effective management and careful design of infrastructure such as turbines, crossing points and access points.

11.11 If deep peat is localised, the most appropriate form of peat management may be to avoid siting infrastructure within deep peat areas through careful and iterative infrastructure design.

11.12 Mitigation and monitoring measures will be put in place to ensure that water quality within the specified watercourses is not compromised as a result of the Proposed Development.

11.13 [Discussion around how inbuilt mitigation alleviates some potential significant effects]

Inclusion or Exclusion from the EIAR

11.14 In order to establish the existing hydrology, hydrogeology and geology conditions at the Site an initial desktop information gathering exercise will be carried out followed by site surveys. Following initial assessments, a detailed methodology focusing on the principal areas of consideration will be established and will form the basis of the EIAR assessment. Principial areas for consideration will include:

- Water quality and pollution prevention;
- Site drainage (tracks, turbine foundations and hardstanding areas);
- Ground water (in particular relating to turbine foundation construction);
- Peat risk and peat waste management;
- Watercourse crossings and the impact of other engineering activities near water;
- Potential for land contamination; and
- Private water supplies.

11.15 A flood risk assessment is not anticipated to be required for this Proposed Development and so will not be included in the EIAR.

Proposed Scope of Assessment

11.16 The baseline section above will be expanded following hydrological site visit to validate baseline characteristics through the review of relevant and available information relating to soil, geology and water. This will include the review of information held by SEPA, SNH, Scottish Water and the Highland Council, such as groundwater resources, licensed and unlicensed groundwater and surface water abstractions, public and private water supplies, surface water flows, flooding, rainfall data, and water quality and soil data. The desk study will identify sensitive features which may potentially be affected by the Proposed Development. An additional review of published geological maps, OS maps, aerial photographs and Site-specific data such as site investigation data, geological and hydrological reports, digital terrain models (slope plans) and geological literature will also be carried out.

11.17 A walkover site visit will also be undertaken to identify site constraints and verify the presence or absence of receptors. Detailed site observations will be recorded.

11.18 Peat probing will inform the assessment of potential effects and more detailed design work. The investigation will look at potential locations for turbines, access routes and borrow pits for signs of existing or potential peat instability. Outputs from the walkovers and site visits will comprise a record of investigation locations and summary of peat depths recorded.

11.19 When the design layout has been finalised, further peat probing will be carried out along infrastructure and at turbine locations. The further peat probing will ensure that all infrastructure locations and routes have sufficient peat depth information to support related studies on peat instability and peat excavation and re-use

11.20 The scope of assessment will also cover requirements from regulatory bodies such as SEPA which require proposed and existing watercourse crossings to be documented and photographed.

11.21 The information obtained from the review of existing data, site surveys and guidance documentation will inform the assessment of any potential effects associated with the proposed development. In the event that likely significant effects are identified, mitigation measures will be proposed.

11.22 Liaison would be undertaken between team members to identify interactions between surface and ground water at the site and also any potential interactions between peat distribution at the site and hydrology. Discussions would also be undertaken with team members involved in the ecology assessment to identify potential impacts on groundwater dependent terrestrial ecosystems (GWDTEs). If significant areas of moderate or high GWDTEs are located in proximity to proposed infrastructure, additional studies would be undertaken to define whether these are truly groundwater dependent, refine their extent, conceptualise the hydrogeology and assess if there are any potential effects on them.

11.23 It is not expected that detailed runoff or flood modelling for catchments downstream of the site will be required. However, standard runoff calculations would be carried out to show the potential impact of increases in hardstanding on downstream flows.

11.24 A peat landslide hazard and risk assessment (PLHRA) will be carried out in accordance with the Scottish Government Peat Landslide Hazard & Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, 2017). The PLHRA will be informed by information gathered from peat depth models, site walkovers and detailed geomorphological mapping and terrain classification. The assessment will utilise a combined qualitative (contributory factor) and quantitative (factor of safety) approach to assess the likelihood of peat landslides, the consequences should peat landslide occur and appropriate mitigation measures based on calculated risk levels.

11.25 A peat management plan (PMP) will be prepared in accordance with 'Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste' (Scottish Renewables, SEPA, 2012). The PMP will be informed by peat depth probing as described above, and by a full site appraisal of potential re-use opportunities (e.g. mapping of drainage ditches, informal and industrial peat turbary, and landscaping requirements associated with infrastructure). Where opportunities are identified to integrate the PMP with wider environmental enhancement measures, for example for peat restoration, the PMP will indicate the volume and type of peat (acrotelm / catotelm) to be used for this activity.

12 CULTURAL HERITAGE

Introduction

12.1 This chapter of the Scoping Report provides an overview of the cultural heritage baseline in relation to the proposed development, describes the potential effects associated with construction and operation of the Proposed Development, and presents the assessment methodology to be used in the EIA.

Baseline Conditions

12.2 An initial desk-based study of cultural heritage records has been carried out to inform the potential for significant effects in the vicinity of the proposed development. The site boundary was used to determine the potential for effects on designated and non-designated heritage assets during construction, through physical impacts. A 15km buffer from the turbine positions for designated heritage assets has been used at this stage to identify designated heritage assets that have the potential for effects through changes within their setting. Significant effects are considered unlikely to occur outside of a 5-10km radius from the turbine locations, unless the significance of the heritage asset includes specific long distance landscape views or intervisibility with other heritage assets and/or landscape features.

12.3 The distribution of heritage assets within the site boundary and the 15km buffer discussed is illustrated in Fig 12.1. There are no designated heritage assets within the site boundary. There are, however, 63 scheduled monuments located within the 15km buffer, 53 of which are located within the scoping Zone of Theoretical Visibility (ZTV). The closest scheduled monument to the site boundary is Urchany Barrow (**SM13523**), located within 1km of the nearest turbine position (T12) but outside the site boundary. The scheduled monuments highlighted as being located within the 15km buffer and with theoretical visibility of the proposed development are set out in **Table 12.1** below:

Table 12.1: Scheduled Monuments located within the ZTV, 15km of turbine positions

Name	Scheduled Monument Reference	Eastings	Northings
Carn na Buaile, fort 750m NNW of Comrie, Contin	SM11056	241151	856690
Urchany, barrow 595m SW of	SM13523	244268	845507
Tarradale, chambered cairn 480m ENE of Hilton	SM13628	254996	849734
Achnasoul, medieval earthwork 440m SSE of	SM13629	248808	851821
Heights of Brae, boulder containing prehistoric rock art, 110m SSE of Ivy Croft	SM13645	251983	861052

Name	Scheduled Monument Reference	Eastings	Northings
Henge, 135m SW of Fiodh Mhor	SM13745	251057	857989
Castle Hill,henge	SM1665	252728	849716
Conon Bridge,henge 230m NE of Riverford	SM1666	254293	855071
Knock Farril, fort, Knockfarrel, Fodderty	SM1672	250496	858527
Clach an Tiompain, symbol stone	SM1676	248487	858511
Gilchrist,Old Church of Kilchrist	SM1682	253890	849214
Heights of Brae, chambered cairn 375m NNW of Firth View	SM2312	251445	861528
Preas Mairi,chambered cairn	SM2397	246084	855847
Dun Garbhlaich,fort,Kilmorack	SM2422	246605	846572
Dun Mor,fort,Ballindoun	SM2423	253441	842904
Dun a Chliabhain,fort	SM2424	247701	846069
Culburnie,ring cairn & stone circle	SM2425	249180	841810
Belladrum, chambered cairns 250m NNE of Brockie's Lodge	SM2435	251417	842120
Clachan Corrach, chambered cairn 375m E of Beallach Farm	SM2466	248840	856544
David's Fort,homestead moat,Balavil Wood	SM2500	253941	853288
Little Garve,bridge over Black Water	SM2720	239637	862879
Dun Mor,fort	SM3107	251268	847195
Cairn Irenan, chambered cairn	SM3122	256661	852296
Carn Glas,cairns,Mains of Kilcoy	SM3123	257757	851872
Windhill,standing stone NNE of	SM3127	253273	848342
Windhill,standing stone N of	SM3128	253096	848323
Mulchaich, chambered cairn 80m NE of Auchencairn	SM3145	257663	856800

Name	Scheduled Monument Reference	Eastings	Northings
Belladrum Home Farm,chambered cairn WNW of	SM3194	251610	841580
Corff House,fort SW of	SM3195	251382	844787
Tom na Croiseige, stepped mound	SM3196	251269	841346
Carn Glas,chambered cairn,Mains of Kilcoy	SM3213	257842	852065
Dugary, henge 425m SE of	SM3403	252323	852672
Balvaird,chambered cairn 250m E of Balvaird House	SM3635	253944	851931
Brahan Wood, chambered cairn 835m NW of Brahan House	SM3839	250465	855215
Whiteleys, chambered cairn 300m SW of Craig Ruadh	SM3846	253043	856511
Loch Kinellan,crannog	SM3987	247111	857588
Drumrunie,chambered cairn 170m WNW of Drumrunie Cottage	SM4565	255004	852597
Kilcoy North,chambered cairn 750m NW of Kilcoy Castle	SM4606	257039	851738
Lochlait,settlement & field systems 400m N of	SM4608	254972	836222
Kilcoy South,chambered cairn 700m NW of Kilcoy Castle	SM4650	257021	851605
Muir of Conon,chambered cairn 630m ENE of East End	SM4652	254611	852498
Castle Spynie,broch	SM4653	254173	842053
Phoineas Hill,enclosure 900m ESE of Phoineas House	SM4729	253353	842554
Balvaird Wood,chambered cairn 450m NNE of East End	SM4741	254128	852797
Auchvaich,chambered cairn 650m W of	SM4744	252362	840392
Dun Mor,fort	SM4979	245737	845150
Erchless Castle,dun 650m WNW of	SM5004	240440	841036
Dun Fhamhair,fort	SM5212	248416	847068
Kiltarlity Old Parish Church	SM5570	249744	843928

Name	Scheduled Monument Reference	Eastings	Northings
Redcastle, crannog 600m SSE of	SM7763	258572	848954
Phopachy, crannog 540m NNW of	SM7816	260220	846603
Beauly Priory,priory and burial ground	SM90031	252755	846473
Balblair Stone, symbol stone, Moniak Castle Wineries	SM932	255172	843583

12.4 There are a total of 173 listed buildings within the ZTV out of 256 within the 15km buffer as a whole. These comprise 11 Category A Listed Buildings, 113 Category B Listed Buildings, and 49 Category C Listed Buildings. There are also two Conservation Areas, Beauly Village Square and Strathpeffer, and four Inventory Gardens and Designed Landscapes (GDLs): Beaufort Castle (**GDL00052**); Brahan (**GDL00068**); Castle Leod (**GDL00094**); and Fairburn (**GDL00174**), all located within the 15km buffer and with theoretical visibility of the proposed development.

12.5 There are 39 non-designated heritage assets recorded by Highland Council within the site boundary per Historic Environment Scotland's (HES) online pastmap resource, consisting of shieling huts, mounds, enclosures and bothies. The non-designated heritage assets consist of:

- A shieling located close to T14 at Rie Faskindun, Beinn Beag Fhada (MHG62718)
- Two shielings located southeast of T29 at Allt na Creagach, Kilmorack (MHG59519, MHG59520)
- A building or shieling hut located north of T33 at Allt na Creagach, Kilmorack (MHG59521)
- A total of 34 recorded shieling-associated features including shieling mounds, huts, enclosures pens and two potential bothys, centred on the associated Canmore record (Canmore ID: 354824) collectively referred to as the Gleann Goibhre Southwest Shieling Site, approximately 45m southeast of T34.

12.6 These are not reproduced in Figure 12.1 with the exception of the Canmore record referenced above.

Likely Significant Effects During Construction

12.7 Significant effects during construction are related to physical impacts, such as alteration or destruction, of heritage assets. Effects related to noise and visual impacts of construction activity are temporary in nature, and not anticipated to be significant.

12.8 None of the turbine locations or anticipated access tracks are located where they could physically impact upon any of the known heritage assets within the site boundary,

although the exact location of the shieling cluster is yet to be determined. The potential for currently unknown archaeological remains to exist in the site boundary is low due to the previous surveys that have been conducted, suggesting that all known heritage assets with upstanding remains may already be recorded.

12.9 There is potential for significant effects due to direct physical impacts upon the cluster of non-designated heritage assets close to the proposed T34 location (**Canmore ID: 354824**). During the final design stages for the proposed development, avoidance of these heritage assets will be considered wherever possible.

Likely Significant Effects during Operation

12.10 Significant effects during operation are related to the proposed development introducing changes within the setting of designated heritage assets, and some non-designated heritage assets within the defined study area. The initial baseline review included all heritage assets within a 15km buffer of the turbine locations. For the EIA Report, the baseline will be refined to only include those heritage assets with visibility of the proposed development, within the following study areas:

- 10km for Scheduled Monuments, GDLs and Category A Listed Buildings;
- 5km for Conservation Areas and Category B and C Listed Buildings; and
- 5km for non-designated heritage assets deemed to be of national importance, and with long ranging views forming part of the heritage assets significance.

12.11 The EIA chapter will provide outline assessments of heritage assets that are within these study areas where effects have been assessed as not significant.

12.12 The designated heritage assets that are of particular interest in terms of potential significant effects during operation, as well as cumulative effects, are as follows:

- Urchany Barrow (SM13523), 860m south of T12, in ZTV for 10-18 blade tips
- Dun a Chliabhain fort (SM2424) 2.5km southeast of T7, in borderline ZTV area for 10-18 and 19-27 blade tips
- Dun Garbhlaich (SM2422), 1.7km east of T8, in ZTV for 10-18 blade tips
- Dun Fhamhair (SM5212), 2.7km east of T7, in borderline ZTV area for 10-18, 19-27 and 28-36 blade tips
- Dun Mor (SM4979), 1.7km south of T10, in ZTV for 19-27 blade tips
- Kiltarlity Old Parish Church (SM5570) and Category A-listed Kiltarlity Old Parish Church Burial Ground (LB8081), 5.4km southeast of T8, in ZTV for 19-27 blade tips
- Category A-listed St Mary's Church, Kirkhill (LB7815), 9.6km east of T7, in ZTV for 19-27 blade tips
- Category A-listed Fairburn Tower (LB14031) within Fairburn Designed Landscape (GDL00174), in ZTV for 1-9 blade tips
- Category A-listed Beaufort Castle (LB8068) within Beaufort Castle Designed Landscape (GDL00052), 6.7km southeast of T8, in ZTV for 28-36 blade tips

12.13 These designated heritage assets will be assessed in detail, and further heritage assets may be assessed on the basis of consultation with HES and the Highland Council Historic Environment Team (HCHET).

Design and Mitigation

12.14 The design of the proposed development will take into account the potential effects on the settings and significance of designated and non-designated heritage assets in agreement with consultees.

12.15 Construction impacts on heritage assets will be eliminated or reduced where possible through design and adopting preventative measures such as demarcation and avoidance during construction.

12.16 Where effects on non-designated heritage assets cannot be avoided, mitigation measures such as archaeological excavation and recording will be proposed.

Inclusion or Exclusion from the EIAR

12.17 The direct physical impacts on non-designated heritage assets within the site boundary discussed above, including those assets associated with Canmore record ID 354824 will be scoped into the assessment. As there are no designated heritage assets within the site boundary, and due to the temporary nature of construction impacts on changes within the setting of heritage assets, construction phase impacts on designated heritage assets will be scoped out of the assessment.

12.18 Potential significant effects via change to setting on designated heritage assets during operation will be scoped into the assessment. It is not anticipated that significant effects through change to setting on non-designated heritage assets will arise as a result of the proposed development during construction or operation. Some associated effects on these assets may be scoped in following consultation with HCHET.

12.19 Based on visibility in accordance with the ZTV, and within the bounds of the study areas set out above, the operational impacts due to changes within the setting on designated, and some selected non-designated heritage assets are scoped into the assessment.

Proposed Scope of Assessment

12.20 The assessment of potential effects on heritage assets within the baseline will be carried out in accordance with the standards set by the Chartered Institute for Archaeologists (CIfA), and follow the methodology contained within the Environmental Impact Assessment Handbook (2018) published by Scottish Natural Heritage (now NatureScot) and HES.

12.21 A detailed desk study will be undertaken to inform the cultural heritage baseline and will include consultation with HES and HCHET. The assessment will be informed by a review of all available archaeological records, historical documentary evidence, cartographic

evidence, and photographic material. This will involve consultation of the following sources:

- GIS data on Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Battlefields, and Gardens and Designed Landscapes obtained from HES;
- GIS data on other, non-designated heritage assets obtained from the Scottish National Record of the Historic Environment (SNRHE) which is maintained by HES, and from the Highland Council Historic Environment Records (HER);
- readily accessible primary and secondary historical sources for information relating to the area's historical past, including past land use;
- pre-Ordnance Survey maps of the site boundary, available online from the National Library of Scotland (NLS);
- first and subsequent editions of the Ordnance Survey (OS) maps of the site boundary, examined via the NLS;
- LiDAR datasets of the general area through NLS;
- the solid and drift geology for the site boundary based on that recorded by the British Geological Survey/Geological Survey of Great Britain maps; and
- the results of a walkover survey of the construction areas of the proposed development.

Methodology

12.22 Consultation with HES and HCHET will be undertaken to agree the assessment methodology and visualisation viewpoints for the setting assessment.

12.23 Effects on the cultural heritage resource will be determined by identifying the value of the heritage assets within the baseline and assessing the magnitude of any potential impacts. Mitigation measures will be recommended to minimise the impact of the proposed development on identified heritage assets, and a residual effect will be determined. Cultural heritage significance lies in the value of a heritage asset to this and future generations because of its heritage interest; this may be artistic, archaeological, architectural, historic, traditional, aesthetic, scientific or social.

12.24 The determination of the value of heritage assets is based on statutory designation and/or professional judgement against the characteristics and criteria expressed in HES Designation Policy and Selection Guidance and the Historic Environment Policy for Scotland.

12.25 **Table 12.2** identifies factors which are appropriate to consider during the assessment of heritage asset value, with the adoption of five ratings for value: very high, high, medium, low, and negligible.

Table 12.2: Criteria for assessing the value of heritage assets

Value	Example
Very High	World Heritage Sites (including nominated sites); and

	Heritage assets of acknowledged international importance.
High	Scheduled Monuments (including proposed sites); Listed Buildings (Category A and B); Battlefields included within the inventory; Marine Protected Areas; Gardens and Designed Landscapes; Conservation areas containing nationally important buildings; Non-designated heritage assets of scheduled quality and importance; and Heritage assets of national importance.
Medium	Listed Buildings (Category C); Conservation areas containing buildings that contribute significantly to its historic character; and Heritage assets of regional importance.
Low	Heritage assets of local importance; Heritage assets compromised by poor preservation and/or poor survival of contextual associations; and Buildings of modest quality in their fabric or historical association.
Negligible	Heritage assets with very little or no surviving archaeological interest; Artefact find spots (where the artefacts are no longer in situ and where their provenance is uncertain); and Poorly preserved examples of particular types of minor historic landscape features (e.g., quarries and gravel puts, dilapidated sheepfolds, etc).

12.26 The criteria for assessing the magnitude of impact from the Proposed Development on heritage assets is shown in **Table 12.3**.

Table 12.3: Criteria for assessing the magnitude of impact on heritage assets

Magnitude of Impact	Adverse	Beneficial
Major	Loss of most or all key archaeological materials or key historic building elements such that the significance of the heritage asset is totally altered. Comprehensive changes to setting such as extreme visual effects, gross change of noise or change to sound quality, or fundamental changes to use or access.	Preservation of a heritage asset in situ where it would otherwise be completely or almost lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated, and experienced.
Moderate	Changes to many key archaeological materials or key historic building elements, such that the significance of the heritage asset is clearly modified.	Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored.

	Considerable changes to setting that affect the character of the heritage asset such as visual change to many key aspects or views, noticeable differences in noise or sound quality, or considerable changes to use or access.	Changes that improve the way in which the heritage asset is understood, appreciated, and experienced.
Minor	Changes to key archaeological materials or key historic building elements, such that the significance of the heritage asset is slightly altered. Slight changes to setting such as slight visual changes to few key aspects or views, limited changes to noise levels or sound quality, or slight changes to use or access.	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
Negligible	Changes to archaeological materials or historic buildings elements such that alterations to the significance of the heritage asset are very minor. Very minor changes to setting such as virtually unchanged visual effects, very slight changes in noise levels or sound quality, or very slight changes to use or access.	Very minor changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Very minor changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
No Change	Changes to fabric or setting that leave significance unchanged.	

12.27 The significance of the effect of an impact on an attribute of a heritage asset is a function of the importance of the attribute and the magnitude of impact. For this assessment, effects of Moderate or greater significance are potentially significant in the context of the EIA regulations and are highlighted in bold in **Table 12.4**.

Table 12.4: significance of effect

		Magnitude of Impact				
Value		Major	Moderate	Minor	Negligible	No Change
	Very High	**Very Large**	**Large or Very Large**	**Moderate or Large**	Slight	Neutral
	High	**Large or Very Large**	**Moderate or Large**	Slight or **Moderate**	Slight	Neutral
	Medium	**Moderate or Large**	**Moderate**	Slight	Neutral or Slight	Neutral
	Low	Slight or **Moderate**	Slight	Neutral or Slight	Neutral or Slight	Neutral
	Negligible	Slight	Neutral or Slight	Neutral or Slight	Neutral	Neutral

13 POPULATION AND HUMAN HEALTH

Introduction

13.1 The requirement to assess population and human health arose from the reform to EIA Regulations in 2017. Relevant to wind farms, the potential effects upon population and human health can be considered in the following terms:

- Impact of the proposed development upon population trends in the area;
- Impact of the proposed development upon wealth and prosperity in the area, including job creation and/or loss;
- Impact of the proposed development upon recreational pursuits;
- Impact of the proposed development upon human health in terms of pollution, amenity and direct impacts.

Baseline Conditions

13.2 The 2022 Census enumerated the population of Highland as a Local Authority at 235,400. As a Local Authority, Highland has the seventh highest population of the Scottish Local Authorities, yet the lowest population density of eight people per square kilometre[40].

13.3 In terms of economy, sectors which the population are noticeably more employed in compared to the Scottish average, include water supply, construction, accommodation and food services and human health and social work activities.

13.4 According to NOMIS 2021 statistics, across the Highland area, 77.1% of people were economically active compared to a national average of 77.5%. Self-employment and part time working are both higher in Highland than the national average. Benefit claimants are slightly lower than the national average (2.3% compared to 3.1%).

13.5 In terms of recreation, there are no Core Paths within the site or on its boundaries albeit informal recreation paths are utilised.

13.6 The average life expectancy across Highland is 77.6 for men and 82.0 for women, comparing favourably with Scottish average of 76.5 and 80.8 respectively.[41]

Likely Significant Effects During Construction

13.7 Significant effects during construction would be related to economic benefits associated with local contracts in the construction of the wind farm. Where possible, Energiekontor

[40] https://www.highland.gov.uk/info/695/council_information_performance_and_statistics/165/highland_profile_-_key_facts_and_figures

[41] https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/highland-council-profile.html#life_expectancy

tender and award contracts to local companies across elements of construction and associated services.

13.8 It is not anticipated there would be any significant effects upon recreation via construction, as typically these would be associated with temporary closures. Turbine vehicles would move at night therefore limiting any obstructions to tourist traffic, whilst other HGVs would be controlled via a Traffic Management Plan.

Likely Significant Effects during Operation

13.9 Likely significant effects during operation include proceeds from community benefit, which has the potential to greatly aid local causes such as community schemes, facilities, sports clubs, arts, culture and recreational pursuits.

Inclusion or Exclusion from the EIAR

13.10 Socio-economic impacts associated with wind farm developments primarily relate to job creation, use of local services and income spent in the locality of a project. This section of the EIAR will therefore consider and assess the likely impacts of the proposal on the economic profile of the area, including short term job opportunities, and outline these accordingly.

Proposed Scope of Assessment

13.11 The EIAR will consider the effects of the Proposed Development on employment and the economy. This will include the employment opportunities for local suppliers with relevant construction and maintenance experience during the construction and operational phases of the development. The EIAR will focus on short and long term employment opportunities and input from the Proposed Development into the local economy (expenditure in shops / local services etc.).

13.12 Potential effects upon tourism and recreation would be considered as would potential effects on land management practices.

13.13 There is no established guidance for conducting a socio-economic assessment as part of the EIA process. It is therefore proposed that the assessment uses desk-based information sources to assess the likely scale of effects, supplemented by consultation with local stakeholders.

13.14 Cross reference would be made to other technical assessments to consider potential effects on recreational assets and other leisure and tourism attractions in the surrounding area, for example due to visual impact, traffic, and noise.

14 OTHER ISSUES

14.1 This section of the EIA Report will consider the following topics:

- Climate Change
- Air Quality
- Major Accidents and Disasters
- Radio-Communications and Television
- Aviation
- Shadow Flicker.

Climate Change

14.2 By its very nature, the proposed Development will reduce demand for fossil fuel electricity generation and therefore provide a benefit to the Scottish Government's carbon reduction targets. This positive effect will be given further consideration in the EIA.

14.3 With respect to climate adaptation, consideration will also be given to the resilience of the wind farm to projected climate change and to the likely consequences of climate change for baseline conditions/assessment findings, and the resilience of proposed mitigation measures to any projected changes. The latest climate change projections (UKCP18) will be used, which allow climate changes to be projected at the regional level; in this case, the north of Scotland.

14.4 Scottish Planning Policy requires proposed wind farm developments to consider potential impacts on carbon rich soils utilising the carbon calculator tool, and it is suggested that this tool will be utilised as part of the EIAR to fully assess any potential impacts that may occur as a result of the Proposed Development.

Air Quality

14.5 The nearest Air Quality Monitoring Area (AQMA) to the Site is located in Inverness. The closest automatic air quality monitoring site is situated in Inverness and records pollutant levels within the area. In most areas, the majority of ambient pollutions are currently well below limits set for protecting human health and the environment. It is estimated that air quality levels in Scotland will remain stable or continue to improve.

14.6 The potential effects associated with air quality during construction and decommissioning are the effects of dust associated with construction and decommissioning activities and the effects of emissions arising from construction traffic on local air quality.

14.7 No adverse air quality impacts are anticipated from the operation of the Proposed Development given the rural nature of the site and the distance from sources of air pollution. Additionally, due to the short term, temporary nature of the construction and decommissioning phases, it is proposed that air quality (with the potential exception of dust) is scoped out of the EIA Report.

14.8 Potential impacts on air quality from dust during the construction and decommissioning phases will be addressed through standard mitigation techniques to be agreed as part of a Construction Environmental Management Plan (CEMP). No further specific assessment is proposed.

Major Accidents and Disasters

14.9 The proposed Development is not located in an area with a history of natural disasters such as extreme weather events, and the construction and operation of the proposed Development would be managed within the requirements of a number of health and safety related Regulations, including the Construction (Design and Management) Regulations 2015 and the Health and Safety at Work etc. Act 1974.

14.10 As the development is not considered vulnerable to any major accidents or disasters that could result in likely significant environmental effects, it is proposed that this topic is scoped out from further assessment within the EIA Report.

Radio-communications and Television

14.11 Wind turbines can cause electromagnetic interference through physical and electrical interference. Physical interference can cut across electromagnetic signals resulting in a 'ghosting' effect which largely affects television signals and radar. Electrical interference arises as a result of the operation of the generator within the nacelle of the turbine and can also affect communication equipment in proximity to the turbines. Where possible, any potential effects on radio-communication links and television will be mitigated at the turbine layout design stage by the use of exclusion zones around any link paths.

14.12 The Office of Communications (Ofcom) is responsible for the licensing of two-way radio transmitters. It holds a register of most microwave links and will therefore be consulted in order to establish baseline conditions. However, because not all microwave links are published, system operators will also be individually consulted on the proposed development's potential to cause electromagnetic interference. The outcome of this consultation process, including any mitigation actions taken, will be detailed in the EIA Report.

Aviation

14.13 The EIA Report will include a description of military and civilian aeronautical and radar issues relating to the Proposed Development. Consultation will be undertaken once the locations of the turbines have been finalised with appropriate interested parties. The EIA Report will present the findings of these consultations and all responses received, as well as any predicted impacts on aviation and mitigation required.

14.14 In particular, NATS En Route Ltd (NERL) operates a network of long- range Air Traffic Control (ATC) radars throughout the United Kingdom. There are two main long range 'en route' NATS radars that cover the area surrounding the Proposed Development.

14.15 Radar systems can be susceptible to interference from wind turbines as the blade movement can cause intermittent detection by radars within their operating radius. This is particularly relevant where there is a line of sight between the radar and the wind turbine development. Due to their height, wind turbines can also impact upon airports and airfields if they protrude into the safeguarding distance above and around them.

14.16 The Proposed Development will not affect any other aviation interests, including MOD radar, civil airports or NATS communications.

14.17 The UK Air Navigation Order (ANO) 2016, Article 222, sets out the statutory requirement for the lighting on en-route obstacles, which applies to structures 150m or more above ground level. As the proposed turbines exceed 150m, aviation lighting will be required.

Shadow Flicker

14.18 Shadow flicker is a phenomenon where, under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off. It only occurs inside buildings where the flicker appears through a narrow window opening.

14.19 A shadow flicker assessment is generally required if any properties lie within 10x rotor diameter of the wind farm. This is in line with Scottish Government online renewables planning advice on 'onshore wind turbines' which states that "*where separation is provided between wind turbines and nearby dwellings (as a general rule 11 rotor diameters), 'shadow flicker' should not be a problem.*" However, in 'Spatial Planning for Onshore Wind Energy in Highland' (2015) and the associated Onshore Wind Energy Supplementary Guidance, this distance has been increased to 11x rotor diameter. This is to account for the northern latitudes of the Highlands and is in line with the conclusions of the DECC Update of the UK Shadow Flicker Evidence Base, 2011.

14.20 With the nearest residential property located over 2km to the southeast of the site, it is not anticipated that shadow flicker will have any impact on residential properties and as such will not be assessed as part of the EIA.

15 CONTENT AND STRUCTURE OF THE EIAR

15.1 Following the rationale set out in the above sections, it is proposed that the final EIAR contains the following chapters:

- Chapter 1: Introduction
- Chapter 2: EIA Methodology
- Chapter 3: Proposed development and Construction Methods
- Chapter 4: Design Evolution and Alternatives
- Chapter 5: Renewable Energy and Planning Policy
- Chapter 6: Landscape and Visual
- Chapter 7: Noise
- Chapter 8: Terrestrial Ecology
- Chapter 9: Ornithology
- Chapter 10: Traffic and Transport
- Chapter 11: Geology, Hydrology and Hydrogeology
- Chapter 12: Cultural Heritage
- Chapter 13: Population and Socio-Economics
- Chapter 14: Other Issues
- Chapter 15: Schedule of Mitigation

15.2 These chapters will be supported by supplementary volumes containing all relevant figures, technical appendices and visualisations. A standalone Non-Technical Summary (NTS) will also be provided. These will be structured as follows:

- Volume 1: Written Statement
- Volume 2: Figures
- Volume 3: NatureScot Visualisation
- Volume 4: Technical Appendices
- Volume 5: THC Visualisations

15.3 For the benefit of doubt, the environmental topics highlighted above are those which to be scoped into the EIA Report. Those which will be scoped out of full assessment are:

- Noise – amplitude modulation, vibration, decommissioning noise
- Traffic and Transport – operational traffic
- Cultural Heritage – construction effects
- Population and Human Health – human health
- Other Issues – air quality, natural disasters

15.4 We would welcome comment on the proposed scope and methodologies contained within this Scoping Report from all consultees and look forward to a collaborative EIA process. If you wish to discuss any aspect of this Scoping Report, please contact:

- Calum Morris, Project Manager, Energiekontor 44 Elliot Street Mews, Glasgow, G3 8DZ

Scottish Government
Riaghaltas na h-Alba
gov.scot

The Scottish Government
Energy Consents Unit

BALLACH WIND FARM

Scoping opinion on behalf of the Scottish Ministers under the Electricity Works (Environmental Impact Assessment)(Scotland) Regulations 2017

Issued to:

Energiekontor UK Ltd in respect of the Ballach Wind Farm proposal

28 November 2024

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ANNEX A Consultation responses

1. Introduction

1.1 This scoping opinion is issued by the Scottish Government's Energy Consents Unit ("the ECU") on behalf of the Scottish Ministers to Energiekontor UK Ltd ("the Company"), a company incorporated under the Companies Acts with company number 03830818 and having its registered office at 114 St Martin's Lane, Covent Garden, London, United Kingdom, WC2N 4BE. It has been issued in response to a request for a scoping opinion made by the Company in September 2024 in relation to the proposed Ballach Wind Farm ("the proposed Development"). The request was accompanied by a scoping report.

1.2 The proposed Development will be located approximately 4km northwest of Kilmorack within the Erchless and Farley estates in the local authority area of the Highland Council.

1.3 The proposed Development will have a total generating capacity in excess of 50 megawatts ("MW") and will comprise of up to 36 turbines each with a blade tip height of up to 230 metres. It will also include associated development such as crane hardstandings, access tracks, a substation, temporary construction compound and battery storage.

2. Consultation

2.1 Prior to the submission of the request for a scoping opinion a list of consultees was agreed between the Company and the ECU. Following receipt of the scoping opinion request, a consultation, as required by Regulation 12 of the Electricity Works (Environmental Impact Assessment)(Scotland) Regulations 2017 ("the 2017 Regs"), was initiated by the ECU on 01 October 2024. The deadline for submitting consultation responses was 02 November 2024 but this was extended to accommodate extension requests from consultees.

2.2 As part of the consultation, the Scottish Ministers also requested responses from their internal advisors Transport Scotland and Scottish Forestry.

2.3 Standing advice from Marine Directorate – Science Evidence Data and Digital ("MD-SEDD") (formerly Marine Scotland Science – MSS) has been provided. This includes a requirement for the Company to complete a checklist prior to the submission of the application for consent under section 36 of the Electricity Act 1989.

2.4 The purpose of the consultation was to obtain scoping advice from each consultee on environmental matters within their remit. Responses from consultees and advisors, including the standing advice from MD-SEDD, should be read in full for detailed requirements and for comprehensive guidance, advice and, where appropriate, templates for preparation of the Environmental Impact Assessment report ("the EIA report").

2.5 All consultation responses received and the standing advice from MD-SEDD are attached in ***ANNEX A Consultation responses***.

2.6 The Scottish Ministers expect the EIA report to include all matters raised in responses from the consultees and advisors.

2.7 The following organisations were consulted but did not provide a response:

- Civil Aviation Authority – Airspace;
- John Muir Trust;
- Kilmorack Community Council;
- Kiltarlity Community Council;
- Mountaineering Scotland;
- Muir of Ord Community Council;
- Ness & Beauly Fisheries Trust;
- Scottish Fire & Rescue Service Highland P&P Fire Safety Enforcement;
- Scottish Forestry;
- Scottish Wild Land Group;
- Visit Scotland; and
- Woodland Trust.

2.8 With regards to those consultees who did not respond, it is assumed that they have no comment to make on the scoping report. However, they may be consulted again in the event that an application for section 36 consent is submitted subsequent to this EIA scoping opinion.

2.9 The Scottish Ministers are satisfied that the requirements for consultation set out in Regulation 12(4) of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 have been met.

2.10 As instructed in their respective responses to the scoping consultation Aberdeen International Airport, Crown Estate Scotland, Fisheries Management Scotland and the Health & Safety Executive (HSE) will not be consulted in any subsequent consultations relating to the proposed Development.

3. The Scoping Opinion

3.1 The Scottish Ministers adopt this scoping opinion having taken into account the information provided by the Company in September 2024 and the responses received to the consultation undertaken. In providing this scoping opinion, the Scottish Ministers have had regard to current knowledge and methods of assessment; have taken into account the specific characteristics of the proposed Development, the specific characteristics of that type of Development and the environmental features likely to be affected.

3.2 A copy of this scoping opinion has been sent to the Highland Council for publication on their website. It has also been published on the ECU website at www.energyconsents.scot.

3.3 The Scottish Ministers expect the EIA report which will accompany the application for the proposed Development to consider, in full, all consultation responses and advice attached in ***ANNEX A Consultation responses***.

3.4 The Scottish Ministers are satisfied with the scope of the EIA set out at within the scoping report submitted by the Company when making the request for a scoping opinion.

3.5 In addition to the consultation responses, the Scottish Ministers wish to provide comments with regards to the scope of the EIA report. The Company should note and address each matter:

Aviation – Civil Aviation Authority ("CAA")

It is recommended by the Scottish Ministers that, as soon as they can, the Company engages with the CAA to discuss and agree their night-time aviation lighting requirements.

Aviation – aviation lighting night time assessment

It is recommended by the Scottish Ministers that with regards to impacts of night time aviation lighting, the Company should discuss and agree with the Highland Council and NatureScot, the range (in kilometres from the proposed Development) for hours of darkness assessments of the impacts of aviation lighting and the receptors therein to be assessed.

As well as the scope, methodology, findings and recommendations of such assessments, full details of all mitigation of aviation lighting impacts subsequently identified should be provided in the EIA report.

Aviation – Defence Infrastructure Organisation ("DIO")

It is recommended by the Scottish Ministers that the Company has discussions with the DIO to resolve their concerns in respect of proposed Development introducing a physical obstruction to low flying aircraft operating out of Tactical Training Area 14T (TTA 14T) and within Low Flying Area 14 (LFA14).

Battery Storage

With regards to battery storage being included in the proposed Development, full details of what it will entail (scale, dimensions etc), its location in the site, minimum and maximum export capacity of megawatts and megawatt hours of electricity and a full assessment of its impacts and effects and all proposed mitigation should be included in the EIA report. Assessment of fire risk and assessment of operational noise associated with the proposed battery storage should also be completed and included in the EIA report.

Biodiversity - enhancing

The Company should take note of the requirements of Policy 3(b) of National Planning Framework 4 whereby biodiversity enhancements are to be provided in addition to any proposed mitigation. Information on predicted losses and proposed offsetting and delivery of positive effects on biodiversity should be clearly set out in the EIA report.

Bird surveys

It is recommended by the Scottish Ministers that decisions on bird surveys – species, methodology, vantage points, viewsheds and duration – site specific and cumulative – should be made following discussion between the Company and NatureScot.

Borrow pits

Where borrow pits are proposed as a source of on-site aggregate they should be considered as part of the EIA process and included in the EIA report detailing information regarding their location, size, layout and nature.

Ultimately, it would be necessary to provide details of the proposed depth of the excavation compared to the actual topography and water table, proposed drainage and settlement traps, turf and overburden removal and storage for reinstatement, and details of the proposed restoration profile. The impact of such facilities (including dust, blasting and impact on water) should also be appraised as part of the overall impact. Information should cover the requirements set out in '*PAN 50: Controlling the Environmental Effects of Surface Mineral Workings'*.

Cumulative impact assessments

To ensure that cumulative impact assessments are as up-to-date as possible, other Developments to be included should be discussed and agreed by the Company and the Highland Council. Assessments, photography and visualisations submitted in the EIA report should reflect the most up-to-date cumulative position.

Description of the proposed Development

In the description of the proposed Development to be included in the EIA report, **all** the specific elements of the proposed Development for which consent under section 36 of the Electricity Act 1989 is applied for must be made clear. If applicable, that includes battery storage.

Designated areas, protected areas and protected species

The Scottish Ministers recommend that the Company seek the agreement of Historic Environment Scotland, NatureScot and RSPB Scotland regarding the designated sites, protected areas and protected species to be included in the EIA report.

Where required, sufficient information should be included in the EIA report regarding Habitat Regulation Appraisals.

Ecology and ornithology and designated and protected areas

The EIA report should provide a baseline survey of the animals (mammals, reptiles, amphibians, etc) and bird interests on site. Before an application is submitted it needs to be categorically established which species are present on the site, and where they are present. Further, the EIA report should provide an account of the habitats present on the site of the proposed Development.

It should identify rare and threatened habitats, and those protected by European or UK legislation, or identified in national or local Biodiversity Action Plans.

Fish

Fisheries Management Scotland have developed advice which should be fully considered throughout the planning, construction and monitoring phases of the proposed Development. That advice can be found at: 170412-Guidance-Terrestrial- windfarms.pdf (fms.scot)

MD-SEDD generic scoping guidelines for onshore wind farm (and overhead line development) is provided at: Onshore Renewables Interactions - gov.scot (www.gov.scot)

How fish populations can be impacted during the construction, operation and decommissioning of a wind farm development should be considered, in relation to freshwater and diadromous fish and fisheries, during the EIA process.

Hydrology, geology, hydrogeology and peat

A full assessment on the impact on peat should be included in the EIA report and must include peat probing for all areas where development is proposed. The assessment should include probing not just at the locations of infrastructure but also covering the areas of ground which would be subject to micro siting limits. A Peat Management Plan should also be prepared, as well as an Outline Habitat Management Plan.

Landscape and visual – study area

The study area in kilometres of the proposed Development should be agreed following discussion between the Company, NatureScot and the Highland Council.

MD-SEDD standing advice

Please ensure that the checklist contained in the MD-SEDD standing advice is adhered to with regards to the appropriate chapters of the EIA report and is submitted as part of the application documentation.

Noise assessment

It is recommended by the Scottish Ministers that the final list of receptors in respect of noise assessment should be agreed following discussion between the Company and the Highland Council.

The noise assessment report should be formatted as per Table 6.1 of the IOA "***A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise***".

Peat landslide hazard and risk assessment

The Scottish Ministers consider that where there is a demonstrable requirement for peat landslide hazard and risk assessment ("PLHRA"), the assessment should be undertaken as part of the EIA process. This will provide the Scottish Ministers with a clear understanding of whether the risks are acceptable and capable of being controlled by mitigation measures.

The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition), published at Proposed electricity generation developments: peat landslide hazard best practice guide - gov.scot (www.gov.scot), should be followed in the preparation of the EIA report, which should contain such an assessment and details of mitigation measures.

It should be noted by the Company that the Scottish Ministers engage the services of appropriate specialists to assess PLHRAs submitted with an EIA report.

Private water supplies

The Scottish Ministers request that the Company investigates the presence of any private water supplies which may be impacted by the proposed Development. The EIA report should include details of any supplies identified by this investigation, and if any supplies are identified, the Company should provide an assessment of the potential impacts, risks, and any mitigation which would be provided.

River Beauly

With regards to the River Beauly and its associated watercourses including the Erchless Burn and the Breakachy Burn, the Scottish Ministers recommend that the Company has discussions with the Beauly Fishery Board in respect of the concerns and issues raised in their consultation response.

Scoping out

The Company should note the advice provided by NatureScot, the Highland Council, RSPB Scotland, SEPA and Transport Scotland in respect of matters to be scoped out and matters that should not be scoped out.

Transport – abnormal loads

The Scottish Ministers recommend that the Company discuss and agree the scope of the Abnormal Loads Assessment with Transport Scotland prior to it being undertaken.

Transport – construction traffic management plan

The Scottish Ministers recommend that the Company discuss and agree the scope of the construction traffic management plan with the Highland Council and Transport Scotland. Local communities which will be impacted by the proposed Development's construction traffic should also be involved in such discussions.

With regards to the assessment of traffic and transport, it should be noted by the Company that the Environmental Assessment of Traffic and Movement (2023) guidelines have replaced the Environmental Assessment of Road Traffic (IEMA)(1993) guidelines.

Viewpoints and visualisations

The final list of viewpoints and visualisations should be agreed following discussion between the Company, the Highland Council and NatureScot.

4. Mitigation Measures

4.1 When determining an application for consent under section 36 of the Electricity Act 1989 ("section 36 consent") to construct and operate a wind farm, the Scottish Ministers are required to make a reasoned conclusion on the significant effects of the proposed Development on the environment as identified in the environmental impact assessment.

4.2 The mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion to each chapter in the EIA report.

4.3 Applicants are also asked to provide a consolidated schedule of all mitigation measures proposed in the environmental assessment, provided in tabular form, where that mitigation is relied upon in relation to reported conclusions of likelihood or significance of impacts.

5. Conclusion

5.1 This scoping opinion is based on information provided by the Company in their request for a scoping opinion and information available at the date of this scoping opinion. The adoption of this scoping opinion by the Scottish Ministers does not preclude the Scottish Ministers from requiring of the Company information in connection with an EIA report submitted in connection with any application for section 36 consent for the proposed Development.

5.2 This scoping opinion will not prevent the Scottish Ministers from seeking additional information at application stage. For example, to include cumulative impacts of additional Developments which enter the planning process after the date of this scoping opinion.

5.3 Without prejudice to that generality, it is recommended that advice regarding the requirement for an additional scoping opinion be sought from the Scottish Ministers in the event that no application has been submitted within 12 months of the date of this scoping opinion.

5.4 It is acknowledged that the environmental impact assessment process is iterative and should inform the final layout and design of proposed Developments. The Scottish Ministers note that further engagement between relevant parties in relation to the refinement of the design of this proposed Development will be required and would request that they are kept informed of on-going discussions in relation to this.

5.5 When finalising the EIA report, applicants are asked to provide a summary in tabular form of where within the EIA report each of the specific matters raised in this scoping opinion has been addressed.

5.6 Applicants are reminded that there will be limited opportunity to materially vary the form and content of the proposed Development once an application is submitted.

6. Pre application

6. In advance of an application for section 36 consent being submitted – ideally before design freeze – the Company should liaise with the ECU with regards to the Gatecheck process and the statutory arrangements that will have to be made when the application is ready to be submitted. For example, the provision of hard copies of the EIA report and supporting documentation to the Scottish Ministers will have to be discussed and agreed as will public notices and public viewing requirements.

Stephen McFadden
Energy Consents Unit
28 November 2024

ANNEX A

Consultation

List of consultees who provided a response	Page/s
The Highland Council	A1 - A43
Aberdeen International Airport	A44
Beauly Fishery Board	A45 – A46
British Horse Society	A47 - A49
BT	A50 – A51
Crown Estate Scotland	A52
Defence Infrastructure Organisation	A53 - A55
Fisheries Management Scotland	A56
Highlands & Islands Airports Ltd	A57
Historic Environment Scotland	A58 – A68
Health & Safety Executive	A69 – A70
Joint Radio Company	A71 – A73
Marine Directorate (standing advice)	A74 – A82
Marybank, Scatwell & Strathconon Community Council	A83 – A84
NATS Safeguarding	A85
NatureScot	A86 – A94
RSPB Scotland	A95 – A102
Scottish Forestry	A103 - A105
Scottish Water	A106 – A108
ScotWays	A109 – A116
SEPA	A117 – A127
Strathglass Community Council	A128
Transport Scotland	A129 – A134

A1

The Highland Council
Comhairle na Gàidhealtachd

Energy Consents Unit
Per Stephen McFadden
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

By email only to:
Stephen.McFadden@gov.scot

Please ask for: Mark Fitzpatrick
REDACTED

e-mail: Mark.Fitzpatrick@Highland.gov.uk

Our Ref: 24/04177/SCOP
Your Ref. ECU00005219
Date: 12 November 2024

Dear Stephen,

PLANNING REFERENCE: 24/04177/SCOP

DEVELOPMENT: SCOPING REQUEST FOR BALLACH WIND FARM - ERECTION AND OPERATION OF A WIND FARM FOR A PERIOD OF 35 YEARS, COMPRISING 36 TURBINES WITH A MAXIMUM BLADE TIP HEIGHT OF 200M AND 230M, ALONG WITH A BATTERY ENERGY STORAGE SYSTEM (BESS) AND ANCILLARY INFRASTRUCTURE

LOCATION: LAND 6260M NE OF ERCHLESS FOREST COTTAGE, STRUY, BEAULY

Thank you for requesting this Environmental Impact Assessment (EIA) Scoping Request for the above project. We received the consultation on 01 October 2024 by email and we are grateful for the extension of time to make comments.

Our view on the scope of the assessment may be subject to change on a number of topics within the EIAR if the scale of development, in terms of the number and height of turbines, changes.

Whilst unlikely, this application may reduce in scale to a level which would be considered as an application under the Town and Country Planning (Scotland) Act 1997 (As Amended). If this is the case, we would require a revised scoping response under the relevant regulations.

We note that the applicant has requested to use The Council's pre-application advice service for Major Developments (PREMAJ), with the meeting scheduled in January 2025. As such, the advice contained in this Scoping response should be read alongside that to be provided in the PREMAJ Advice Pack once issued.

We trust that this consultation response helps inform ECUs Scoping Response and is helpful to the applicant when formalising any forthcoming application.

Yours sincerely,

Mark Fitzpatrick
MRTPI
Principal Planner – Strategic Projects Team
The Highland Council

A3

SCOPING RESPONSE TO ENERGY CONSENTS UNIT

Applicant:	**Energiekontor UK Ltd**
Project:	**Scoping request for Ballach Wind Farm - Erection and Operation of a Wind Farm for a period of 35 years, comprising 36 turbines with a maximum blade tip height of 200m and 230m, along with a battery energy storage system (BESS) and ancillary infrastructure.**
Project Address:	**Land 6260M NE Of Erchless Forest Cottage, Struy, Beauly**
Our Reference	**24/04177/SCOP**

This response is given without prejudice to the Planning Authority's right to request information in connection with any statement, whether Environmental Impact Assessment Report (EIAR) or not, submitted in support of any future application. These views are also given without prejudice to the future consideration of and decision on any planning application received by The Highland Council (THC).

THC request that any EIAR submitted in support of an application for the above development take the comments highlighted below into account; many of which are already acknowledged within the Scoping Report. In particular, the elements of this report as highlighted in parts 3, 4 and 5 should be presented as three distinct elements.

Responses to the internal consultation undertaken are included in the report below. Should any further responses be received from internal consultees, these will be forwarded on in due course.

1.0 Description of the Development

1.1 The description of development for an EIAR is often much more than would be set out in any planning application. An EIAR must include:

- a description of the physical characteristics of the whole development and the full land-use requirements during the operational, construction and decommissioning phases. These might include requirements for borrow pits, local road improvements, infrastructural connections (i.e., connections to the grid), off site conservation measures, etc. A plan with eight figure OS Grid co-ordinates for all main elements of the proposal should be supplied;
- a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;
- the risk of accidents, having regard in particular to substances or technologies used;
- an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light / flicker, heat, radiation, etc.) resulting from the operation of the development; and
- the estimated cumulative impact of the project with other consented or operation development.

2.0 Alternatives

2.1 A statement is required which outlines the main development alternatives studied by the applicant and an indication of the main reasons for the final project choice. This is expected to highlight the following:

- the design chapter should clearly set out the design evolution of the scheme including constraints to the delivery of that scheme;
- the range of technologies that may have been considered;
- locational criteria and economic parameters used in the initial site selection;
- options for access;
- design and locational options for all elements of the proposed development (including grid connection); and
- the environmental effects of the different options examined.

The assessment should also highlight sustainable development attributes including for example assessment of carbon emissions / carbon savings.

3.0 Environmental Elements Affected

3.1 The EIAR must provide a description of the aspects of the environment likely to be significantly affected by the development. The following paragraphs highlight some principal considerations. There are a number of wind energy developments in the area and you are encouraged to use your understanding of these in assessing your development and the potential for cumulative effects to arise. The EIAR should fully utilise this understanding to ensure that information provided is relevant and robustly grounded.

Land Use and Policy

3.2 The current Development Plan comprises the:

- Fourth National Planning Framework (NPF4) adopted in 2023.
- Highland-wide Local Development Plan (HwLDP) adopted 2012.
- Inner Moray Firth Local Development Plan 2 (IMFLDP2) adopted 2024.
- Associated Supplementary Guidance (SG), with particular regard to the Onshore Wind Energy Supplementary Guidance (OWESG) (2016) and Part 2b (2017).

A large number of policies will apply to this proposal from the above development plan documents. This response does not attempt to detail all which may be relevant, as such, it is recommended that the applicant/agent reviews all these plans and documents prior to submission to establish the planning policy context for the EIA. The scope of the EIA should, however, address all the relevant issues covered within NPF4, HwLDP, IMFLDP2, and Highland Council Supplementary Guidance. The Inner Moray Firth Local Development Plan 2 (IMFLDP2) has recently replaced IMFLDP (27 June 2024) to become part of the approved Development Plan. The IMFLDP2 will have limited relevance to this proposal however, as its focus is mainly on regional and settlement strategies as well as identifying specific site allocations. However, certain aspects of the strategies for the local area and settlements may help to inform plans for community engagement. It should be noted that the Special Landscape Area boundaries that were established (including refinements) under IMFLDP across the plan area, remain the same in IMFLDP2. The SLA citations webpage summarise key characteristics, qualities, sensitivities, and measures for enhancement and must be used to assess the potential impacts of the proposed development. You should note that THC considers SLAs to be **regionally** valuable landscapes significant to Highlands and valued beyond their locale.

3.3 The Council has recently commenced the preparation of a new-style Highland Local Development Plan (HLDP), with the intention to undertake the evidence-gathering stage of the new LDP throughout 2023, with the tentative programme including an Evidence Report in 2024 and subsequent Gate Check, with Proposed Plan stage in 2025. Once adopted this new style HLDP will supersede and replace HwLDP and the Council 'area' LDP. The programme of work includes the review of the coverage and content of its current suite of Supplementary Guidance, to establish which aspects should be covered within the new

Local Development Plan itself, which aspects should be covered within non-statutory planning guidance and any aspects no longer required. Applicants are advised to monitor the Council's annual Development Plans Newsletter, as this provides the most up to date timetable for this work.

3.4 The Onshore Wind Energy Supplementary Guidance, on pages 19 and 20, lists ten landscape and visual criteria that the Council use as a framework for assessing proposals. In considering landscape and visual impacts, the assessment should pay particular attention to these 10 criteria, as these will be used in the future appraisal of an application and should therefore also form part of the applicant's own assessment.

3.5 The Council also recognises the importance of the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, as the legislative tool for addressing Scotland's Climate & Ecological Emergency, which the Council committed to under its own Climate and Ecological Emergency declaration in May 2019. In addition, the Scottish Government published its Onshore Wind: Policy Statement 2022 on 21st December 2022. This statement sets out the Government ambition to deploy a minimum of 20GW of onshore wind by 2030, up from the 8.7GW of existing generation capacity in June 2022.

3.6 Benefits to rural areas, such as provision of jobs and opportunities to restore and protect natural habitats, are also highlighted in Scottish Government Policy documents, with the aforementioned Policy Statement reinforcing the notion that the right development should be permitted in the right place.

3.7 In addition to the above it may be noted that the July 2024 update of the Highland Wind Turbine Mapping is now available. Existing wind farm activity in the area will be a key consideration for this proposal in terms of cumulative impacts.

3.8 Developer Contributions, Community Benefit & Community Wealth Building will all need to be considered as the scheme develops. With Developer Contribution sought towards Transport (including Active Travel), Green Infrastructure, Water & Waste and Public Art/Realm in compliance with NPF4 Policy 18 (Infrastructure first), HwLDP Policy 31 (Developer Contributions) and Developer Contributions Supplementary Guidance (2018).

3.9 Your attention is also drawn to the fact that the council has a separate remit to promote community benefit which is distinct and separate from planning. The policy contains contacts for further discussion on this matter and we would encourage the developer to engage early in the process. The Council's position with regard community benefits has recently been updated with the approval of a new 'Social Values Charter for Renewables Investment' at its meeting on 27 June 2024, with the report available at the following link:

https://www.highland.gov.uk/meetings/meeting/5003/highland_council

3.10 The approved charter sets out The Highland Council's expectations from developers wishing to invest in renewables in the Highland area and what the Highland partnership – public, private, and community – will do to support and enable this contribution, namely:

- embed an approach to community wealth building into Highland;
- maximise economic benefits from our natural environment and resources;
- engage and involve relevant stakeholders to understand how we can continually improve our impact; and,
- unlock economic opportunities for the area.

3.11 Community Wealth Building is intended to encourage, promote, and facilitate a new strategic approach to economic development as set out in NPF4 Policy 25. This Policy indicates examples of what contributions by development proposals to community wealth building could include: improving community resilience and reducing inequalities; increasing spending within communities; ensuring the use of local supply chains and services; local job creation; supporting community led proposals, including creation of new local firms and enabling community led ownership of buildings and assets. However, that is not an exhaustive list.

3.12 Following consultation, the Highland Council's Community Wealth Building Strategy 2024-2027 was agreed by Council on 19 September 2024 (see item 6) subject to minor amendments. The strategy provides a framework that sets out how the Council will utilise different activities to maximise the impact of investment in local areas and support more local ownership of assets and wealth. The finalised version of the strategy will be uploaded to the Council's website in due course. Further information is also available from the associated Council's press release on 19 September 2024: https://www.highland.gov.uk/news/article/16240/councillors agree revised community wealth building strategy.

3.13 Notwithstanding that wind energy developments contribute to the production and supply of renewable energy, the Council maintains that this commitment must be taken in balance along with all other considerations, and that such developments should be located, sited, and designed appropriately and thus assessed against the wider development plan policies.

Sustainability

3.14 The Council's Sustainable Design Guide SG provides advice and guidance on a range of sustainability topics, including design, building materials, and minimising environmental impacts of development. A Sustainable Design Statement is required. Wind farms produce a sustainable form of energy; however, the Council will need to be satisfied in reaching a conclusion on any consultation or application that the development in its entirety is in fact sustainable development. In order for us to do so we recommend that matters related to the three pillars of sustainable development are fully assessed in the information which supports the application. The wind farm needs to be considering the provision of energy systems within the holistic demand cycle of the network. The developer needs to consider the impact of the installation and the prospective long-term use of the energy to

accommodate the requirements of a decarbonised energy provision for Scotland and the Highlands. The application should include a statement on how the development is likely to contribute to the Scottish Government Energy Efficient Scotland roadmap and provide the Highlands with secure and clean electricity supplies.

3.15 Further information will be required regarding the associated Battery Energy Storage System (BESS) including the type and nature of storage facility proposed, such as scale and appearance, and whether any associated buildings with the wind farm scheme are designed in a way which is sympathetic to the local area and existing pattern of development, as well as screening; the electricity network benefits and capacity proposed (noting that energy storage is typically considered to be part of "generation"); the potential impacts, for example any pollution risks and particular requirements for decommissioning. Careful consideration is required regarding fire risk management, fire suppression, fire extinguishing and potential consequential effects. It is understood that the Scottish Fire Service is currently preparing guidance for BESS developments which should, when available, be of assistance and could identify an arrangement for SFS to be consulted.

3.16 It would be highly beneficial to have information to explain electricity network benefits and capacity proposed, with the end result ideally being all wind turbines being operational on a consistent basis when there is sufficient windspeeds, rather than either certain or no turbines being in operational depending upon short term grid constraints or levels of demand.

3.17 It may be noted that the Council supports in broad principle the inclusion of energy storage within such developments and that in respect of hydrogen the Council has (March 2021) agreed to prepare a Hydrogen Strategy for Highland. A strategy for the provision of charging points within the development should also be submitted with the application.

Landscape and Visual

3.18 The Council expects the EIAR to consider the landscape and visual impact of the development. The Council makes a distinction between the two. While not mutually exclusive, these elements require separate assessment and therefore presentation of visual material in different ways. It is the Council's position that it is not possible to use panoramic images for the purposes of visual impact assessment. The Council, while not precluding the use of panoramic images, require single frame images with different focal lengths taken with a 35mm format full frame sensor camera – not an 'equivalent.' The focal lengths required are 50mm and 75mm. The former gives an indication of field of view and the latter best represents the scale and distance in the landscape; i.e., a more realistic impression of what we see from the viewpoint. These images should form part of the EIAR and not be separate from it. Photomontages should follow the Council's Visualisation Standards and are subject an independent verification check upon receipt:

https://www.highland.gov.uk/downloads/file/12880/visualisation_standards_for_wind_energy_developments

3.19 Separate volumes of visualisations should be prepared to both Highland Council Standards and NatureScot guidance. These should be provided in hard copy. It would be beneficial for THC's volume to be provided in a **A3 leaver arch folder** for ease of use. The use of monochrome for specific viewpoints is useful where there are a number of different wind farms in the view. We are happy to provide advice on this matter going forward. All existing turbines should be re-rendered even if they appear to be facing the viewer in the photograph to ensure consistency.

3.20 All elements of a development are important to consider within any EIAR and the assessment must include the expected landscape and visual impact of any on-site BESS, borrow pits, access roads, compounds including substations, this is despite the fact that the principal structures will be a primary concern. All elements of the proposal are to be rendered into photomontages.

3.21 There are a number of similar applications in this area that are yet to be determined / concluded in the vicinity of this application, many of these have been identified in the scoping report, which may or may not help clarify the weight towards particular policy elements in the final planning balance. Our interactive Wind Turbine map is up to date as of 01 July 2024 and can be accessed on the following link: http://highland.gov.uk/windmap.

3.22 The Council is aware of several proposals within the 45 km Study Area most of which are currently at the Scoping stage, which should be given consideration within the cumulative assessment including:

- Balmore Wind Farm – near Nairn (THC ref. 23/02340/SCOP);
- Balnespick Wind Farm – Tomatin (THC ref. 23/04199/SCOP);
- Beinneun 2 Wind Farm – Glenmoriston (THC ref. 23/05636/SCOP);
- Carn Na Saobhaidh Wind Farm – near Farr (THC ref. 24/03625/SCOP);
- Ceislein Wind Farm – Evanton (THC ref. 24/03524/SCOP);
- Chrathaich Wind Farm – (THC ref. 23/03311/S36, ECU00004704)
- Clune Wind Farm – Tomatin (THC ref. 24/00690/SCOP);
- Cnoc Farasd Wind Farm – Glenurquhart (THC ref. 24/04447/SCOP);
- Creachan Wind Farm – Alness (THC ref. 24/03825/SCOP);
- Highland Wind Farm – Tomatin (THC ref. 24/01107/SCOP);
- Kyllachy Wind Farm – Tomatin (THC ref. 24/03494/SCOP); and,
- Millenium East Wind Farm – Glenmoriston (THC ref. 24/00359/SCOP).

3.23 The finalised list of Viewpoints (VP) and wireframes for the assessment of effects of a proposed development must also be agreed in advance of preparation of any visuals with THC and NatureScot.

3.24 We acknowledge that there will be some micrositing of the viewpoints to avoid intervening screening of vegetation boundary treatments etc. We would recommend that the photographer has in their mind whether the VP is representative or specific and also who the receptors are when they are taking the photos it would be helpful. We have also found that if the photographer has a 3D model on a laptop when they go out on site it helps the orientation of the photography.

3.25 As far as possible, the viewpoints should correspond with the viewpoints used for existing wind energy schemes within the area. The detailed location of viewpoints will be informed by site survey, mapping and predicted ZTVs. Failure to do this may result in abortive work, requests for additional visual material and delays in processing applications/consultation responses. Community Council's may request additional viewpoints and it would be recommended that any pre-application discussions with the local community, and associated reporting on consultation undertaken, take this into account.

3.26 The Council notes the viewpoints selected in the Scoping Report however there is insufficient information included with Scoping request to conclude that Significant landscape or visual effects are unlikely to occur in large parts of the Study Area and we would request further information so that impacts on the following receptors can be given further consideration:

- A9(T) between Kildory and Tore;
- The interior of the Black Isle including, but not limited to, along the B9163 and the Unclassified road near Balmungie for example;
- Sea Lock House at Clachnaharry;
- A862 between Clachnaharry and the junction with the A833 southwest of Kirkhill;
- A96(T) and B9006 between Nairn and Smithton.

The Council would welcome discussion of the above matters at the upcoming Major Pre-application meeting in January 2025 and would advise the applicant to provide visual materials to facilitate the discussion.

3.27 The purpose of the selected and agreed viewpoints shall be clearly identified and stated in the supporting information. For example, it should be clear that the VP has been chosen for landscape assessment, or visual impact assessment, and / or cumulative assessment, or sequential assessment, or to show a representative view, or for assessment of impact on designated sites, communities, or individual properties. However, it is important for assessors to remember that Visual Effects are defined by GLVIA3 not just as effects on views, but as 'Effects on specific views and on the general amenity experienced by people'.

3.28 The Study Area will be 45km, given the scale of the turbines. Given the size of the turbines and the landscape sensitivities of this site and the surrounding area, we would expect a detailed assessment of effects should be undertaken for the whole Study Area, including for Cumulative Impact Assessment, which should also include an assessment of sequential effects as the receptor moves through the landscape.

3.29 Furthermore, the LVIA Chapter of the EIAR should clearly set out the methodology including:

- Definitions of each point on the scale of magnitude of change which is used by the applicant in reaching a conclusion on the magnitude of change;
- Definitions of each point on the scale of sensitivity of receptor which is used by the applicant in reaching a conclusion on the sensitivity of receptor;
- The threshold to which the applicant considers a significant effect is reached including significant cumulative effects. For the avoidance of doubt the Council consider that Moderate impacts can be significant, and it is recommended that the EIAR takes this approach as well;

A clear matrix approach supported by descriptive text setting out how the conclusion of effect is reached on landscape character, designated landscapes, visual receptors, and residential amenity. The LVIA should contain be an assessment of significance of singular and cumulative effects for each of the viewpoints following this methodology in addition to receptor groups. This approach is important because the logic of the applicant's assessment must be clearly and readily understood.

3.30 When assessing the impact on recreational routes please ensure that all core paths, rights of way, national cycle network, and long distance trails are assessed. It should be noted that these routes are used by a range of receptors.

3.31 Given the potential cumulative impact of renewable energy in this area it is expected that the applicant should present images for presentation within the Panoramic Digital Viewer deployed by the Council – see visualisation standards document. If the applicant wished to utilise this tool there may be an associated cost per image to be inserted which should be discussed with the Council prior to submission. To view current or determined schemes in the Council's Panoramic Viewer please see the link below:

http://www.highland.gov.uk/panoramicviewer

3.32 We expect the Landscape and Visual Impact Assessment to refer to the Council's Onshore Wind Energy Supplementary Guidance and expect an assessment of the proposal against the criterion set out in the Council's OWESG at pages 19 and 20 to be included within the LVIA chapter of the EIAR.

3.33 We advise that wind energy developments are generally sited within a complex combination of Landscape Character Types. As such, the Landscape Impact Assessment's analysis

should not only focus on potential impacts on individual Landscape Character Types and individual Units, but also on the local landscape character composition within which these elements come together to define a particular sense of place.

3.34 An assessment of the impacts of the proposal on landscape should assess the impacts on any landscapes designated at a national and regional scale. While NatureScot will respond separately to the ECU on landscape and other matters, their draft guidance on assessing the impacts on Special Landscape Qualities of National Scenic Areas should be followed with NatureScot determining which qualities should be scoped in for detailed assessment once the full list of VPs is finalised.

3.35 In addition, any assessments of Special Landscape Areas (SLA) must be undertaken using the SLA citations available from the Council's website, in particular for Strathconon, Monar and Mullardoch SLA, and Ben Wyvis SLA. Given the presence of intervening wind farms and distances, The Council agrees that impacts on other SLAs can be scoped out. The Council considers that special qualities that relate to a sense of wildness, remoteness, and isolation etc., would be impacted by aviation lighting in the hours of darkness and should be included in any such assessment of hours of darkness 'effects'.

3.36 As the heights of the proposed turbines are above 150m, aviation lighting is required. Further advice on aviation lighting is available from NatureScot however generally the impact of aviation lighting on WLAs and SLAs and areas where there would be an expectation of dark skies should be included. THC generally prefers the term 'Hours of Darkness' over 'Night-Time' in recognition of how extensive hours of darkness can be in the Highlands. It is pertinent to the assessment to understand that Hours of Darkness Effects will be visible during people's working day and commuting hours for a significant part of the year and that sensitivities of receptors to these effects must account for this. Therefore, Hours of Darkness VPs should be representative of commutes and communities, as well as Wild Land.

3.37 The residential visual amenity impact on sensitive properties occasioned by a wind farm with turbines of up to 230m tip height beyond 2km is unknown. The Council would suggest that a RVAA is not scoped out of the EIAR at this stage and that sensitive properties including the hotel are subject to a RVAA up to a minimum of 4km from the nearest turbine given the scale of the proposed turbines.

3.38 The Highland Council's Landscape Officer will provide detailed comments as part of the PREMAJ request following the scheduled meeting in January 2025.

Cultural Heritage

3.39 The EIAR needs to identify all designated sites which may be affected by the development either directly or indirectly. This will require you to identify:

- the architectural heritage (Conservation Areas, Listed Buildings);

- the archaeological heritage (Scheduled Monuments);
- the landscape (including designations such as National Parks, National Scenic Areas, Areas of Great Landscape Value, Gardens and Designed Landscapes and general setting of the development; and
- the inter-relationship between the above factors.

3.40 We would expect any assessment to contain a full appreciation of the setting of these historic environment assets and the likely impact on their settings. Where the assessment finds that significant impacts are likely, appropriate visualisations such as photomontage and wireframe views of the development in relation to the sites and their settings should be provided. Visualisations illustrating views both from the asset towards the proposed development and views towards the asset with the development in the background would be helpful.

3.41 Historic Environment Scotland (HES) are anticipated to provide comment on the assessment methodology for heritage assets within their remit including the scope of the assessment and their requirements for supporting information (including visualisations) and the potential impacts on heritage assets in their consultation response.

3.42 The Council's Archaeologist will provide further comments on archaeological matters for the PREMAJ Advice Pack, we therefore suggest that archaeological matters are not scoped out at this stage.

Geology, Hydrology and Hydrogeology (Water Environment)

3.43 The EIAR should include a full assessment on the impact of the development on peat. The assessment of the impact on peat must include peat probing for all areas where development is proposed. The Council are of the view this should include probing not just at the point of infrastructure as proposed by the scheme but also covering the areas of ground which would be subject to micrositing limits.

3.44 SEPA can provide detailed advice on methodology for peat probing and the peat assessment.

3.45 Carbon balance calculations should be undertaken and included within the EIAR with a summary of the results provided focussing on the carbon payback period for the wind farm.

3.46 The EIAR should fully describe the likely significant effects of the development on the local geology including aspects such as borrow pits, earthworks, site restoration and the soil generally including direct effects and any indirect. Proposals should demonstrate construction practices that help to minimise the use of raw materials and maximise the use of secondary aggregates and recycled or renewable materials. Where borrow pits are proposed the EIAR should include information regarding the location, size and nature of

these borrow pits including information on the depth of the borrow pit floor and the borrow pit final reinstated profile. This can avoid the need for further applications.

3.47 The EIAR needs to address the nature of the hydrology and hydrogeology of the site, and of the potential impacts on water courses, water supplies including private supplies, water quality, water quantity and on aquatic flora and fauna. Impacts on watercourses, lochs, groundwater, other water features and sensitive receptors, such as water supplies, need to be assessed. Measures to prevent erosion, sedimentation or discolouration will be required, along with monitoring proposals and contingency plans. Assessment will need to recognise periods of high rainfall which will impact on any calculations of run-off, high flow in watercourses and hydrogeological matters. You are strongly advised at an early stage to consult SEPA as the regulatory body responsible for the implementation of the Controlled Activities (Scotland) Regulations 2005 (CAR), to identify if a CAR license is necessary and the extent of the information required by SEPA to assess any license application.

3.48 If culverting should be proposed, either in relation to new or upgraded tracks, then it should be noted that SEPA has a general presumption against modification, diversion or culverting of watercourses. Schemes should be designed to avoid crossing watercourses, and to bridge watercourses where this cannot be avoided. The EIAR will be expected to identify all water crossings and include a systematic table of watercourse crossings or channelising, with detailed justification for any such elements and design to minimise impact. The table should be accompanied by photography of each watercourse affected and include dimensions of the watercourse. It may be useful for the applicant to demonstrate choice of watercourse crossing by means of a decision tree, taking into account factors including catchment size (resultant flows), natural habitat and environmental concerns. Further guidance on the design and implementation of crossings can be found on SEPA's Construction of River Crossings Good Practice Guide.

3.49 The Council's Flood Risk Management Team had no comments to make at this stage. However, there are a number of watercourses and waterbodies on the site therefore the following applies:

- A minimum of a 50m buffer of all watercourses / bodies and turbines/crane hard-standings, which should be shown on a suitably scaled drawing;
- All tracks should be kept a minimum 10m away from any waterbody except water crossings;
- Access tracks not acting as preferential pathways for runoff and efforts being made to retain existing natural drainage wherever possible;
- Natural flood management techniques should be applied to reduce the rate of runoff where possible; use of SuDS to achieve pre-development runoff rates and to minimise erosion on existing watercourses;
- Water crossings in the form of culverts or bridges, or upgrades to existing crossings must be designed to accommodate to 1 in 200 year flood event, plus climate change;

- Land rising within any floodplain to be avoided; if ultimately required, compensatory storage must be provided; and,

The EIAR should be informed by the Council's Flood Risk and Drainage Impact Assessment SG.

3.50 The need for, and information on, abstractions of water supplies for concrete works or other operations should also be identified. The EIAR should identify whether a public or private source is to be utilised. If a private source is to be utilised, full details on the source and details of abstraction need to be provided.

3.51 The applicant will be required to carry out an investigation to identify any private water supplies, including pipework, which may be adversely affected by the development. A report which includes details of the measures proposed to prevent contamination or physical disruption shall be submitted for the written approval of the Planning Authority. The report should include details of any monitoring prior to, during and following construction and proposals for contingency measures in the event of an incident. Highland Council has some information on known supplies but it is not definitive. An on-site survey will be required.

3.52 It is anticipated that detailed comments will be provided on impacts on the water environment, in particular on buffers to water courses, by SEPA.

Ecology

3.53 The EIAR should provide a baseline survey of the bird and animals (mammals, reptiles, amphibians, etc.) interest on site. It needs to be categorically established what species are present on the site, and where, before a future application is submitted. Further the EIAR should provide an account of the habitats present on the proposed development site. It should identify rare and threatened habitats, and those protected by European or UK legislation, or identified in national or local Biodiversity Action Plans. Habitat enhancement and mitigation measures should be detailed, particularly in respect to blanket bog, in the contexts of both biodiversity conservation and the inherent risk of peat slide (see later). Details of any habitat enhancement programmes (such as native- tree planting, stock exclusion, etc.) for the proposed site should be provided. It is expected that the EIAR will address whether or not the development could assist or impede delivery of elements of relevant Biodiversity Action Plans.

3.54 The developer should undertake a specific peat assessment to inform the siting, design, or other mitigation in order to overcome significant effects on peatland and Carbon Rich Soils, Deep Peat, and Priority Peatland Habitat (CPP). Attention is drawn to paragraph 4.34 on page 24 of the OWESG, which discusses peat and CPP. We also expect an up-to-date National vegetation Classification (NVC) survey and a commitment to undertake peatland restoration on an area of increased size to that of the application site. The Environmental

Impact Assessment Report (EIAR) should provide details of all direct, indirect, permanent, and temporary impacts to any bog habitat present on the site.

3.55 The EIAR should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development. It should provide proposals for any mitigation that is required to avoid these impacts or to reduce them to a level where they are not significant. NatureScot can also provide specific advice in respect of the designated site boundaries for SACs and SPAs and on protected species and habitats within those sites. The potential impact of the development proposals on other designated areas such as SSSI's should be carefully and thoroughly considered and, where possible, appropriate mitigation measures outlined in the EIAR. NatureScot provide advice on the impact on designated sites.

3.56 If wild deer are present or will use the site an assessment of the potential impact on deer will be required. This should address deer welfare, habitats, and other interests.

3.57 The EIAR needs to address the aquatic interests within local watercourses, including downstream interests that may be affected by the development, for example increases in silt and sediment loads resulting from construction works; pollution risk / incidents during construction; obstruction to upstream and downstream migration both during and after construction; disturbance of spawning beds / timing of works; and other drainage issues. The EIAR should evidence consultation input from the local fishery board(s) where relevant.

3.58 The EIAR should include a map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems (GWDTE) and buffers, these habitats are easily damaged by insensitive drainage.

3.59 NPF4's commitment to deliver positive effects for biodiversity through development. Policy 3 states that, 'Development proposals for national, major and of EIA development should only be supported where it can be demonstrated that the proposal will conserve and enhance biodiversity, including nature networks within and adjacent to the site, so that they are in a demonstrably better state than without intervention, including through future management.' A draft or outline Habitat Management Plan (HMP) and Species Protection Plan (SPP) should be produced as part of the EIA, including any proposals for mitigation and enhancement in relation to important habitats and species. Any compensatory planting plans should be carefully considered and included in the HMP. The HMP should include a comprehensive monitoring programme for all habitat improvements, and breeding birds on the site. Remote sensing using radar or infra-red cameras should be considered, to help inform future development and decision making within the industry with regards to eagles. Lastly, the HMP (or other document) should also include a protocol for reporting collisions to NatureScot.

3.60 NatureScot's Developing with Nature guidance has been prepared, in discussion with Scottish Government, to support major development applications. It sets out a number of common measures to enhance biodiversity. For national, major and EIA developments,

more detailed assessment and more ambitious measures are likely to be required. The applicant should explore and identify opportunities for biodiversity enhancement as early as possible, including through discussion with key stakeholders. Within the EIA report, information on predicted losses, proposed compensation and delivery of additional positive effects should be clearly summarised. The information must be sufficient to allow the consenting authority and relevant stakeholders to see clearly how effects will be addressed, and compensation and enhancement delivered. Developers may wish to consider the simple template at Annex C of the Developing with Nature guidance.

https://www.nature.scot/doc/developing-nature-guidance#annex-c

Ornithology

3.61 The presence of Schedule 1 Birds and qualifying interests of Special Protected Areas and other areas designated for aviary interests must be included and considered as part of the planning application process; not as an issue that can be considered at a later stage. Any consent given without due consideration to these species may breach European Directives with the possibility of consequential delays or the project being halted by the EC. Please refer to any comments from NatureScot and RSPB in this respect.

3.62 An assessment of the impacts to birds through collision, disturbance, and displacement from foraging / breeding / roosting habitat will be required for both the proposed development site and cumulatively with other proposals. The EIAR should be clear on the survey methods and any deviations from guidance on ornithology matters.

Noise

3.63 The scoping report has identified that the following matters should be scoped out:

- Decommissioning noise
- Vibration
- Low-frequency noise
- Amplitude modulation

The Highland Council's Environmental Health Team consider that operational vibration, infrasound, and low frequency noise can be scoped out from further assessment. Further detailed comments have been provided in their consultation response.

Operational Noise

3.64 The applicant must submit a noise assessment with regard to the operational phase of the development. The assessment should be carried out in accordance with ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and the associated Good Practice Guide published by the Institute of Acoustics.

3.65 The target noise levels are either a simplified standard of 35dB LA90 at wind speeds up to 10m/s or a composite standard of 35dB LA90 (daytime) and 38dB LA90 (night time) or up to 5dB above background noise levels at up to 12m/s. Should a higher daytime noise limit be sought, the application will require to be accompanied by a supporting argument to justify the choice as described in ETSU-R-97. The night time lower limit of 43dB LA90 as suggested in ETSU is not considered acceptable in many areas of the highlands due to very low background levels.

These limits would apply to cumulative noise levels from more than one development. However, where existing development has consented limits that result in theoretical cumulative levels already being higher than suggested above, the applicant should agree appropriate limits with the Council's Environmental Health Officer.

Cumulative Noise

3.66 The noise assessment must take into account the potential cumulative effect from any other existing or consented or, in some cases, proposed wind turbine developments. Where applications run concurrently, developers and consultants are advised to consider adopting a joint approach with regard to noise assessments. The noise assessment must take into account predicted and consented levels from such developments. The good practice guide offers guidance on how to deal with cumulative issues. Where existing development has consented limits higher than suggested above, the applicant should agree appropriate limits with the Council's Environmental Health Officer.

3.67 The assessment should include a map showing all wind farm developments which may have a cumulative impact and all noise sensitive receptors including any for which a financial involvement relaxation is being claimed. There may be some receptors where a relaxation of noise limits has been applied due to the occupier having a financial involvement with a previous wind farm development. It is not necessarily the case that the relaxation will extend to other developments. The assessment should also include a table of figures which includes the following:

- The predicted levels from this development based at each noise sensitive location (NSL) at wind speeds up to 12m/s.
- The maximum levels based on consented limits from each existing or consented wind farm development at each NSL. If any reduction is made for controlling property or another reason, this should be made clear.
- The predicted levels from each existing or consented wind farm development at each NSL.
- The cumulative levels based on consented and predicted levels at each NSL.

The assessment should also include a mitigation scheme to be implemented should noise levels from the development be subsequently found to exceed consented levels.

Noise Exposure

3.68 When assessing the cumulative impact from more than one wind farm, consideration must be given to any increase in exposure time. Regardless of whether cumulative levels can meet relevant criteria, if a noise sensitive property subsequently becomes affected by wind turbine noise from more than one direction this could result in a significant loss of respite.

Background Noise Measurements

3.69 If background noise surveys are required, these should be undertaken in accordance with ETSU-R-97 and the Good Practice Guide. It is recommended that monitoring locations be agreed with the Council's Environmental Health Officer. Where a monitoring location is to be used as a proxy location for another property, particular care must be taken to ensure it is not affected by other noise sources such as boiler flues, wind chimes, etc. which are not present at that other property.

3.70 Difficulties can arise where a location is already subject to noise from an existing wind turbine development. ETSU states that background noise must not include noise from an existing wind farm. The GPG offers advice on how to approach this problem and in some cases, it may be possible to utilise the results from historical background surveys.

3.71 It is recommended that the developer's noise consultant liaises with Environmental Health at an early stage to discuss any issues regarding the proposed methodology.

Amplitude Modulation

3.72 Research has been carried out in recent years on the phenomenon of amplitude modulation arising from some wind turbine developments. However at this time, the Good Practice guide does not provide definitive Planning guidance on this subject. That being the case, any complaints linked to amplitude modulation would be investigated in terms of the Statutory Nuisance provisions of the Environmental Protection Act 1990.

Construction Noise

3.73 Given the separation distances to noise sensitive receptors, it is unlikely that a detailed construction noise assessment will be required in relation to work at the turbine sites however, construction traffic and any access track works are likely to be closer to receptors and this may require detailed assessment.

3.74 Planning conditions are not used to control the impact of construction noise as similar powers are available to the Local Authority under Section 60 of the Control of Pollution Act 1974. Generally, people are tolerant of construction noise during typical working hours which are taken to be 8am to 7pm Monday to Friday and 8am to 1pm on Saturdays. Works for which noise is inaudible at the curtilage of any noise sensitive property could still be carried out out-with these times.

3.75 If the applicant intends to undertake audible work out-with the aforementioned times, they will be required to submit a detailed construction noise assessment for the written approval of the planning authority. For the avoidance of doubt, this would include any proposal to run compound generators overnight for the purposes of lighting or drying of PPE etc. The assessment should include:

1. A description of construction activities with reference to noise generating plant and equipment.
2. A detailed plan showing the location of noise sources, noise sensitive premises and any survey measurement locations.
3. A description of any noise mitigation methods that will be employed and the predicted effect of said methods on noise levels.
4. A prediction of noise levels resultant at the curtilage of noise sensitive receptors.
5. An assessment of the predicted noise levels in comparison with relevant standards.

3.76 Regardless of whether a construction noise assessment is required, it is expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The applicant will be required to submit a scheme demonstrating how this will be implemented. Particular attention should be given to the use of tonal reversing alarms and ground compaction plant which are often the most intrusive noise generating elements of a large construction project.

Substations and Battery Energy Storage Systems

3.77 If the application includes a proposal for a sub-station or a Battery Energy Storage System, a separate noise assessment may be required to demonstrate that noise will meet the following standards:

- Noise arising from within the operational land of the sub-station/battery storage site, when measured and/or calculated as an LZeq, 5min, in the 100Hz one third octave frequency band must not exceed 30 dB, at noise sensitive premises (in the case of BESS sites, this requirement may be waived if it can be demonstrated that the noise has no tonal element)
- The Rating Level of noise arising from the use of plant, machinery or equipment installed or operated within the operational land of the sub-station, must not exceed the current background noise levels at noise sensitive premises. The Rating Level should be calculated in accordance with BS 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

Noise from sub-stations and battery sites would not normally be considered cumulatively with wind farms.

Traffic and Transport

3.78 Transport Planning have provided comments on the transport related information submitted in the Scoping Report including the scope of the assessment and their requirements for supporting information in their consultation response.

3.79 A Transport Assessment (TA), Construction Traffic Management Plan (CTMP) and an Abnormal Load Assessment will be required within the EIAR. The Transport Assessment Methodology below sets out what the Council requires and further information is provided in our published Roads and Transport Guidelines for New Developments. When establishing a scope for the assessment consideration should be given to the use of the public roads in this area can be influenced significantly by tourist traffic.

3.80 We noted the intention for the assessment of environmental impacts from the predicted traffic associated with the construction of this development will follow the principles set out in the Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Traffic and Movement. The document references the edition published in 1993, which we understand has now been superseded. Any such use of the above should adhere with the latest published version of that document.

The approach set out in the IEMA does not include any requirement to assess the existing local public road networks condition and capability to physically and safely accommodate the predicted traffic impacts, whilst remaining safe for other road users. This will be required and should be done for all construction and operational traffic, not just abnormal loads (AILs). Such an approach should be contained within a supporting additional Transport Assessment (TA) document.

3.81 Regarding quantifying the scale of traffic impacts and the intention in the EIA to use Rule 1 (30% increase in all and HGV traffic) and Rule 2 (10% increase in all and HGV traffic at high sensitivity locations) from the IEMA Guidelines, we will require any single-track roads with passing places impacted by this proposed development to be identified as high sensitivity as defined by Rule 2. This reflects the sensitivity of such routes to changes in the quantum and nature of traffic flows along them.

3.82 The A831, which would need to provide connection to the proposed point of access for the development, is not formally recognised as a route capable in its current form of physically or safely accommodating quantities of large heavy commercial goods vehicles, or abnormal loads (AIL's). The Timber Transport Forum has designated the route as a "Consultation Route" meaning that the route is not up to agreed standards to be used for transporting timber. This would also be the case for the large standard commercial goods vehicles and AILs that this proposed development would generate. Therefore, any assessment of that route will need to recognise that physical improvements will be required alongside suitable traffic management measures.

Also, the nature of the A831 changes along its length, with the southern section being less suited to accommodating larger commercial goods vehicles. We would therefore expect any submission to demonstrate their intention to avoid routing commercial goods vehicles associated with this development from the south via Cannich.

3.83 Whilst there is reference to the port of entry for turbine components being Invergordon, the report says that this is still to be clarified, as is the routing of such loads between the port and the site. It should be noted that no AIL's should be routed across the Lovat Bridge carrying the A862 over the River Beauly until suitable detailed inspections and structural assessments have been undertaken and accepted by Highland Council Structures Team. It's our understanding that such inspections will need to include diving surveys of the existing bridge piers and foundations within the river to check for scour damage.

3.84 When considering the routing of AIL's to this development site, we recommend that early engagement is had with our Structures Team. They can be contacted through the generic Email address structures@highland.gov.uk . Similarly, early engagement should be had with The Councils Abnormal Load Team. Again, they can be contacted through the generic Email address abnormal.loads@highland.gov.uk .

3.85 We noted the intention to gather traffic flow data for existing routes and use that in the environmental assessment to compare changes as a result of the proposed development. Given that the construction working hours and vehicle movements for this development are likely to be between restricted on a typical working day (possibly 07:00 and 19:00), Annual Average Daily Flows (AADF) information should not be used for comparison purposes. 12-hour average flows should be used for the period 07:00 – 19:00. Using AADF would simply lessen the scale of change that the development will be generating during the working day.

3.86 Any assessment done of the impacts of traffic from this development will need to take into account the cumulative impacts from other developments that may come forward during the proposed construction of this new facility. Highland Council Planning Service will need to clarify what those potential developments could be.

When calculating the predicted quantum and profile of construction traffic likely to be generated by the proposed development, this should also include the likely traffic generated by the felling and removal of any trees required for the delivery of this development.

3.87 Any assumptions made about the sourcing of materials from borrow pits within or close to the development site, along with the batching of concrete on site and the movement of the workforce to and from the development site should be clearly set out and justified in any submission made. If there is an intention to reduce traffic numbers by suggesting gravel materials can be sourced on site, we would expect appropriate ground investigation works to have been done justifying that there are suitable such materials that can be won. If such investigations are not undertaken, we would expect the traffic impacts to have assessed the worst case scenario of such materials needing to be imported.

3.88 The TA required in support of any application will need to justify the adequacy of any temporary or permanent points of construction and ongoing operational access proposed from the local public road network. This will include justifying the adequacy of visibility splays, which may require traffic speed data for those sections of public road impacted. The layout and construction form of all accesses will also need to be clarified and their

suitability justified. We would also expect any submission to justify why each individual new permanent access needs to be retained and if so, in what form.

3.89 The submission suggests that an existing estate access from the A831 near to Erchless Castle will provide the construction and ongoing operational access for this development. This will require careful consideration of achievable visibility splays from that access in both directions along the A831. It is our understanding that visibility splays may be restricted by the local topography and road alignment, with may require extensive improvements. If the requirements from Table 5.5 from our published Roads and Transport Guidelines for New Developments cannot be met from a 4.5m setback within the mouth of the proposed access, using 85%'ile speed data gathered at that location from suitable traffic count data, then more suitable alternative access arrangements may be required.

Transport Assessment Methodology

3.90 Transport Planning would expect a Transport Assessment to be submitted with any future planning application and a High National Traffic Forecast be applied. The information below is not exhaustive and should be used as a guide to submitting all relevant information in relation to roads, traffic and transportation matters arising from the development proposals.

1. Identify all public roads affected by the development. In addition to transporting major turbine components, this should also include routes to be used by local suppliers and the workforce.
2. Set out the existing nature and condition of these public roads. This should include:

- The road name and number, where applicable.
- Road widths, including any pinch points.
- The nature of their horizontal and vertical alignments, including any known steep gradients.
- The location and condition of existing passing places on single track roads.
- An assessment of the carriageway strength including, where necessary, construction depths and road formation where there is likely to be significant proposed impacts. This may include the need for non-destructive testing and sampling as required to determine the carriageway construction and strength. This work should be undertaken by a suitably capable and qualified consulting engineer acceptable to the Council.
- The location and nature of any structures either spanning or supporting the roads, including a description of their nature (eg bridge, culvert etc), any width, height or weight restrictions and where necessary, an assessment of their load carrying capability. This work should be undertaken by a suitably capable & qualified consulting engineer acceptable to the Council.

- The nature and quantum of properties serviced by the roads. In addition to the quantum of residential properties, specific recognition should be made of any schools, businesses or other community facilities serviced by these roads.
- The nature and quantum of existing traffic flows on these roads. This should include reference to how often the roads are used by school or commercial bus services, refuse vehicles and whether the routes are used by pedestrians, cyclists and equestrians.

3. Identify the anticipated impacts from the proposed development, including any cumulative impacts from other developments likely to be happening at the same time as your development. These impacts should include:

- The quantum of new traffic impacting on these roads. This should cover:

  o numbers of light and heavy vehicles

  o numbers of abnormal loads

  o profiles of anticipated new traffic movements throughout the duration of the works

- Any impacts to existing carriageways, structures, verges or other aspects of these public roads. This should include information on swept paths and gradient analysis where it is envisaged that the passage of traffic could be problematic.
- The location of any new or changes to existing accesses off these public roads to be used for accessing this development. This should include the extent of existing visibility from each of these accesses onto the public roads.
- Any impacts or restrictions needing to be imposed on existing road users.
- Any impacts or restrictions needing to be imposed on adjacent properties or local communities serviced by these public roads.

4. Set out the proposed mitigation measures needed to tackle the anticipated impacts set out above. This should include:

- The location and nature of any carriageway widening or strengthening.
- Visibility improvements at access points and along the public roads forming access routes.
- The location and nature of any strengthening or widening needed to existing structures.
- The provision of new or enhanced passing places on single track roads.
- Road safety measures to manage the impacts of any identified road safety concerns.
- Traffic management proposals for the construction and ongoing operation of the facility.

5. Any residual effects on the road network and its users following implementation of the proposed mitigation and any actions proposed associated with those residual effects.

Construction Traffic Management Plan

3.91 THC Transport Planning will require any application for planning permission associated with this proposal to submit a CTMP for the approval of the Planning Authority. A CTMP will normally detail the following issues, however this is not an exhaustive list and the CTMP should be tailored to reflect the issues pertinent to this development:

- Identification of all Council maintained roads likely to be affected by the various stages of the development,
- Predicted volume, type and duration of construction traffic.
- Location of site compound, staff parking and visitor parking.
- Proposed measures to mitigate the impact of general construction traffic and abnormal loads on the local road network following detailed assessment of relevant roads.
- Details of any traffic management signage required for the duration of the construction period.
- Measures to ensure that all affected public roads are kept free of mud and debris arising from the development.
- The developer may also be requested to enter into a Section 96 agreement with the Highland Council to cover any abnormal wear and tear to the Council roads. This will include a requirement for pre and post construction surveys to be undertaken and agreed with the Council and for the provision of a suitable bond.
- If the development involves any abnormal loads a detailed protocol, route and delivery programme will be required and agreed with any interested parties such as Highland Council, the Police, Transport Scotland, and community representatives. The protocol shall identify any requirement for convoy working and/or escorting of vehicles and include arrangements to provide advance notice of abnormal load movements in the local media.

Detailed Junction Design

3.92 Details of any new site access should be clearly set out on dimensioned drawings related to OS data and include confirmation of geometry, construction form, drainage details to prevent water running out onto the public road and evidence that appropriate visibility splays can be achieved. Vehicle swept paths should also be provided to evidence that the proposed junction form will be suitable for its intended use. Details of reinstatement of any temporary site access at its junction with the public road, post construction is also required. Appropriate junction arrangements and visibility splay information can be found in THC's published Roads and Transport Guidelines for New Developments.

3.93 The scoping report has identified that the following matters should be scoped out:

- Operational traffic

Operational traffic can be scoped out from further assessment. Although the Transport Planning Team have no objection to this approach, they will expect any submission to clarify the likely quantum and profile of operational traffic levels due to be generated by the finished development to justify such an approach.

Socio-Economic, Tourism and Recreation

3.94 We consider that Socio-Economic, Tourism and Recreational impacts should be considered even if this is separate to the EIAR to ensure that these matters are appropriately addressed. The assessment should estimate who may be affected by the development, in all or in part, which may require individual households to be identified, local communities or a wider socio economic groupings such as tourists and tourist related businesses, recreational groups, economically active, etc. The application should include relevant economic information connected with the project, including the potential number of jobs, and economic activity associated with the procurement, construction, operation and decommissioning of the development. In this regard wind farm development experience in this location should be used to help set the basis of likely impact. This should set out the impact on the regional and local economy, not just the national economy. Any mitigation proposed should also address impacts on the regional and local economy.

Public Access

3.95 The proposal has potential to significantly impact the full breadth of public access types, including wider access rights, promoted trails, 2 recorded public rights of way and 1 unrecorded public right of way.

3.96 The site is on land with access rights provided by the Land Reform Scotland Act. The potential impact on and mitigation for public access should be assessed incorporating core paths, public rights of way, long distance routes, other paths and wider access rights across the site. While the Scoping Report and an eventual EIA may include impacts on elements of outdoor access assessed under other headings, THC's Access Officer considers that all the impacts on outdoor access should all be brought together here in a comprehensive assessment of the proposals visual and physical impacts on outdoor access during the preparatory, construction, operational and post-operational phases. Guidance on assessing that impact as part of an EIA in Appendix 6 of this document:

https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf

3.97 Those impacts, along with the mitigation measures, will inform an Access Management Plan which is required to be submitted as part of the EIAR and an assessment of the

development's impact on public access included within this Socio Economic section of the EIAR as per the requirements of HwLDP Policy 77 Outdoor Access.

3.98 As a point to note, any retained or planned gates should have a pass gate installed by them to accommodate walkers, cyclists and horse riders with an internal width of at least 1.5m – kissing gates are unacceptable.

Aviation, Radar and Telecoms

3.99 The EIAR needs to recognise community assets that are currently in operation for example TV, radio, tele-communication links, aviation interests including radar, MOD safeguards, etc. In this regard the applicant, when submitting a future application, will need to demonstrate what interests they have identified and the outcomes of any consultations with relevant authorities such as Ofcom, NATS, BAA, CAA, MOD, Highlands and Islands Airports Ltd, etc. through the provision of written evidence of concluded discussions / agreed outcomes. We consider the results of these surveys should be contained within the EIAR to determine whether any suspensive conditions are required in relation to such issues.

3.100 There should be continued dialogue with HIAL over the impact on the radar at airports in the area.

3.101 If there are no predicted effects on communication links as a result of the development, the EIAR should still address this matter by explaining how this conclusion was reached.

Miscellaneous: Health and Safety and Shadow Flicker

3.102 The EIAR needs to address all relevant climatic factors which can greatly influence the impact range of many of the preceding factors on account of seasonal changes affecting, rainfall, sunlight, prevailing wind direction etc. From this base data information on the expected impacts of any development can then be founded recognising likely impacts for each phases of development including construction, operation and decommissioning. Issues such as dust, air borne pollution and / or vapours, noise, light, shadow-flicker can then be highlighted. Consideration must also be given to the potential health and safety risks associated with lightning strikes and ice throw given the proximity of recreational routes through the site.

3.103 Depending on the proximity of works to receptors, the applicant may be required to submit a scheme for the suppression of dust during construction. Particular attention should be paid to construction traffic movements and routing.

3.104 A number of the aforementioned matters could be addressed by a CEMD for the proposal. While acceptable in principle we would request that an Outline CEMD is included with the application.

3.105 The scoping report has identified that the following matters should be scoped out:

- air quality (with the potential exception of dust)
- natural disasters
- Human health

The Highland Council have no comments to make on these above matters.

Forestry

3.106 The Highland Council's Forestry Officer has provided comments on the forestry related information submitted in the Scoping Report including the scope of the assessment and their requirements for supporting information in their consultation response.

3.107 In the Scoping Report it is noted "that the habitats within the site were mapped using Phase 1 Habitat Survey and the National Vegetation Classification (NVC) system" and there are Habitat survey results drawings (Figures 8.3a, b and c). Where trees or woodland are identified in Habitat survey drawings, further tree survey will be required.

3.108 Within the access track corridor there are relatively small area of woodland which are listed in the Ancient Woodland Inventory as Long-established plantation origin (LEPO1860).

3.109 An ES is required which should include a baseline survey of all the woodlands, trees and plants (including fungi, lichens and bryophytes) present on the site to determine the presence of any rare or threatened species. This could be a specific Forestry Chapter by a professional forester which identifies the location, area, type and condition of all productive and native woodland on and around the access route.

3.110 A breakdown of the impact of the proposals on woodland by type (productive, native or both) should be provided, as well as making clear the likely impact on woodland listed in the AWI under the various categories and also provide confirmation of the impact on native woodland listed in the NWSS.

3.111 The layout should be designed to minimise the impact on woodland as much as possible and in particular, the adverse impact on native broadleaf woodland and woodland listed on the AWI as ASNO should be minimised. The ES should include Tree Constraints Plans and Tree Protection Plans to BS 5837:2012 to show how retained trees/ woodland would be safeguarded from construction activity as well as a tree/ woodland removal drawing which shows the extent of woodland that would need to be removed to accommodate new development.

3.112 A Landscape Plan and Landscape Maintenance Plan should be provided to show how trees to be removed are to be replaced with on-site planting and to show how the visual amenity of the local landscape is to be enriched.

3.113 Where woodland is proposed to be removed, compliance with the Scottish Government's Control of Woodland Removal policy must be demonstrated. Where there are any proposals for woodland removal, compensatory planting of an area of new woodland, of a scale and type of woodland equivalent to that which is to be removed will be required.

4.0 Significant Effects on the Environment

4.1 Leading from the assessment of the environmental elements the EIAR needs to describe the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

- the existence of the development;
- the use of natural resources; and
- the emission of pollutants, the creation of nuisances and the elimination of waste.

4.2 The potential significant effects of development must have regard to:

- the extent of the impact (geographical area and size of the affected population);
- the trans-frontier nature of the impact;
- the magnitude and complexity of the impact;
- the probability of the impact; and
- the duration, frequency and reversibility of the impact.

4.3 The effects of development upon baseline data should be provided in clear summary points.

4.4 The Council requests that when measuring the positive and negative effects of the development a four point scale is used advising any effect to be either strong positive, positive, negative or strong negative.

4.5 The applicant should provide a description of the forecasting methods used to assess the effects on the environment.

5.0 Mitigation

5.1 Consideration of the significance of any adverse impacts of a development will of course be balanced against the projected benefits of the proposal. Valid concerns can be overcome or minimised by mitigation by design, approach or the offer of additional features, both on and off site. A description of the measures envisaged to prevent, reducing and where possible offset any significant adverse effects on the environment must be set out within the EIAR statement and be followed through within the application for development.

5.2 The mitigation being tabled in respect of a single development proposal can be manifold. Consequently the EIAR should present a clear summary table of all mitigation measures associated with the development proposal. This table should be entitled draft Schedule of Mitigation. As the development progresses to procurement and then implementation this carries forward to a requirement for a Construction Environmental Management Document (CEMD) and then Plan (CEMP) which in turn will set the framework for individual Construction Method Statements (CMS). Further guidance can be obtained at:

http://www.highland.gov.uk/NR/rdonlyres/485C70FB-98A7-4F77-8D6B-ED5ACC7409C0/0/construction_environmental_management_22122010.pdf

This is currently under review by a working party led by SEPA working through Heads of Planning Scotland but for the time being remains relevant.

5.3 The implementation of mitigation can often involve a number of parties other than the developer. In particular local liaison groups involving the local community are often deployed to assist with phasing of construction works – abnormal load deliveries, construction works to the road network, borrow pit blasting. It should be made clear within the EIAR or supporting information accompanying a planning application exactly which groups are being involved in such liaison, the remit of the group and the management and resourcing of the required effort.

If you would like to discuss this scoping response please contact the Planning Authority using the details at the end of this response.

Yours sincerely

Mark Fitzpatrick
Principal Planner – Strategic Projects Team
The Highland Council

Consultee Comments for Planning Application 24/04177/SCOP

Application Summary

Application Number: 24/04177/SCOP
Address: Land 6260M NE Of Erchless Forest Cottage Struy Beauly
Proposal: Scoping request for Ballach Wind Farm - Erection and Operation of a Wind Farm for a period of 35 years, comprising 36 turbines with a maximum blade tip height of 200m and 230m, along with a battery energy storage system (BESS) and ancillary infrastructure
Case Officer: Laura May

Consultee Details

Name: Mr Stewart Eastaugh
Address: The Highland Council Headquarters, Glenurquhart Road, Inverness IV3 5NX
Email: Not Available
On Behalf Of: Access Officer

Comments

Dear Laura,

There needs to be a re-assessment of this proposal's potential impact on public access.

Almost the full breadth of public access types could be signficantly affected here including wider access rights, promoted trails, 2 recorded public rights of way and 1 unrecorded public right of way.

To ensure that the proposal's potential impact on public access is adequately assessed, managed and mitigated I recommend that the EIA include an assessment delivered along the lines in NatureScot's handbook on the subject.

Regards,

Stewart

The Highland Council
Comhairle na Gàidhealtachd

FORESTRY TEAM

Consultation Response

Application Name	Ballach Wind Farm – 36 turbines, battery energy storage scheme (BESS) and ancillary infrastructure, NE of Erchless Forest Cottage, Struy, Beauly
Planning Reference	24/04177/SCOP
Planning Case Officer	Laura May
Date of Response	6/11/24

The Site

I have not had a chance to visit the site since being consulted but have compared the proposals against our scaled aerial photography and would offer the following comments.

The proposed turbine development is located within largely open hill ground where there doesn't appear to be any significant areas of woodland. However, the access track from the A831 public road to the site passes through what appears to be significant areas of woodland comprising productive conifer woodland (from recent planting to mature), areas of conifer clear-fell and patches of mature upland birchwood. There also appears to be small areas of riparian woodland around the Allt Liath. There is no indication at this stage where the battery energy storage scheme (BESS) is propose to be located.

In the Scoping Report it is noted "that the habitats within the site were mapped using Phase 1 Habitat Survey and the National Vegetation Classification (NVC) system" and there are Habitat survey results drawings (Figures 8.3a, b and c). Where trees or woodland are identified in Habitat survey drawings, further tree survey will be required.

Within the access track corridor there are relatively small area of woodland which are listed in the Ancient Woodland Inventory as Long-established plantation origin (LEPO1860).

Policy

NPF4 Policy 6 b) notes that "Development proposals will not be supported where they will result in: i. Any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition; ii. Adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value… iii. Fragmenting or severing woodland habitats, unless appropriate mitigation measures are identified and implemented in line with the mitigation hierarchy."

NPF4 Policy 6 c) notes that "Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered".

The Proposals

The applicant has provided a Scoping Report and an Indicative Scoping Layout showing access corridor and turbine layout.

It appears that there is an existing access track from the public road, but they don't look adequate. It is noted in that "Access to the site will be taken form the A831 to the south of the site, where the existing site tracks will be upgraded to accommodate access." However, there are no further details.

Section 4.9 of the Scoping Report indicates other construction works including site compounds, storage areas, office facilities and energy storage compound, but at this stage, there is no indication of the location or scale of associated development.

Recommendations

The applicant will need to provide an ES which includes a baseline survey of all the woodlands, trees and plants (including fungi, lichens and bryophytes) present on the site to determine the presence of any rare or threatened species. This could be a specific Forestry Chapter by a professional forester which identifies the location, area, type and condition of all productive and native woodland on and around the access route.

The applicant will also need to provide a breakdown of the impact of the proposals on woodland by type (productive, native or both), as well as making clear the likely impact on woodland listed in the AWI under the various categories and also provide confirmation of the impact on native woodland listed in the NWSS.

The applicant should design the layout to minimise the impact on woodland as much as possible and in particular, the adverse impact on native broadleaf woodland and woodland listed on the AWI as ASNO should be minimised. The ES should include Tree Constraints Plans and Tree Protection Plans to BS 5837:2012 to show how retained trees/ woodland would be safeguarded from construction activity as well as a tree/ woodland removal drawing which shows the extent of woodland that would need to be removed to accommodate new development.

The applicant will also need to provide a Landscape Plan and Landscape Maintenance Plan which shows how trees to be removed are to be replaced with on-site planting and to show how the visual amenity of the local landscape is to be enriched.

Where woodland is proposed to be removed, compliance with the Scottish Government's Control of Woodland Removal policy must be demonstrated. Where there are any proposals for woodland removal, compensatory planting of an area of new woodland, of a scale and type of woodland equivalent to that which is to be removed will be required.

Name	Forestry Team

The Highland Council
Comhairle na Gàidhealtachd

Scoping Application
Environmental Health Response

Planning Ref:	24/04177/SCOP
Proposal Name	Ballach Wind Farm
Your Organisation	Highland Council
Your Name	Robin Fraser
Your Position	Environmental Health Officer
Email	Robin.fraser@highland.gov.uk
Date	15 October 2024

Response
Topic Amenity - Noise - Operational

Operational Noise

The applicant will be required to submit a noise assessment with regard to the operational phase of the development. The assessment should be carried out in accordance with ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and the associated Good Practice Guide published by the Institute of Acoustics.

The target noise levels are either a simplified standard of 35dB LA90 at wind speeds up to 10m/s or a composite standard of 35dB LA90 (daytime) and 38dB LA90 (night time) or up to 5dB above background noise levels at up to 12m/s. Should a higher daytime noise limit be sought, the application will require to be accompanied by a supporting argument to justify the choice as described in ETSU-R-97. The night time lower limit of 43dB LA90 as suggested in ETSU is not considered acceptable in many areas of the highlands due to very low background levels.

These limits would apply to cumulative noise levels from more than one development. However, where existing development has consented limits that result in theoretical cumulative levels already being higher than suggested above, the applicant should agree appropriate limits with the Council's Environmental Health Officer.

Cumulative Noise

The noise assessment must consider the potential cumulative effect from any other existing or consented or, in some cases, proposed wind turbine developments. Where applications run concurrently, developers and consultants are advised to consider adopting a joint approach regarding noise assessments. The noise assessment must take into account predicted and consented levels from such developments. The good practice guide offers guidance on how to deal with cumulative issues.

The assessment should include a map showing all wind farm developments which may have a cumulative impact and all noise sensitive receptors including any for which a financial

involvement relaxation is being claimed. There may be some receptors where a relaxation of noise limits has been applied due to the occupier having a financial involvement with a previous wind farm development. It is not necessarily the case that the relaxation will extend to other developments.

The assessment should include a table of figures which includes the following: -

- The predicted levels from this development based at each noise sensitive location (NSL) at wind speeds up to 12m/s
- The maximum levels based on consented limits from each existing or consented wind farm development at each NSL. If any reduction is made for controlling property or another reason, this should be made clear.
- The predicted levels from each existing or consented wind farm development at each NSL.
- The cumulative levels based on consented and predicted levels at each NSL.

The assessment should also include a mitigation scheme to be implemented should noise levels from the development be subsequently found to exceed consented levels.

Noise Exposure

When assessing the cumulative impact from more than one wind farm, consideration must be given to any increase in exposure time. Regardless of whether cumulative levels can meet relevant criteria, if a noise sensitive property subsequently becomes affected by wind turbine noise from more than one direction this could result in a significant loss of respite.

Background Noise Measurements

If background noise surveys are required, these should be undertaken in accordance with ETSU-R-97 and the Good Practice Guide. It is recommended that monitoring locations be agreed with the Council's Environmental Health Officer. Where a monitoring location is to be used as a proxy location for another property, particular care must be taken to ensure it is not affected by other noise sources such as boiler flues, wind chimes, etc. which are not present at that other property.

Difficulties can arise where a location is already subject to noise from an existing wind turbine development. ETSU states that background noise must not include noise from an existing wind farm. The GPG offers advice on how to approach this problem and in some cases, it may be possible to utilise the results from historical background surveys.

It is recommended that the developer's noise consultant liaises with Environmental Health at an early stage to discuss any issues regarding the proposed methodology.

Amplitude Modulation

Research has been carried out in recent years on the phenomenon of amplitude modulation arising from some wind turbine developments. However at this time, the Good Practice guide does not provide definitive Planning guidance on this subject. That being the case, any complaints linked to amplitude modulation would be investigated in terms of the Statutory Nuisance provisions of the Environmental Protection Act 1990.

Operational vibration, infrasound, and low frequency noise can be scoped out from further assessment.

Construction Noise

Given the separation distances to noise sensitive receptors, it is unlikely that a detailed construction noise assessment will be required in relation to work at the turbine sites however, construction traffic and any access track works are likely to be closer to receptors and this may require detailed assessment.

Planning conditions are not used to control the impact of construction noise as similar powers are available to the Local Authority under Section 60 of the Control of Pollution Act 1974. Generally, people are tolerant of construction noise during typical working hours which are taken to be 8am to 7pm Monday to Friday and 8am to 1pm on Saturdays. Works for which noise is inaudible at the curtilage of any noise sensitive property could still be carried out out-with these times.

If the applicant intends to undertake audible work out-with the aforementioned times, they will be required to submit a detailed construction noise assessment for the written approval of the planning authority. For the avoidance of doubt, this would include any proposal to run compound generators overnight for the purposes of lighting or drying of PPE etc.

The assessment should include: -

1) A description of construction activities with reference to noise generating plant and equipment.

2) A detailed plan showing the location of noise sources, noise sensitive premises and any survey measurement locations.

3) A description of any noise mitigation methods that will be employed and the predicted effect of said methods on noise levels.

4) A prediction of noise levels resultant at the curtilage of noise sensitive receptors.

5) An assessment of the predicted noise levels in comparison with relevant standards.

Regardless of whether a construction noise assessment is required, it is expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The applicant will be required to submit a scheme demonstrating how this will be implemented.

Sub-stations & Battery Storage
If the application includes a proposal for a sub-station or a Battery Energy Storage System, a separate noise assessment may be required to demonstrate that noise will meet the following standards: -

- Noise arising from within the operational land of the sub-station/battery storage site, when measured and/or calculated as an LZeq, 5min, in the 100Hz one third octave frequency band must not exceed 30 dB, at noise sensitive premises (*in the case of BESS sites, this requirement may be waived if it can be demonstrated that the noise has no tonal element*)

- The Rating Level of noise arising from the use of plant, machinery or equipment installed or operated within the operational land of the sub-station, must not exceed the current background noise levels at noise sensitive premises. The Rating Level should be calculated in accordance with BS 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

Noise from sub-stations and battery sites would not normally be considered cumulatively with wind farms.

Dust
Depending on the proximity of works to receptors, the applicant may be required to submit a scheme for the suppression of dust.

Topic Amenity - Private Water Supplies

Private Water Supplies
The applicant will be required to carry out an investigation to identify any private water supplies, including pipework, which may be adversely affected by the development. A report which includes details of the measures proposed to prevent contamination or physical disruption shall be submitted for the written approval of the Planning Authority. The report should include details of any monitoring prior to, during and following construction and proposals for contingency measures in the event of an incident.

Highland Council has some information on known supplies which can be provided on request however, it is not definitive. An on-site survey will be required.

Assessments to be carried out and/or submitted with application	
Operational noise assessment	Y
Detailed construction noise assessment	Y (access route)
Construction noise – scheme of best practicable means	Y
Dust suppression scheme	Y
Private water supply survey/mitigation scheme	Y
Odour impact assessment	N
Other	N

A38

The Highland Council
Comhairle na Gàidhealtachd

Memorandum

To:	Planning Service (Laura May – Case Officer)
From:	Transport Planning Team
Subject:	Balloch Wind Farm, Struy, Beauly – EIA Scoping
Date:	6 November 2024
Your ref:	24/04177/SCOP

Thank you for giving us the opportunity to comment on the information submitted in support of the above EIA Scoping. Our findings have been set out below.

Findings

We note the intention for the assessment of environmental impacts from the predicted traffic associated with the construction of this development will follow the principles set out in the *Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Traffic and Movement*. The document references the edition published in 1993, which we understand has now been superseded. Any such use of the above should adhere with the latest published version of that document.

The approach set out in the above document does not include any requirement to assess the existing local public road networks condition and capability to physically and safely accommodate the predicted traffic impacts, whilst remaining safe for other road users. This will be required and should be done for all construction and operational traffic, not just abnormal loads (AILs). Such an approach should be contained within a supporting additional Transport Assessment (TA) document, with the attached note giving guidance on the required scope of such an assessment.

Regarding quantifying the scale of traffic impacts and the intention in the EIA to use Rule 1 (30% increase in all and HGV traffic) and Rule 2 (10% increase in all and HGV traffic at high sensitivity locations) from the IEMA Guidelines, we will require any

single-track roads with passing places impacted by this proposed development to be identified as high sensitivity as defined by Rule 2. This reflects the sensitivity of such routes to changes in the quantum and nature of traffic flows along them.

The A831, which would need to provide connection to the proposed point of access for the development, is not formally recognised as a route capable in its current form of physically or safely accommodating quantities of large heavy commercial goods vehicles, or abnormal loads (AIL's). The Timber Transport Forum has designated the route as a "Consultation Route" meaning that the route is not up to agreed standards to be used for transporting timber. This would also be the case for the large standard commercial goods vehicles and AILs that this proposed development would generate. Therefore, any assessment of that route will need to recognise that physical improvements will be required alongside suitable traffic management measures.

Also, the nature of the A831 changes along its length, with the southern section being less suited to accommodating larger commercial goods vehicles. We would therefore expect any submission to demonstrate their intention to avoid routing commercial goods vehicles associated with this development from the south via Cannich.

Whilst there is reference to the port of entry for turbine components being Invergordon, the report says that this is still to be clarified, as is the routing of such loads between the port and the site. It should be noted that no AIL's should be routed across the Lovat Bridge carrying the A862 over the River Beauly until suitable detailed inspections and structural assessments have been undertaken and accepted by Highland Council Structures Team. It's our understanding that such inspections will need to include diving surveys of the existing bridge piers and foundations within the river to check for scour damage.

When considering the routing of AIL's to this development site, we recommend that early engagement is had with our Structures Team. They can be contacted through the generic Email address structures@highland.gov.uk.

Similarly, early engagement should be had with The Councils Abnormal Load Team. Again, they can be contacted through the generic Email address abnormal.loads@highland.gov.uk.

We note the intention to gather traffic flow data for existing routes and use that in the environmental assessment to compare changes as a result of the proposed development. Given that the construction working hours and vehicle movements for this development are likely to be between restricted on a typical working day (possibly 07:00 and 19:00), Annual Average Daily Flows (AADF) information should not be used for comparison purposes. 12-hour average flows should be used for the period 07:00 – 19:00. Using AADF would simply lessen the scale of change that the development will be generating during the working day.

Any assessment done of the impacts of traffic from this development will need to take into account the cumulative impacts from other developments that may come forward during the proposed construction of this new facility. Highland Council Planning Service will need to clarify what those potential developments could be.

When calculating the predicted quantum and profile of construction traffic likely to be generated by the proposed development, this should also include the likely traffic generated by the felling and removal of any trees required for the delivery of this development.

Also, any assumptions made about the sourcing of materials from borrow pits within or close to the development site, along with the batching of concrete on site and the movement of the workforce to and from the development site should be clearly set out and justified in any submission made. If there is an intention to reduce traffic numbers by suggesting gravel materials can be sourced on site, we would expect appropriate ground investigation works to have been done justifying that there are suitable such materials that can be won. If such investigations are not undertaken, we would expect the traffic impacts to have assessed the worst case scenario of such materials needing to be imported.

We note the comments that operational traffic levels are predicted to be low and as such, no assessment of those likely impacts is deemed necessary. We will expect any

submission to clarify the likely quantum and profile of operational traffic levels due to be generated by the finished development to justify such an approach.

The additional TA required in support of any application will need to justify the adequacy of any temporary or permanent points of construction and ongoing operational access proposed from the local public road network. This will include justifying the adequacy of visibility splays, which may require traffic speed data for those sections of public road impacted. The layout and construction form of all accesses will also need to be clarified and their suitability justified. We would also expect any submission to justify why each individual new permanent access needs to be retained and if so, in what form.

The submission suggests that an existing estate access from the A831 near to Erchless Castle will provide the construction and ongoing operational access for this development. This will require careful consideration of achievable visibility splays from that access in both directions along the A831. Its our understanding that visibility splays may be restricted by the local topography and road alignment, with may require extensive improvements. If the requirements from Table 5.5 from our published Roads and Transport Guidelines for New Developments cannot be met from a 4.5m setback within the mouth of the proposed access, using 85%'ile speed data gathered at that location from suitable traffic count data, then more suitable alternative access arrangements may be required.

Transport Planning Team

A42

Matters to be included in a Transport Assessment/:

1. Identify all public roads affected by the development. In addition to transporting major turbine components, this should also include routes to be used by local suppliers and the workforce.

2 Set out the existing nature and condition of these public roads. This should include:
- The road name and number, where applicable.
- Road widths, including any pinch points.
- The nature of their horizontal and vertical alignments, including any known steep gradients.
- The location and condition of existing passing places on single track roads.
- An assessment of the carriageway strength including, where necessary, construction depths and road formation where there is likely to be significant proposed impacts. This may include the need for non-destructive testing and sampling as required to determine the carriageway construction and strength. This work should be undertaken by a suitably capable and qualified consulting engineer acceptable to the Council.
- The location and nature of any structures either spanning or supporting the roads, including a description of their nature (eg bridge, culvert etc), any width, height or weight restrictions and where necessary, an assessment of their load carrying capability. This work should be undertaken by a suitably capable & qualified consulting engineer acceptable to the Council.
- The nature and quantum of properties serviced by the roads. In addition to the quantum of residential properties, specific recognition should be made of any schools, businesses or other community facilities serviced by these roads.
- The nature and quantum of existing traffic flows on these roads. This should include reference to how often the roads are used by school or commercial bus services, refuse vehicles and whether the routes are used by pedestrians, cyclists and equestrians.

3 Identify the anticipated impacts from the proposed development, including any cumulative impacts from other developments likely to be happening at the same time as your development. These impacts should include:
- The quantum of new traffic impacting on these roads. This should cover:
    - numbers of light and heavy vehicles
    - numbers of abnormal loads
    - profiles of anticipated new traffic movements throughout the duration of the works
- Any impacts to existing carriageways, structures, verges or other aspects of these public roads. This should include information on swept paths and gradient analysis where it is envisaged that the passage of traffic could be problematic.
- The location of any new or changes to existing accesses off these public roads to be used for accessing this development. This should include the extent of existing visibility from each of these accesses onto the public roads.
- Any impacts or restrictions needing to be imposed on existing road users.
- Any impacts or restrictions needing to be imposed on adjacent properties or local communities serviced by these public roads.

4 Set out the proposed mitigation measures needed to tackle the anticipated impacts set out above. This should include:
- The location and nature of any carriageway widening or strengthening.
- Visibility improvements at access points and along the public roads forming access routes.
- The location and nature of any strengthening or widening needed to existing structures.
- The provision of new or enhanced passing places on single track roads.
- Road safety measures to manage the impacts of any identified road safety concerns.
- Traffic management proposals for the construction and ongoing operation of the facility.

5 Any residual effects on the road network and its users following implementation of the proposed mitigation and any actions proposed associated with those residual effects.

Consultee Comments for Planning Application 24/04177/SCOP

Application Summary

Application Number: 24/04177/SCOP
Address: Land 6260M NE Of Erchless Forest Cottage Struy Beauly
Proposal: Scoping request for Ballach Wind Farm - Erection and Operation of a Wind Farm for a period of 35 years, comprising 36 turbines with a maximum blade tip height of 200m and 230m, along with a battery energy storage system (BESS) and ancillary infrastructure
Case Officer: Laura May

Consultee Details

Name: Jamie Leadbeater
Address: The Highland Council Headquarters, Glenurquhart Road, Inverness IV3 5NX
Email: Not Available
On Behalf Of: Scottish & Southern Energy Plc

Comments

Thank you for consulting us on the EIA Scoping report for the proposed Ballach Wind Farm.

Upon review of the scope of the report, we note that the "other issues" section does not acknowledge the presence of our existing 132kV (132,000 volt) overhead electrical transmission line running through the red line site area which is on the Beauly to Deanie North circuit.

We ask that our existing infrastructure is acknowledged within the forthcoming Environmental Assessment report and measures set out on how that intend to mitigated development affects on it's continued safe operation. Should the applicant need any further advice on this, they can contact us at: Transmission.Ple@sse.com.

From: #ABZ Safeguarding <abzsafeguard@aiairport.com>
Sent: Friday, October 4, 2024 1:28 PM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Subject: RE: Ballach Wind Farm proposal - scoping consultation

This proposal is located outwith our consultation area. As such we have no comment to make and need not be consulted further.

Kind regards
Kirsteen

#ABZ Safeguarding
abzsafeguard@aiairport.com
www.aberdeenairport.com
Aberdeen International Airport Limited, Dyce, Aberdee
n, AB21 7DU

2023 UK NTA NATIONAL TRANSPORT AWARDS 2023
WINNER: TRANSPORT HUB OF THE YEAR 2023

From: Anthony Watkins <Ant@beaulyfisheryboard.org>
Sent: Friday, October 25, 2024 10:19 AM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Cc: Sunny Bradbury <sunny.bradbury@cromartyboard.com>; Brian Davidson <brian@fms.scot>
Subject: RE: Ballach Wind Farm proposal - scoping consultation

Dear Stephen,

Thank you for contacting the Board with this.

I have had a look at the scoping report and some other relevant documents at the website link you provided below, and whilst the location of most of the site means direct impacts upon migratory salmonids (Atlantic salmon and sea trout – the remit of the Beauly Fishery Board is to protect these species) are unlikely, the southern extent of the site (the access route) is very close to the Erchless burn, which holds these species, and the eastern part of the site (in the area of the site where the turbines are sited) is located on the headwaters of the Breakachy burn, an important and well-used tributary of the lower Beauly for these species. Migratory salmonids only have access to the lower reaches of this burn, but impacts in the headwaters have the potential to impact downstream reaches.

Further to this, brown trout are likely to be present in the upper reaches of these burns, and possibly within the proposed site itself. It is therefore concerning that I don't seem to be able to find any reference to fish within the documents, or how this proposed development may impact upon fish and fish habitat. The closest I see is in Section 11 (Soil Geology and Water), where section 11.6 highlights the presence of a "number of watercourses", and in 11.12 - "Mitigation and monitoring measures will be put in place to ensure that water quality within the specified watercourses is not compromised as a result of the Proposed Development." The last reference is wide in potential scope, so may cover what is required, but requirements are wider than just protecting water quality. Protecting the physical condition of watercourses, including maintaining the free passage of fish (including movement of trout in upper reaches) is also important and needing consideration. Appropriate routing of tracks and design of bridges/crossing points following best practice guidance should help to ensure fish are protected, but it would be good for the aims of mitigation to identify what they are trying to protect i.e. not just water quality.

As outlined in the linked guidance Brian at FMS has provided below, consideration, assessment, and potentially monitoring, of fish should be included in windfarm developments that have the potential to impact upon watercourses and fish that reside in them.

Sensitive development and appropriate mitigation, following best practice, should prevent impacts upon watercourses from windfarm developments, but issues can still occur. Clear documenting of how the development will avoid impacts upon the respective watercourses, through the way it is developed and the mitigation to be used, is therefore key; and also what monitoring will be in place to generate a baseline (pre-development), and then continuing through construction and operation to ensure no impacts are caused, should also be provided as part of the proposed development.

This all requires a level of assessment of the aquatic environment and the receptors (species) within it, whether that is simply desk-based as a start, or more intensive with surveys and fieldwork. With no reference to fish within the scoping report, this appears to have been overlooked.

Kind regards,

Ant

Anthony Watkins
Senior Biologist
Beauly Fishery Board,
Corff house, Lovat bridge,
Beauly,
Inverness,
IV4 7BE
Tel: *redacted*

www.beauly.dsfb.org.uk
Facebook

Beauly
Fishery Board

A47

Patron His Majesty The King

Bringing horses and people together

The British Horse Society Scotland
Suite A3
Stirling Agricultural Centre
Stirling FK9 4RN

Email catriona.davies@bhs.org.uk
Website www.bhs.org.uk
REDACTED

By email to: stephen.mcfadden@gov.scot

30th October 2024

Dear Sir/Madam,

Re: Request for scoping opinion for proposed Ballach Wind Farm ECU00005219

Thank you for the opportunity to respond to this request for scoping opinion. The British Horse Society (The BHS) represents the interests of the 3.4 million people in the UK who ride or who drive horse-drawn vehicles and is the largest and most influential equestrian charity in the UK. The BHS is committed to protecting and promoting the interests of all horses and the people who care for them through our work in education, welfare, safety and access.

Outdoor Access
Access to safe off-road riding routes is vital to the health and wellbeing of horses and their riders. Under the terms of the Land Reform (Scotland) Act 2003, equestrians have the same rights of access to the outdoors as other non-motorised users, such as pedestrians and cyclists. Equestrian use should therefore be included when planning and designing wind farm proposals. Considering all access takers, including equestrians, in the early stages helps to avoid problems down the line and ensures that projects like this are an opportunity to preserve and improve access for all, rather than curtail it or restrict it to certain groups.

Although there are no designated core paths within the application boundary, forestry tracks and hill tracks, like those within and close to this site, are often ideal routes for equestrians. In addition, a traditional, long-distance route, promoted as Scottish Hill Track 279 passes through the site from Strathglass to Glen Orrin. Consideration should therefore be given to how access will be managed both during the construction phase and when the wind farm is operational. The creation of tracks within wind farms can be an opportunity to improve outdoor access and provide the local community with additional amenity, especially if tracks can offer circular routes for walkers, cyclists, horse riders and others. Obstructions to access like cattle or deer grids and locked gates with no side gate should be avoided.

The BHS is here to help and can provide guidance on suitable surfaces and infrastructure to accommodate equestrians and other access takers. We would be very willing to work with the applicant on these aspects.

The Importance of Off-Road Riding
Access to safe off-road riding routes is vital to the health and wellbeing of horses and their riders. Equestrian road users are classed as vulnerable as they are more likely to be involved in a road accident and more likely to suffer the worst consequences.

Most riding accidents happen on minor roads and with increasing numbers of horses and riders seeking to access the countryside, adequate access to off-road riding should be a priority, especially in rural and semi-rural areas, like the Highlands. Few riders access busy roads by choice (although the horse has as much right to be on public roads as cars, bikes and pedestrians) - but they often have few other places to ride or no other way to access their safe off-road riding.

The British Horse Society is an Appointed Representative of South Essex Insurance Brokers Limited
who are authorised and regulated by the Financial Conduct Authority.

Registered Charity Nos. 210504 and SC038516. A company limited by guarantee. Registered in England & Wales No. 444742

Vehicles travelling two and from the site are likely to meet equestrians on the road and drivers should be advised of this risk. I have enclosed a copy of our *"Guidance to drivers of large vehicles"* document.

The Horse and the Rural Economy
Scotland's equestrian industry is worth over £300 million to the Scottish economy annually. This figure excludes the value of the horse racing industry, which is worth a further £300 million. Equestrianism is an important part of the economy in rural areas like the Highlands. Recent joint research between SRUC and The BHS showed current trends in the sector point to a continued increase in horse numbers and riding activity in all geographical areas of Scotland and across a wide cross section of society, leading to growth in the sector.

A national survey of riders who had recently given up their horse found that 27% of them had done so because they had lost access and had nowhere to ride. Failing to accommodate horses on our local path networks may lead to riders being forced to give up their horses, which in turn may damage the local economy.

I trust that the above information is of assistance. If you have any questions or would like to discuss the needs of equestrians further, please do contact me.

Kind regards,

REDACTED

Catriona Davies
Scotland Access Officer
The British Horse Society

A49

Guidance to Drivers of Large Vehicles

The British Horse Society Scotland

Horses are normally nervous of large vehicles, particularly when they do not often meet them. They can run away in panic if they are really frightened. Whilst their riders will do all they can to prevent this, should it happen, it could cause a serious accident for other road users, as well as for the horse and rider.

In such a situation, the main factors causing the fear are:

- Being approached by something which is unfamiliar to them and intimidating
- A large moving object, especially if it is noisy
- Lack of space between the horse and the vehicle
- The sound of the vehicles air brakes
- Anxiety on the part of the rider

How can you help?

- On seeing a rider, or riders, approaching – please slow down and be prepared to stop if necessary.
- Be aware that the sound of your airbrakes may spook the horse.
- If the horse, or horses, show signs of nervousness as you get closer, please turn the engine off and allow them to pass.
- Please don't move off again until the riders are well clear of the rear end of the vehicle.
- If you are approaching riders and wishing to overtake them, please approach slowly, or even stop to give the rider's time to find a gateway, or other place off the road, where they can take refuge and create sufficient space between the horse and vehicle. Horses are very aware of things coming from behind, due to the position of their eyes.
- Please be patient. Most riders will do their best to reassure their horses even though they may be feeling a high degree of anxiety themselves.
- Note: the safest place for the rider's hands is on the reins, so if they are anxious, they may only be able to nod their thanks to you – but please do be assured that they will be very, very grateful for your consideration of their situation.

THE BRITISH HORSE SOCIETY IS VERY GRATEFUL TO ALL DRIVERS WHO ARE WILLING TO FOLLOW THESE GUIDELINES.



From: radionetworkprotection@bt.com <radionetworkprotection@bt.com>
Sent: Wednesday, October 2, 2024 12:12 PM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Subject: Ballach Wind Farm proposal - scoping consultation WID13590

OUR REF:- WID13590

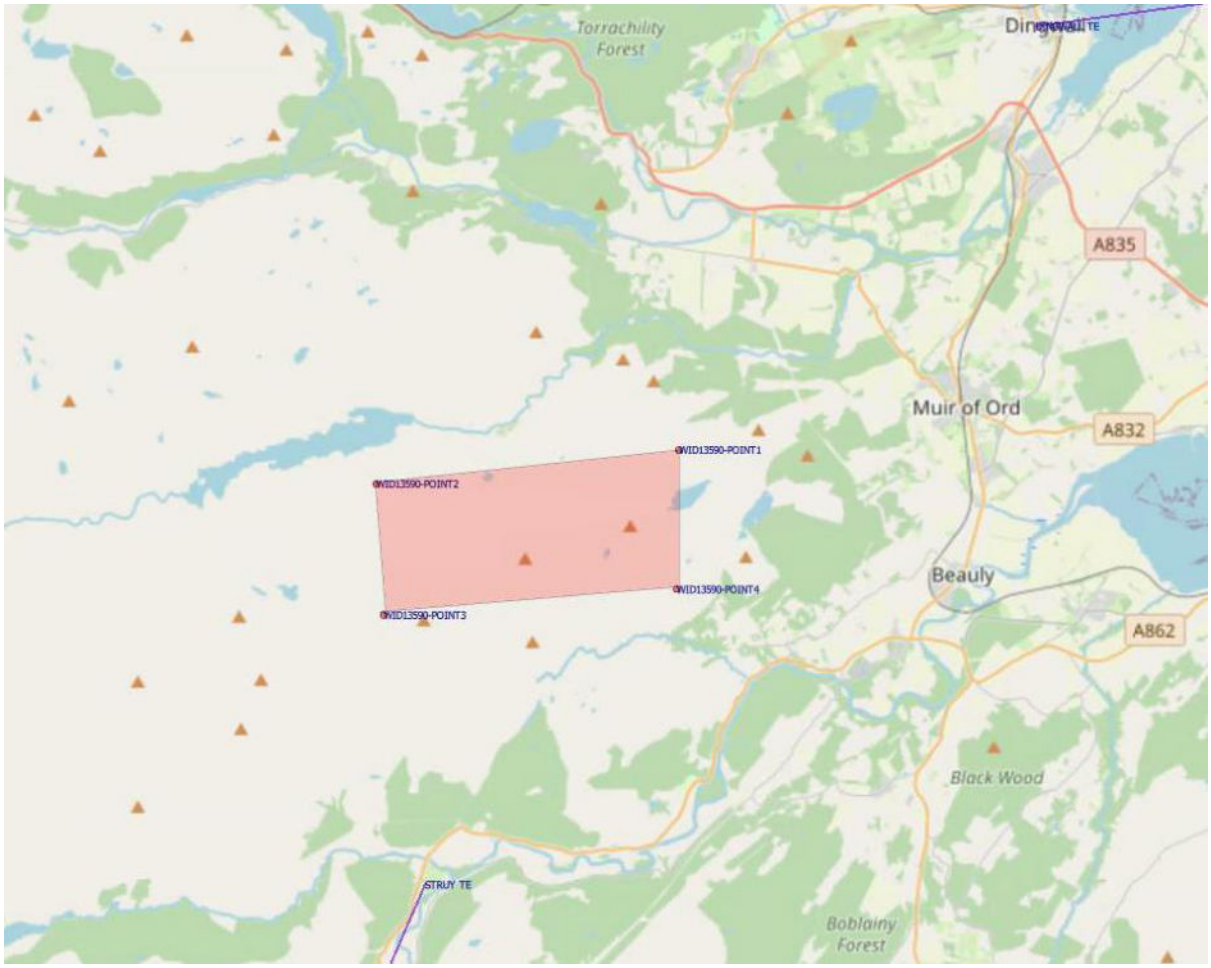
Good afternoon Stephen

Thank you for your email dated 01/10/2024

We have studied the proposed windfarm development with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that the Project indicated should not cause interference to BT's current and presently planned radio network.

Kind Regards
Chris



A51


Nigg
Sands
Invergordon
Kinlochewe
Achanalt
Garve
Dingwall
Muir of Ord
ulags
Struy
lan
ridge
Invergarry
Kilfinnan

A52

From:	Joshua Dickson
To:	Stephen McFadden
Subject:	Ballach Wind Farm
Date:	23 October 2024 16:25:01
Attachments:	20241001 Ballach Wind Farm proposal - scoping consultation.eml.msg

Hi Stephen

In response to the attached email,

I confirm that the assets of Crown Estate Scotland are not affected by this proposal, and we therefore have no comments to make.

Kind regards

Joshua

Joshua Dickson (he/him)
Assistant Portfolio Co-ordinator

Crown Estate Scotland

REDACTED

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A53

Defence Infrastructure Organisation

Teena Oulaghan
Safeguarding Manager
Ministry of Defence
Safeguarding Department
St George's House
DIO Headquarters
DMS Whittington
Lichfield
Staffordshire
WS14 9PY

Telephone [MOD]: REDACTED

E-mail: teena.oulaghan100@mod.gov.uk

Your Reference: ECU00005219

Our Reference: DIO10064562

Stephen McFadden
Energy Consents Unit
Scottish Government
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

By email only

25 October 2024

Dear Stephen,

THE ELECTRICITY ACT 1989.
THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017.
SCOPING OPINION REQUEST– BALLACH WIND FARM PROPOSAL.

Thank you for consulting the Ministry of Defence (MOD) in relation to the scoping through your communication dated 01 October 2024.

The Defence Infrastructure Organisation (DIO) Safeguarding Team represents the MOD as a consultee in UK planning and energy consenting systems to ensure that development does not compromise or degrade the operation of defence sites such as aerodromes, explosives storage sites, air weapon ranges, and technical sites or training resources such as the Military Low Flying System.

I am writing to advise you that the MOD has concerns with the proposal.

The proposal concerns a development of 36 turbines. Turbines 1, 3, 4, 13, 15, 29, 33, 34 and 36 with maximum blade tip heights of 230 metres above ground level and turbines 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, and 35 with maximum blade tip heights of 200 metres above ground level. The proposed development has been assessed using the location data (Grid References) below provided in Environmental Impact Assessment Scoping Report dated August 2024.

Turbine	Easting	Northing		Turbine	Easting	Northing
1	245625	848024		19	243222	846390
2	245157	847905		20	242697	846421
3	244429	847917		21	242561	847107

4	243881	847875		22	242559	847587
5	244317	847362		23	242162	847826
6	245009	847466		24	242143	847356
7	245727	847574		25	242187	846818
8	245475	847172		26	241526	846960
9	245024	846976		27	241686	847402
10	244716	846618		28	241686	847867
11	244101	846777		29	241182	848094
12	244297	846360		30	241273	847627
13	243725	846408		31	241104	847186
14	243746	847089		32	240816	847561
15	243409	847832		33	240706	848035
16	242935	847888		34	240237	848038
17	243095	847381		35	240273	847581
18	243110	846869		36	239803	847863

The principal safeguarding concerns of the MOD with respect to this development of wind turbines relates to their potential to create a physical obstruction to air traffic movements.

Physical Obstruction

In this case part of the development falls within Tactical Training Area 14T (TTA 14T), an area within which fixed wing aircraft may operate as low as 100 feet or 30.5 metres above ground level to conduct low level flight training. The addition of turbines in this location has the potential to introduce a physical obstruction to low flying aircraft operating in the area.

The remainder of the development falls within Low Flying Area 14 (LFA 14), an area within which fixed wing aircraft may operate as low as 250 feet or 76.2 metres above ground level to conduct low level flight training. The addition of turbines in this location has the potential to introduce a physical obstruction to low flying aircraft operating in the area.

To address the impact up on low flying given the location and scale of the development, the MOD would require that conditions are added to any consent issued requiring that the development is fitted with aviation safety lighting and that sufficient data is submitted to ensure that structures can be accurately charted to allow deconfliction.

The development proposed includes wind turbine generators that exceed a height of 150m agl and are therefore subject to the lighting requirements set out in the Air Navigation Order 2016. In addition to CAA requirements, the MOD will require the submission, approval, and implementation of an aviation safety lighting specification that details the installation of MOD accredited aviation safety lighting.

As a minimum the MOD would require that the cardinal turbines are fitted with both 25cd visible and infra-red (IR) COMBI lighting.

Summary

The MOD has concerns with this proposal due to the potential impact to low flying aircraft operating in the development area.

The MOD must emphasise that the advice provided within this letter is in response to the information detailed in the developer's document "Environmental Impact Assessment Scoping Report" dated August 2024. Any variation of the parameters (which include the location, dimensions, form, and finishing materials) detailed may significantly alter how the development relates to MOD safeguarding requirements and cause adverse impacts

to safeguarded defence assets or capabilities. In the event that any amendment, whether considered material or not by the determining authority, is submitted for approval, the MOD should be consulted and provided with adequate time to carry out assessments and provide a formal response.

I hope this adequately explains our position on the matter. If you require further information or would like to discuss this matter further, please do not hesitate to contact me.

Further information about the effects of wind turbines on MOD interests can be obtained from the following websites:

***MOD*:** https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding

Yours sincerely
REDACTED

Teena Oulaghan
Safeguarding Manager

From: Brian Davidson <brian@fms.scot>
Sent: Friday, October 11, 2024 8:25 AM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Cc: Anthony Watkins <Ant@beaulyfisheryboard.org>; Sunny Bradbury <sunny.bradbury@cromartyboard.com>
Subject: RE: Ballach Wind Farm proposal - scoping consultation

Dear Stephen,

Thank you for your correspondence concerning the proposed Ballach wind farm.

Fisheries Management Scotland (FMS) represents the network of 40 Scottish District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), who have a statutory responsibility to protect and improve salmon and sea trout fisheries and the 26 fishery trusts who provide a research, educational and monitoring role for all freshwater fish.

FMS act as a convenient central point for Scottish Government and developers to seek views on local developments. However, as we do not have the appropriate local knowledge, or the technical expertise to respond to specific projects, we are only able to provide a general response with regard to the potential risk of such developments to fish, their habitats and any dependent fisheries. Accordingly, our remit is confined mainly to alerting the relevant local DSFB/Trust to any proposal.

The proposed development falls within the catchments relating to the Beauly and Cromarty District Salmon Fishery Boards. It is important that the proposals are conducted in full consultation with the relevant boards (see link to FMS member DSFBs and Trusts below). We have also copied this response to both organisations.

Due to the potential for such developments to impact on migratory fish species and the fisheries they support, FMS have developed, in conjunction with Marine Scotland Science, advice for DSFBs and Trusts in dealing with planning applications. We would strongly recommend that these guidelines are fully considered throughout the planning, construction and monitoring phases of the proposed development.

- LINK TO ADVICE ON TERRESTRIAL WINDFARMS
- LINK TO FMS MEMBER NETWORK CONTACT DETAILS

Kind regards,

Brian

Brian Davidson | Director of Operations
Fisheries Management Scotland
11 Rutland Square, Edinburgh, EH1 2AS
Tel: REDACTED
www.fms.scot

From: Safeguarding <Safeguarding@hial.co.uk>
Sent: Wednesday, October 30, 2024 9:35 AM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Subject: RE: Ballach Wind Farm proposal - scoping consultation

OFFICIAL

Your reference: ECU00005219
Our reference: 2024/278/INV

Dear Stephen,

Proposal: SCOPING OPINION REQUEST– BALLACH WIND FARM PROPOSAL
Location: Approximately 4km northwest of Kilmorack within the Erchless and Farley estates

Highlands and Islands Airports Limited (HIAL) has been consulted on the above proposed development, received by this office on 1 October 2024.

With reference to the above proposal, our preliminary assessment shows that, at the position, the proposed development may impact the safeguarding criteria and operation of Inverness Airport.

Wind turbines in this location will likely be Line of Site to the Primary Surveillance Radar (PSR) and an Optical Line of Site assessment would be required to be conducted and provided by the applicant, considering the Thales STAR PSR & Terma Scanter Radar

The development lies withing the safeguarded area for the Instrument Flight Procedures (IFP) at Inverness Airport. The Easting and Northings will be required in the EIA report to allow an initial IFP impact assessment to be conducted and depending on the outcome, HIAL would reserve the right to submit an objection.

It should be noted that HIAL would work with the developer towards a resolution. However, HIAL would currently submit a holding objection to this development.

Best regards,

Safeguarding Team
Highlands and Islands Airports Limited
safeguarding@hial.co.uk

A58

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email: stephen.mcfadden@gov.scot

Stephen McFadden
Energy Consents Unit
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our case ID: 300075852
Your ref: ECU00005219
31 October 2024

Dear Stephen McFadden

The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Ballach Wind Farm
Comments on scope of proposed Environmental Impact Assessment

Thank you for consulting us on this Environmental Impact Assessment (EIA) scoping report, which we received on 2 October 2024. We have reviewed the details in terms of our historic environment interests. This covers World Heritage Sites, scheduled monuments and their settings, category A listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and Historic Marine Protected Areas.

The relevant local authority archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include topics covered by our advice giving role, and also other topics such as unscheduled archaeology, category B and C listed buildings, and conservation areas.

Proposed development

We understand that the proposed development would comprise a maximum of 36 wind turbines standing up to 200-230m to blade tip plus associated infrastructure. The array would be located approximately 6km west of Beauly in the Highland local authority area.

Scope of assessment

We have identified likely significant effects on our historic environment interests. Our advice on the nature of these impacts and any potential mitigation measures are included in an annex to this covering letter. This also includes our requirements for information to be included in the EIA Report.

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

Further information

Decisions that affect the historic environment should take the Historic Environment Policy for Scotland (HEPS) into account as a material consideration. HEPS is supported by our Managing Change guidance series. In this case we consider the advice in the Setting guidance note to be particularly relevant.

We also recommend that the applicant refers to the EIA Handbook for best practice advice on assessing cultural heritage impacts.

We hope this is helpful. If you would like to submit more information about this or any other proposed development to us for comment, please send it to our consultations mailbox, hmconsultations@hes.scot If you have questions about this response, please contact Deirdre Cameron at deirdre.cameron@hes.scot

Yours sincerely

Historic Environment Scotland

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

ANNEX: Our Detailed Comments

Scoping Report

We note and welcome the inclusion of cultural heritage interests in the scoping report and can confirm we are content with the proposed methodology for the identification and assessment of significant impacts and effects. We wish to highlight the following matters within the report-

Use of study areas
The scoping report uses an initial 15km study area to identify cultural heritage assets for assessment, although we note the proviso in section 12.13 stating that "further heritage assets may be assessed on the basis of consultation with HES and the Highland Council Environment Team". A 10km study area is proposed for ongoing assessment which will only consider "those heritage assets with visibility of the proposed development".

We do not recommend the use of distance-based study areas for the assessment of setting impacts on cultural heritage assets. Instead we recommend that heritage assets should be selected for detailed consideration using Zone of Theoretical Visibility (ZTV) analysis. We note that the scoping report already contains a clear and helpful ZTV map as part of the Landscape and Visual Impact Assessment study.

We expect all nationally designated assets within the ZTV to undergo an initial assessment to determine the potential for effects to their setting. This assessment should demonstrate a full appreciation of the setting of each heritage asset where potentially significant impacts are identified. Impacts may occur on views from, towards or across individual heritage assets as well as from potential changes to their experience. Our Managing Change guidance note on Setting provides further detail on this matter.

Visualisations
The scoping report does not contain any visualisations for cultural heritage assets. Section 12.22 of the report explains that these will be agreed with HES at a later stage. Our comments below outline some of the visualisations we would wish to see to facilitate the assessment of the proposals and we would be happy to offer further advice as the assessment process progresses.

Identification of assets for detailed assessment
Table 12.1 lists the scheduled monuments that lie within the 15km study that fall within the ZTV. Section 12.4 of the report notes there are 11 Category A listed buildings within the same study area. Unlike the much larger number of scheduled monuments in the same category, these buildings are not named or listed in a table within the report. Section 12.12 provides a list of designated assets "that are of particular interest in terms of potential significant effects" but the report does not offer any further information on the selection process behind this list. As a result we cannot understand or assess the reasoning behind the selection process.

While this issue may be addressed in the final EIA Report, we recommend that this detailed information should be provided as early as possible to minimise the risk of a need for further assessment at a late stage in the EIA process and the subsequent delays that can result.

Our interest

We can confirm that there are no designated cultural heritage assets within the red line boundary for the application area. Our comments therefore focus on the setting impacts that could result from the development.

There are many designated cultural heritage assets in the vicinity of the proposed development. We have identified at least 12 scheduled monuments where significant adverse impacts may occur and where we consider visualisations essential to confirm the degree of impact and inform any necessary mitigation. These are described at the end of this section. The lists provided here are based on our initial overview of the information provided. They should not be considered complete; further consideration of the evidence may identify additional assets at risk of significant impacts and likewise show that some identified here would not experience adverse effects from the development.

We expect the cultural heritage assessment in the EIA to include assessments on the following:

- the settings of all the **category A-listed buildings** within the study area which would either have important views towards the wind farm (for example from a principal room) or where the wind farm would be visible in an important view towards the listed building from a third location. This is not clear from the information provided in Table 12.1 or sections 12.2-12.12

- The settings of the following Inventory gardens and designed landscapes which are located within the ZTV:
  - GDL00052 Beaufort Castle
  - GDL00068 Brahan
  - GDL00094 Castle Leod
  - GDL00174 Fairburn

Belladrum Estate is being considered for inclusion in the Inventory of Gardens and Designed Landscapes. Although the designation process is still underway, it is likely that Belladrum could be designated before the EIA is finalised. We therefore expect it to be assessed as part of that process. Located approximately 9km to the south-east of the proposed development, it lies within the ZTV. Views from the higher grounds encompass the Beauly Valley and beyond towards the Strathglass Hills and Ben Wyvis, in the direction of the wind farm. However, although this development would be visible from Belladrum, it would appear in a wider view over the landscape rather than in a planned or focussed view out of the Inventory site. The significance of this impact and its effect should be described in the EIA report and illustrated if necessary.

We would also expect the applicant to carry out an appraisal of the following monuments which the ZTV indicates have a high level of intervisibility with the development and to produce visualisations where appropriate to aid assessment:

- Balvaird Wood, chambered cairn 450m NNE of East End (SM4741)
- Balvaird, chambered cairn 250m E of Balvaird House (SM3635)
- Muir of Conon, chambered cairn 630m ENE of East End (SM4652)
- Drumrunie, chambered cairn 170m WNW of Drumrunie Cottage (SM4565)
- Cairn Irenan, chambered cairn (SM3122)
- Kilcoy North, chambered cairn 750m NW of Kilcoy Castle (SM4606)
- Kilcoy South, chambered cairn 700m NW of Kilcoy Castle (SM4650)
- Carn Glas, cairns, Mains of Kilcoy (SM3123)
- Carn Glas, chambered cairn, Mains of Kilcoy (SM3213)
- Preas Mairi, chambered cairn (SM2397)
- Loch Kinellan, crannog (SM3987)
- Tom na Croiseige, stepped mound (SM3196)
- Belladrum Home Farm, chambered cairn WNW of (SM3194)
- Auchvaich, chambered cairn 650m W of (SM4744)
- Knock Farril, fort, Knockfarrel, Fodderty (SM1672)
- Conon Bridge, henge 230m NE of Riverford (SM1666)
- Dugary, henge 425m SE of (SM3403)

In addition to the sites listed above, we have identified the following scheduled monuments as particularly likely to experience significant impacts and effects:

Urchany, barrow 595m SW of (SM13523)
Urchany barrow is a prehistoric burial monument, probably dating to the Bronze Age (c. 2500-1000 BC). It appears to be a bowl barrow with an external ditch and bank, a rare form of burial monument in this part of Scotland. The monument is prominently situated on a glacial drumlin in the river valley of the Allt an Lochan Bhallaich with extensive views to and from the southwest, southeast and northeast. The key views for the monument appear to be in these directions with the topography to the northwest focussing views from the site in these directions. Reciprocal views are likely to have been of equal importance. A series of undesignated cup-marked stones are located around the monument; there is likely to have been a direct relationship between these sites and the barrow.

The ZTV suggests that between 10 and 18 turbines would be visible from the monument. Given the proximity of the proposed turbines and their placement within key views to the northeast we recommend that the impacts of the proposed development on the setting of the monument are illustrated by at least two photomontages. One should be taken from the site looking toward the proposals and another should be taken from the south of the site demonstrating the impact of the proposals on views from the southern approach to the barrow. A good location for this may be from the southmost of the recorded rock art panels. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Dun Mor, fort (SM4979)
The monument is a large sub-oval fort, probably dating to the Iron Age (c. 800BC-AD400), comprising an inner wall and two outer walls. It is situated in a commanding position with a steep ascent on the west, south and east sides and a precipitous drop on the north to the Breakachy Burn. It is one of a group of four duns (Dun Mor, fort, SM4979; Dun Garbhlaich, fort, SM2422; Dun a Chliabhain, fort SM2424; Dun Fhamhair, fort , SM5212) which appear to be placed to dominate the passage from the south into the northern Straths. While enjoying extensive views of, and being highly visible from, the fertile lands around Kiltarlity and Strathglass to the south, the fort appears to have been positioned to dominate and control north-south movement through the valley of the Breakachy burn. Directly to the north there is an undesignated extensive settlement likely to be contemporary with the fort.

The ZTV indicates that between 19-27 turbines would be visible from the monument. The proximity of the proposals, and the fact they would likely dominate the views from the fort to the north, could detract from the ability to fully appreciate the visual relationship between the fort and the other Iron Age remains in the area. We recommend that the impacts are illustrated with a photomontage looking toward the proposals from within the inner enclosure of the fort. Another photomontage should be produced demonstrating the impacts of the proposals on the setting of the monument as a significant feature within its wider surroundings and in approaches from the south. This visualisation should be made from the summit or eastern flank of Breakachy Hill and should include an indication of the position of the settlement to the north of the fort. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Dun Garbhlaich, fort, Kilmorack (SM2422)
The monument is a D-shaped fort, probably dating to the Iron Age. It is situated on the rocky summit of a crag overlooking the east end of Strathglass. The interior of the fort features a jagged rock outcrop and a large, but ruinous, stone-lined well. It is one of a group of four duns (Dun Mor, fort, SM4979; Dun Garbhlaich, fort, SM2422; Dun a Chliabhain, fort SM2424; Dun Fhamhair, fort, SM5212) which appear to be placed to dominate the passage from the south into the northern Straths.

The monument's position on rising ground to the north and west with commanding views to the south and east suggests that the key visual relationship for the monument were with the coast. The presence of an entrance in the southern arc of the substantial drystone wall, suggest that approaches to the site were from this direction. Reciprocal views between this and other forts, as well as contemporary settlement, are also likely to have been equally important in demonstrating the status and control of the fort's occupants.

The ZTV indicates that between 1-9 turbines would be visible from the monument. It is likely that the proposed turbines, due to their size and proximity, would appear prominently in, and impose on, approaches to the fort from the south, southeast and southwest, detracting from the dominance of the monument over its surroundings,

thereby reducing one's ability to experience and appreciate the role of the monument in the area.

We recommend that the impacts are illustrated with a photomontage looking from the monument toward the proposed turbines. Another viewpoint from Dun a Chliabhain, (considered below), will help clarify the impact of the proposals from southern approaches to the monument. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Dun a Chliabhain, fort (SM2424)
The monument is a sub-oval fort, probably dating to the Iron Age, situated on the southwest extremity of a rocky ridge with steep flanks on the northwest, southeast and southwest sides, but with a gradual approach from the northeast. An entrance is discernible in the east arc of the thick stone wall. The monument is one of a group of four duns (Dun Mor, fort, SM4979; Dun Garbhlaich, fort, SM2422; Dun a Chliabhain, fort SM2424; Dun Fhamhair, fort, SM5212) which appear to be placed to dominate the passage from the south into the northern Straths.

An extensive area of broadly contemporary settlement is located to the southeast of the fort comprising a cairnfield, field systems, at least one hut circle and a burial cairn. It is likely that the fort has a direct relationship with this settlement. A relatively flat area lies to the northwest of the monument until the ground slopes steeply forming a rise on which Dun Garbhlaich (SM2422) is situated. This slope forms a narrow pass with Torr Breac leading northeast toward Gleann Goibhre. The fort was likely situated partly to dominate and control movement from south to north through this natural routeway.

The monument's position, with rising ground to the northeast and commanding views over sloping ground to the south, suggests that the key views relating to the monuments function are extensive. The views from the fort over the nearby settlement, and reciprocal views back to monument, are key to understanding its likely function, as are those to and from the northwest, which illustrate the potential of a monument like this to monitor and control movement through an area.

The ZTV suggests some degree of visibility between the monument and the turbines, though Fig.12.1 is not at a sufficient resolution to make this clear. It is likely that the turbines, due to their size and proximity, would appear prominently in views from the fort to the northwest, rising from behind the slopes of Creag Bhreac and Creag Mhor. They would be likely to dominate views in this direction.

We recommend that impacts are assessed and if there is intervisibility between the monument and the development at least two photomontages should be produced. One should look from the monument to the northwest toward the proposals, ensuring that the position of Dun Garbhlaich is indicated. Another should be produced looking toward the monument from the area of broadly contemporary settlement to the southeast, ideally from the burial cairn Cnoc Na Moine, in order to determine whether reciprocal views between the monument and these features is adversely impacted. These visualisations

will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Dun Fhamhair, fort (SM5212)
The monument is an oval fort dating to the Iron Age comprising a thick stone wall, enclosed by a modern dyke. A further rampart and ditch are situated to the northeast. A central causeway through the rampart lends weight to interpretations that the site was approached from the east.

The fort is one of a group of four duns (Dun Mor, fort, SM4979; Dun Garbhlaich, fort, SM2422; Dun a Chliabhain, fort SM2424; Dun Fhamhair, fort , SM5212) which appear to be placed to dominate the passage from the into the northern Straths. Dun Fhamhair, has by far the most extensive views of the group and views toward the Beauly Firth. The monument's position affords it views in all directions, with the Beauly Firth and Tarradale directly to the east and Gleann Goibhre and Strathglass to the west. Its visibility in views from throughout its surroundings are of equal importance. An area of broadly contemporary settlement is located to the southwest of the fort is likely to be directly related.

The monument is currently situated within a commercial forestry plantation, restricting appreciation of its wider setting. However, forestry is subject to substantial change and felling and it should not therefore be relied upon to mitigate potential impacts or act as screening.

The ZTV suggests some degree of visibility between the monument and the turbines, although Fig.12.1 is not at a sufficient resolution to make this clear. It is likely that the turbines, due to their size and proximity, would appear prominently in and dominate views on the approach to the fort from the east and views inland from the fort itself.

We recommend that the impacts are illustrated with visualisations. Ideally, these should be photomontages, but given the currently wooded nature of the site, bare-earth wireframes may be appropriate in the first instance. At least one visualisation should demonstrate the impact of the proposals in views from within the fort, while another should demonstrate the impact of the proposals in approaches to the fort from the eastern approach to the site, this should be made from an area of high visibility depicted on the applicant's ZTV to the east of the monument. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Carn na Buaile, fort, 750m NNW of Comrie, Contin (SM11056)
The monument consists of a multi-period hill-fort, the earliest phase of which was probably in the Bronze Age, with use continuing through the Iron Age. A post-medieval shepherd's cairn demonstrates use of the site in the life of the area in recent times. The monument is situated on a prominent southwest-facing hillside at the narrow entrance to Strathconon, near its confluence with Strath Bran to the north and the approach with the low-lying coastal plain between the Cromarty and Beauly firths to the east. It would have been sited in this highly visible location with wider views to control

movement between the coast and the mountainous interior of the Highlands to the north and west.

The ZTV suggests there would be a high degree of visibility between the monument and the proposed turbines, which may appear prominently in outward views from the fort to the southwest – over the area of land it appears to have been situated to survey.

To assess the potential impacts of the proposals a photomontage visualisation should be produced demonstrating the how the proposals would appear in views from the interior of the monument looking toward the development. This visualisation will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Castle Spynie, broch (SM4653)
The monument is the remains of a broch dating to the Iron Age comprising a thick stone wall which stands to 1m in height with an entrance in the southwest. Below the broch and to the northeast is an outer defence consisting of a line of boulders, a rampart and a ditch. Another ditch to the southwest provides added defence. The monument is situated on high ground above the Aird where it would have been visible from and be provided with extensive views of the Beauly Firth to the north-northeast and inland toward Strathglass.

The ZTV suggests that between 28-36 turbines would be visible from the site. In the first instance we recommend that a wireframe visualisation should be produced illustrating the impact of the proposed turbines in views from the site. We recommend that the position of the scheduled forts Phoineas Hill, enclosure 900m ESE of Phoineas House (SM4729) and Dun Mor, Ballindoun (SM2423) should be indicated on the visualisation. A photomontage may be required subsequently depending on how helpful this is and/or if significant impacts seem likely. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

David's Fort, homestead moat, Balavil Wood (SM2500)
The monument is a substantial moated site of medieval date situated in what is currently dense commercial forestry. It has been constructed in a position which affords it views over the fertile plain where the rivers Conon and Orrin meet. The monument's visibility from this area is also likely to have been important.

The ZTV suggests a high degree of visibility between the monument and the proposed turbines. As forestry is subject to significant change and felling this should not be relied upon to mitigate potential impacts or act as screening. We recommend that a wireframe visualisation should be produced looking from the monument towards the proposed turbines in the first instance: a photomontage may be requested in due course, depending on the results of the wireframe. These visualisations would inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Beauly Priory, priory and burial ground (SM90031)

The monument consists of the remains of Beauly Priory, founded for Valliscaulian monks around the 13th century. In addition to the standing remains of the church, which is aligned east to west, the buried remains of the monastic buildings underlie the graveyard adjoining the church.

The ZTV suggests a high degree of visibility of the proposed turbines from the monument in views to the west. It is unclear to what degree this visibility would be restricted by the buildings to the west and north of the monument.

We recommend that in the first instance, a bare-earth wireframe visualisation should be produced demonstrating the impact of the proposals in views from the monument. A photomontage may be subsequently required should significant impacts seem likely. These visualisations would inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Windhill, standing stone, N of (SM3128) and Windhill, Standing Stone NNE of (SM3127)
The monuments comprise two prehistoric standing stones on an east- west alignment. The western stone is 1.7m high in an arable field while the second stands 2.3m high. What may be the remains of another standing stone protrude through the grass to the southwest.

The existence of two standing stones in such close proximity suggests that the alignment between the two would have been key to their setting, with distant landscape features, astronomical events, or the rising and setting of the sun potentially playing a role in the ritual significance of the monument. The ZTV suggests a high degree of visibility between the monuments and the proposed turbines which may appear prominently in views from the monument to the west.

We recommend that the applicant assesses the impacts and produces a photomontage taken from the east of Windhill, standing stone, N of, (SM3128) looking towards the development. This visualisation will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Castle Hill, Henge (SM1665)
The monument comprises what has been interpreted as the remains of an unusual henge, although some have argued it may be the remains of a defended homestead. It is situated on raised ground within a modern golf course. Past surveys have identified entrances to west-northwest and east-southeast. Alignments with distant peaks, as well as with astronomical events were likely key to its setting. It is likely that views in these from within the monument, as well as from approaches to it from the lower surrounding ground were key to how the monument was experienced and appreciated in the past.

The ZTV indicates a high degree of visibility between the monument and the proposed turbines which may appear prominently in views from the monument to the west. We recommend that the applicant produces a photomontage visualisation which demonstrates the impact of the proposed turbine in views from the monument looking towards the development. Another photomontage should be produced looking toward the

site from the east demonstrating whether the proposals would detract from the prominence of the monument as a raised feature in an area that is relatively flat. These visualisations will inform the assessment of impacts and effects on the monument and identify any requirements for mitigation.

Mitigation

Based on the information provided in the scoping report, it is not possible to recommend specific mitigation measures at this stage. We would welcome the opportunity to discuss meaningful mitigation measures to avoid or reduce significant impacts with the applicant in due course.

Our position

From the information currently available it appears likely that the development would result in impacts on the settings of a large number of designated heritage assets. Those we consider most vulnerable to significant setting impacts have been outlined in detail above, but we also note that there may be further significant impacts that we have not been able to identify at this stage.

Having undertaken an assessment of the information available, it appears likely that the impact of the development on the settings of the following assets may be significant enough to warrant an objection for our interests.

- Urchany, barrow 595m SW of (SM13523)
- Dun Mor, fort (SM4979)
- Dun Garbhlaich, fort (SM2422)
- Dun a Chliabhain, fort (SM2424)
- Dun Fhamhair, fort (SM5212)

We expect suitable mitigation measures to be used to address any significant impacts on cultural heritage assets in accordance with relevant regulations and policy. Given the potential for significant effects as set out above, we strongly recommend that the applicant undertakes further engagement with us before an application is submitted.

Historic Environment Scotland
31 October 2024

From: LUP enquiries <LUPenquiries@hse.gov.uk>
Sent: Tuesday, October 8, 2024 4:41 PM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Subject: Re: Ballach Wind Farm proposal - scoping consultation

Dear Mr McFadden,

Thank you for your consultation of 1st October 2024 sent to HSE's email address HazSubConsent.CEMHD5@hse.gov.uk for a scoping opinion from the Scottish Ministers for HSE's view on the information which ought to be provided in the Environmental Impact Assessment Report for Ballach Wind Farm and battery energy storage system ahead of the submission for application for consent under section 36 of the Electricity Act 1989.

Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 – regulation 12

- HSE's response is limited to our role in the land use planning system for the control of major industrial hazards involving hazardous substances.

- HSE is not responding in our regulatory role in the health and safety system.

1. The proposed development, being a wind farm and battery energy storage system, is not a type that would store or process hazardous substances in quantities relevant to the potential for industrial major accidents with respect to The Planning (Hazardous Substances) Regulations 2015.

2. The development is not located within a safeguarding zone of an Explosives site licensed under the Explosives regulations 2014 or the Dangerous goods in harbour area regulations 2016.

3. The development is not located within HSE's land-use-planning consultation zones for major accident hazard pipelines and hazardous substances consented sites (licensed explosives sites are covered in the previous paragraph).

Due to the above 3 points, HSE have no views on the information to be included in an Environmental Impact Assessment Report.

4. If there is a major accident hazard establishment with no HSE consultation zones, in the vicinity of the proposed development, and you are concerned that the proposed development might increase the risk or consequences of a major accident at the existing establishment then please directly consult the operator of the establishment, as appropriate.

5. General health and safety at work

HSE realises that Environmental Risk Assessments are not expected to include general health and safety at work however we take this opportunity to point out that it may be beneficial for employer(s) to undertake a risk assessment as early as possible to satisfy themselves that their design and operation will meet requirements of relevant health and safety legislation as the project progresses.

Kind regards,
Berdine Clews
HSE's Land Use Planning Support Team
Health and Safety Executive | Chemicals, Explosives and Microbiological Division 5
lupenquiries@hse.gov.uk



For HSE's Land Use Planning Advice Terms and Conditions, please click on the following link HSE's Planning Advice Web App - Login (hsl.gov.uk) and then click on 'terms and conditions'.

A71

From: JRC Windfarm Coordinations Old
To: Stephen McFadden
Cc: Wind SSE
Subject: Ballach Wind Farm proposal - scoping consultation [WF275006]
Date: 14 October 2024 11:56:53

Dear stephen,

A Windfarms Team member has replied to your co-ordination request, reference **WF275006** with the following response:

If any details of this proposal change, particularly the disposition or scale of any turbine(s), this clearance will be void and re-evaluation of the proposal will be necessary.

Please do not reply to this email - the responses are not monitored.
If you need us to investigate further, then please use the link at the end of this response or login to your account for access to your co-ordination requests and responses.

Dear Stephen

***Planning Ref**:ECU00005219*

***Name/Location**: Ballach Wind Farm Proposal*

***Turbine(s) at NGR**:*

Turbine No	Easting Northing	Hub height (m)	Tip Height (m)
1	245625 848024	152.5	230
2	245157 847905	122.5	200
3	244429 847917	152.5	230
4	243881 847875	152.5	230
5	244317 847362	122.5	200
6	245009 847466	122.5	200
7	245727 847574	122.5	200
8	245475 847172	122.5	200
9	245024 846976	122.5	200
10	244716 846618	122.5	200
11	244101 846777	122.5	200
12	244297 846360	122.5	200
13	243725 846408	152.5	230
14	243746 847089	122.5	200
15	243409 847832	152.5	230
16	242935 847888	122.5	200
17	243095 847381	122.5	200
18	243110 846869	122.5	200

19	243222 846390	122.5	200
20	242697 846421	122.5	200
21	242561 847107	122.5	200
22	242559 847587	122.5	200
23	242162 847826	152.5	230
24	242143 847356	122.5	200
25	242187 846818	122.5	200
26	241526 846960	122.5	200
27	241686 847402	122.5	200
28	241686 847867	122.5	200
29	241182 848094	152.5	230
30	241273 847627	122.5	200
31	241104 847186	122.5	200
32	240816 847561	122.5	200
33	240706 848035	152.5	230
34	240237 848038	152.5	230
35	240273 847581	122.5	200
36	239803 847863	152.5	230

***Hub Height**: 122.5m / 152.5* ***Rotor Radius**: 77.5m*

*This proposal is **cleared - subject to 50m Micrositing -** with respect to radio link infrastructure operated by the local energy networks.*

JRC analyses proposals for wind farms on behalf of the UK Fuel & Power Industry. This is to assess their potential to interfere with radio systems operated by utility companies in support of their regulatory operational requirements.

In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal.

In making this judgement, JRC has used its best endeavours with the available data, although we recognise that there may be effects which are as yet unknown or inadequately predicted. JRC cannot therefore be held liable if subsequently problems arise that we have not predicted.

It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, developers are advised to seek re-coordination prior to considering any design changes.

Regards

Wind Farm Team

Friars House
Manor House Drive

Coventry CV1 2TE
United Kingdom

Office: 02476 932 185

JRC Ltd. is a Joint Venture between the Energy Networks Association (on behalf of the UK Energy Industries) and National Grid.
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We maintain your personal contact details and are compliant with the Data Protection Act 2018 (DPA 2018) for the purpose of 'Legitimate Interest' for communication with you. If you would like to be removed, please contact anita.lad@jrc.co.uk.

We hope this response has sufficiently answered your query.
If not, please **do not send another email** as you will go back to the end of the mail queue, which is not what you or we need. Instead, **reply to this email by clicking on the link below or login to your account** for access to your co-ordination requests and responses.

https://breeze.jrc.co.uk/tickets/view.php?id=34200

ANNEX B

Marine Directorate – Science Evidence Data and Digital (MD-SEDD) advice on freshwater and diadromous fish and fisheries in relation to onshore wind farm developments.

July 2020 updated September 2023

Marine Directorate – Science Evidence Data and Digital (MD-SEDD) provides internal, non-statutory, advice in relation to freshwater and diadromous fish and fisheries to the Scottish Government's Energy Consents Unit (ECU) for onshore wind farm developments in Scotland.

Atlantic salmon (*Salmo salar*), sea trout and brown trout (*Salmo trutta*) are of high economic value and conservation interest in Scotland and for which MD-SEDD has in- house expertise. Onshore wind farms are often located in upland areas where salmon and trout spawning and rearing grounds may also be found. MD-SEDD aims, through our provision of advice to ECU, to ensure that the construction and operation of these onshore developments do not have a detrimental impact on the freshwater life stages of these fish populations.

The Electricity Works (Environmental Impact Assessment) (EIA) (Scotland) Regulations (2017) state that the EIA must assess the direct and indirect significant effects of the proposed development on water and biodiversity, and in particular species (such as Atlantic salmon) and habitats protected under the EU Habitats Directive. Salmon and trout are listed as priority species of high conservation interest in the Scottish Biodiversity Index and support valuable recreational fisheries.

A good working relationship has been developed over the years between ECU and MD-SEDD, which ensures that these fish species are considered by ECU during all stages of the application process of onshore wind farm developments and are similarly considered during the construction and operation of future onshore wind farms. It is important that matters relating to freshwater and diadromous fish and fisheries, particularly salmon and trout, continue to be considered during the construction and operation of future onshore wind farms.

In the current document, MD-SEDD sets out a revised, more efficient approach to the provision of our advice, which utilises our generic scoping and monitoring programme guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren). This standing advice provides regulators (e.g. ECU, local planning authorities), developers and consultants with the information required at all stages of the application process for onshore wind farm developments, such that matters relating to freshwater and diadromous fish and fisheries are addressed in the same rigorous manner as is currently being carried out and continue to be fully in line with EIA regulations. At the request of ECU, MD-SEDD will still be able to provide further and/or bespoke advice relevant to freshwater and diadromous fish and fisheries e.g. site specific advice, at any stage of the application process for a proposed development, particularly where a development may be considered sensitive or contentious in nature.

MD-SEDD will continue undertaking research, identifying additional research requirements, and keep up to date with the latest published knowledge relating to the

impacts of onshore wind farms on freshwater and diadromous fish populations. This will be used to ensure that our guidelines and standing advice are based on the best available evidence and also to continue the publication of the relevant findings and knowledge to all stakeholders including regulators, developers and consultants.

MD-SEDD provision of advice to ECU

- MD-SEDD should not be asked for advice on pre application and application consultations (including screening, scoping, gate checks and EIA applications). Instead, the MD-SEDD scoping guidelines and standing advice (outlined below) should be provided to the developer as they set out what information should be included in the EIA report;
- if new issues arise which are not dealt with in our guidance or in our previous responses relating to respective developments, MD-SEDD can be asked to provide advice in relation to proposed mitigation measures and monitoring programmes which should be outlined in the EIA Report (further details below);
- if new issues arise which are not dealt with in our guidance or in our previous responses, MD-SEDD can be asked to provide advice on suitable wording, within a planning condition, to secure proposed monitoring programmes, should the development be granted consent;
- MD-SEDD cannot provide advice to developers or consultants, our advice is to ECU and/or other regulatory bodies.
- if ECU has identified specific issues during any part of the application process that the standing advice does not address, MD-SEDD should be contacted.

MD-SEDD Standing Advice for each stage of the EIA process

Scoping

MD-SEDD issued generic scoping guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which outline how fish populations can be impacted during the construction, operation and decommissioning of a wind farm development and informs developers as to what should be considered, in relation to freshwater and diadromous fish and fisheries, during the EIA process.

In addition to identifying the main watercourses and waterbodies within and downstream of the proposed development area, developers should identify and consider, at this early stage, any areas of Special Areas of Conservation where fish are a qualifying feature and proposed felling operations particularly in acid sensitive areas.

If a developer identifies new issues or has a technical query in respect of MD-SEDD generic scoping guidelines then ECU should be informed who will then co-ordinate a response from MD-SEDD.

Gate check

The detail within the generic scoping guidelines already provides sufficient information relating to water quality and salmon and trout populations for developers at this stage of the application.

Developers will be required to provide a gate check checklist (annex 1) in advance of their application submission which should signpost ECU to where all matters relevant to freshwater and diadromous fish and fisheries have been presented in the EIA report. Where matters have not been addressed or a different approach, to that specified in the advice, has been adopted the developer will be required to set out why.

EIA Report

MD-SEDD will focus on those developments which may be more sensitive and/or where there are known existing pressures on fish populations (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status/Pressures). The generic scoping guidelines should ensure that the developer has addressed all matters relevant to freshwater and diadromous fish and fisheries and presented them in the appropriate chapters of the EIA report. Use of the gate check checklist should ensure that the EIA report contains the required information; the absence of such information may necessitate requesting additional information which may delay the process:

Developers should specifically discuss and assess potential impacts and appropriate mitigation measures associated with the following:

- any designated area, for which fish is a qualifying feature, within and/or downstream of the proposed development area;
- the presence of a large density of watercourses;
- the presence of large areas of deep peat deposits;
- known acidification problems and/or other existing pressures on fish populations in the area; and
- proposed felling operations.

Post-Consent Monitoring

MD-SEDD recommends that a water quality and fish population monitoring programme is carried out to ensure that the proposed mitigation measures are effective. A robust, strategically designed and site specific monitoring programme conducted before, during and after construction can help to identify any changes, should they occur, and assist in implementing rapid remediation before long term ecological impacts occur.

MD-SEDD has published guidance on survey/monitoring programmes associated with onshore wind farm developments (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which developers should follow when drawing up survey and/or monitoring programmes.

If a developer considers that such a monitoring programme is not required then a clear justification should be provided.

Planning Conditions

MD-SEDD advises that planning conditions are drawn up to ensure appropriate provision for mitigation measures and monitoring programmes, should the development be given consent. We recommend, where required, that a Water Quality Monitoring Programme, Fisheries Monitoring Programme and the appointment of an Ecological Clerk of Works, specifically in overseeing the above monitoring programmes, is outlined within these conditions and that MD-SEDD is consulted on these programmes.

Wording suggested by MD-SEDD in relation to water quality, fish populations and fisheries for incorporation into planning consents:

1. No development shall commence unless a Water Quality and Fish Monitoring Plan (WQFMP) has been submitted to and approved in writing by the Planning Authority in consultation with Marine Directorate – Science Evidence Data and Digital (MD–SEDD) and any such other advisors or organisations.

2. The WQFMP must take account of the Scottish Government's MD-SEDD guidelines and standing advice and shall include:

    a. water quality sampling should be carried out at least 12 months prior to construction commencing, during construction and for at least 12 months after construction is complete. The water quality monitoring plan should include key hydrochemical parameters, turbidity, and flow data, the identification of sampling locations (including control sites), frequency of sampling, sampling methodology, data analysis and reporting etc.;

    b. the fish monitoring plan should include fully quantitative electrofishing surveys at sites potentially impacted and at control sites for at least 12 months before construction commences, during construction and for at least 12 months after construction is completed to detect any changes in fish populations; and

    c. appropriate site specific mitigation measures detailed in the Environmental Impact Assessment and in agreement with the Planning Authority and MD-SEDD.

3. Thereafter, the WQFMP shall be implemented within the timescales set out to the satisfaction of the Planning Authority in consultation with MD- SEDD and the results of such monitoring shall be submitted to the Planning Authority on a 6 monthly basis or on request.

Reason: To ensure no deterioration of water quality and to protect fish populations within and downstream of the development area.

Sources of further information

NatureScot (previously “SNH”) guidance on wind farm developments - https://www.nature.scot/professional-advice/planning-and-development/advice- planners-and-developers/renewable-energy-development/onshore-wind- energy/advice-wind-farm

Scottish Environment Protection Agency (SEPA) guidance on wind farm developments – https://www.sepa.org.uk/environment/energy/renewable/#wind

A joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science (now MD-SEDD) and Association of Environmental and Ecological Clerks of Works (2019) Good Practice during Wind Farm Construction - https://www.nature.scot/guidance- good-practice- during-wind-farm-construction.

Annex 1 (revised September 2023)

Marine Directorate – Science Evidence Data and Digital (MD-SEDD) – EIA Checklist

The generic scoping guidelines should ensure that all matters relevant to freshwater and diadromous fish and fisheries have been addressed and presented in the appropriate chapters of the EIA report. Use of the checklist below should ensure that the EIA report contains the following information; the absence of such information ***may necessitate requesting additional information*** which could delay the process:

MD-SEDD Standard EIA Report Requirements	Provided in application YES/NO	If YES – please signpost to relevant chapter of EIA Report	If not provided or provided different to **MD-SEDD** advice, please set out reasons.
1. A map outlining the proposed development area and the proposed location of: ○ the turbines, ○ associated crane hard standing areas, ○ borrow pits, ○ permanent meteorological masts, ○ access tracks including watercourse crossings, ○ all buildings including substation, battery storage; ○ permanent and temporary construction compounds; ○ all watercourses; and ○ contour lines;			

2. A description and results of the site characterisation surveys for fish (including fully quantitative electrofishing surveys) and water quality including the location of the electrofishing and fish habitat survey sites and water quality sampling sites on the map outlining the proposed turbines and associated infrastructure. **This should be carried out where a Special Area of Conservation (SAC) is present and where salmon are a qualifying feature, and in exceptional cases when required in the scoping advice for other reasons. In other cases, developers can assume that fish populations are present**;			
3. An outline of the potential impacts on fish populations and water quality within and downstream of the proposed development area;			
4. Any potential cumulative impacts on the water quality and fish populations associated with adjacent (operational and consented) developments including wind farms, hydro schemes, aquaculture and mining;			

5. Any proposed site specific mitigation measures as outlined in **MD-SEDD** generic scoping guidelines and the joint publication "Good Practice during Wind Farm Construction" (https://www.nature.scot/guidance-good-practice-during-wind-farm-construction);			
6. Full details of proposed monitoring programmes using guidelines issued by **MD-SEDD** and accompanied by a map outlining the proposed sampling and control sites in addition to the location of all turbines and associated infrastructure. **At least 12 months of baseline pre-construction data should be included. The monitoring programme can be secured using suitable wording in a condition.**			
7. A decommissioning and restoration plan outlining proposed mitigation/monitoring for water quality and fish populations. **This can be secured using suitable wording in a condition.**			

Developers should specifically discuss and assess potential impacts and appropriate mitigation measures associated with the following:	Provided in application YES/NO	If YES – please signpost to relevant chapter of EIA Report	If not provided or provided different to **MD-SEDD** advice, please set out reasons.
1. Any designated area **(e.g. SAC),** for which fish is a qualifying feature, within and/or downstream of the proposed development area;			
2. The presence of a large density of watercourses;			
3. The presence of large areas of deep peat deposits;			
4. Known acidification problems and/or other existing pressures on fish populations in the area; and			
5. Proposed felling operations.			

A83

From: MSS CommunityCouncil
To: Stephen McFadden
Subject: Response to Scoping Consultation for Ballach Windfarm
Date: 14 November 2024 16:57:07

Dear Stephen McFadden,

Thanks for extending the deadline for submitting responses to the scoping consultation for a windfarm at Ballach. On behalf of Marybank, Scatwell & Strathconon Community Council I would like to put on record our deep concerns about this proposal.

It goes without saying that there is a need for moving away from using fossil fuels and generating more renewable sources of energy. However, this should be done with a more holistic approach that takes into account the needs of the environment and the people and creatures who live here.

Seen in connection with the existing windfarm at Fairburn and the planned Fairburn Extension, this new installation would form an uninterrupted swathe of turbines over a vast area of hitherto unspoilt land, all this very much to the detriment of human beings and the existing fauna and flora.

The turbines might not be visible from all nearby locations, but they would still generate a considerable amount of radiation and noise, which would have an impact on our residents' health and wellbeing. Our experience stemming from the noise coming from the existing Fairburn windfarm makes us very worried, not least in view of the fact that any new turbines will be much bigger and therefore noisier. Even now some of our residents complain of headaches and migraines when the turbines are active. This would be much aggravated by this planned "wall of sound".

Our precious wildlife would likewise be affected. Our area provides living room to such rare and protected species as Golden Eagles, Scottish Wildcats, Red Squirrels, Pine Martens, Water Voles and more. These creatures do not understand about windfarms and boundaries. They would just lose their habitats or be killed outright.

The tourism industry in Scotland is a cornerstone of the Scottish economy, offering numerous jobs and attracting millions of visitors every year who come here to enjoy our unspoilt landscape. It is more and more being elbowed into a corner by windfarm developments. If all the planned projects come to pass, large parts of the Highlands will morph into a vast building site for years to come which will leave behind an industrial wasteland.

It is widely accepted that Scotland already generates more renewable energy than is needed in this country, even without considering those facilities that are under construction or at least have planning permission. The area covered by Marybank, Scatwell & Strathconon Community Council is currently hosting 2 hydropower stations and another 2 "half" ones (straddling the boundary to neighbouring CCs). There is also 1 windfarm in operation (20 turbines), a planned extension to it (14 turbines), 2 windfarms immediately adjacent and therefore impacting us (together 40 turbines), and another 3 windfarms at

the planning stage (together 37 turbines). The intended Ballach windfarm would increase the overall number of turbines in or adjacent to our area by just over a third. Neighbouring Community Councils are in the same situation.

Politicians often talk about their desire to stem the depopulation of the countryside. The current proliferation of windfarms has the opposite effect: who wants to live – or come to live – in an area that was once iconic but is now increasingly being marred by turbines?

This project is not in the interest of the people who live here (and pay among the highest prices for energy) but is intended to provide a source of profit to companies who are happy to take advantage of the resources of the country but have no intentions of taking adequately into consideration the wellbeing of the environment and the people.

Kind regards

Christine MacKintosh

(Marybank, Scatwell & Strathconon Community Council, Secretary)

From: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Sent: Wednesday, October 2, 2024 12:53 PM
To: Stephen McFadden <Stephen.McFadden@gov.scot>
Cc: Econsents Admin <Econsents_Admin@gov.scot>
Subject: RE: Ballach Wind Farm proposal - scoping consultation [SG38205]

Our Ref: SG38205

Dear Sir/Madam

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.

However, please be aware that this response applies specifically to the above consultation and only reflects the position of NATS (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.

If any changes are proposed to the information supplied to NATS in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully

NATS

NATS Safeguarding

E: natssafeguarding@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
www.nats.co.uk

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

By email to: stephen.mcfadden@gov.scot

22 November 2024
Your ref: ECU00005219
Our ref: CEA177331

Dear Stephen

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT)(SCOTLAND) REGULATIONS 2017 SCOPING OPINION REQUEST– BALLACH WIND FARM PROPOSAL

Thank you for your consultation dated the 1 October 2024, requesting comments on the above Scoping Request submitted by Energiekontor UK Ltd (hereafter referred to as 'the Applicant') for the Ballach wind farm (hereafter referred to as 'the Proposal'). We understand the Proposal will consist of 36 turbines up to 230m tip height. The Proposal includes a substation, energy storage compound, and ancillary infrastructure including new and upgraded access tracks etc. The Proposal is located approximately 4 kilometres (km) northwest of Kilmorack.

1. Summary

The key issues relevant to our interests that we advise should be addressed in the Environmental Impact Assessment (EIA) Report include:

- Landscape and visual impacts, including impacts on locally and nationally important landscapes and cumulative impacts;
- Potential impacts to protected areas, including the Glen Affric to Strathconon Special Protection Area for breeding golden eagle;
- Potential for impacts, including cumulative impacts, to birds such as, but not limited to, golden eagle, other Schedule 1 species, and black grouse;
- Potential impacts to priority peatland habitats.

The assessment of these issues and the resultant impacts will determine our position on any application which comes forward. We provide more detailed comments on these and other site-specific issues in Annex 1 to this letter, to assist with the EIA process. We recommend the results of survey and assessment are used to inform the design and layout, seeking to avoid impacts to the sensitivities outlined in Annex 1 and in the Scoping Report. If avoidance of impacts is not possible, we advise any impacts are minimised through appropriate mitigation, details of which should be provided in the EIA Report. Any new tracks required to accommodate the Proposal should be subject to the appropriate ecological surveys and assessment. If track widening works are required, then ecological surveys should also be conducted in those areas if there is a possibility of protected species or habitats being present.

2. General pre-application and scoping advice

The Scoping Report broadly covers the topics that we would expect to see included in the EIA. Our website includes a wide range of standing advice and guidance documents which we recommend are followed in the preparation of the EIA Report (available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-standing-advice-and-guidance-documents).

Further guidance is available at: https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms. While this provides guidance on the issues that developers and their consultants should consider for wind farm developments, it also provides advice on other considerations within the EIA. This guidance was updated in February 2024 to align with National Planning Framework 4 (NPF4) and to provide further advice on biodiversity enhancement and peatlands as well as advice on other more general issues. It is a key resource for issues within our remit and outlines our advice on the type of survey and assessment work that would likely be required to support a future application, sources of further information, and guidance on data presentation.

3. Biodiversity enhancement

NPF4 sets out requirements for development to deliver positive effects for biodiversity, primarily under Policy 3. For national and major developments, or those subject to EIA, Policy 3b notes that proposals will only be supported where it can be demonstrated that they will conserve, restore and enhance biodiversity, including nature networks, so they are in a demonstrably better state than without intervention. The policy requires that such proposals demonstrate significant biodiversity enhancement, in addition to any proposed mitigation.

The Scottish Government Draft Planning Guidance on Biodiversity (available at: https://www.gov.scot/publications/scottish-government-draft-planning-guidance-biodiversity/) provides further advice on delivering biodiversity enhancement. Although labelled as “Draft Guidance” it is intended that it should be used now to assist in implementation and delivery of Policy 3.

We advise that:

- Information on predicted losses, and the proposed mitigation, compensation and enhancement should be clearly set out, and also concisely summarised, in the application, so that this can be easily understood by decision makers;
- The proposal should clearly set out the type and scale of enhancement it will deliver, ensuring that the application clearly distinguishes between those elements mitigating or compensating for adverse effects and those delivering enhancement;
- On-site enhancement should be prioritised before off-site delivery. Where purely on-site enhancement is not possible, the Scottish Government draft guidance sets out further considerations for off-site delivery;
- It is also important that the application demonstrates that the enhancement is to be secured within a reasonable timescale and with reasonable certainty, including appropriate management and monitoring arrangements, and sustained for the future (preferably in perpetuity) in order to deliver a lasting legacy; and
- Enhancement requires consideration of all biodiversity, not just the significant effects that are the focus of EIA.

Our Developing with Nature guidance (available at: https://www.nature.scot/doc/developing-nature-guidance) has been prepared, in discussion with Scottish Government, to support local development applications. It sets out a number of common measures to enhance biodiversity that are widely applicable. For national, major and EIA developments, more detailed assessment and more ambitious measures are likely to be required, but elements of our Developing with Nature guidance may still be helpful. The Applicant could also consult the Planning Authority and the Highland Nature Biodiversity Action Plan 2021 to 2026 for further information on potential enhancement opportunities.

For information and updates, please see our enhancing biodiversity webpage (https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-enhancing-biodiversity).

We support the use of a Habitat Management Plan (HMP) on a wind farm site to provide for positive management and enhancement of habitats across the development site to benefit biodiversity and not just mitigate impacts. We note a HMP is currently proposed, and we advise that restoration and enhancement measures are located away from turbines and infrastructure for moorland breeding birds, black grouse and foraging and nesting raptors etc. If management is located within the proposed turbine footprint and the immediate surrounding area it will potentially make the wind farm more attractive to foraging birds and thus negate any supposed benefit.

The EIA Report should offer an outline HMP that sets out broad measures to benefit biodiversity. The outline HMP would then be worked up in detail and implemented should the development be granted permission and be constructed.

Please note that while we are supportive of the principle of renewable energy, our advice is given without prejudice to a full and detailed consideration of the impacts of the Proposal if submitted for formal consultation as part of the EIA or planning process.

The advice in this letter is provided by NatureScot, the operating name of Scottish Natural Heritage.

Please let me know if you or the Applicant require any further information or advice from us in relation to this Proposal.

Yours sincerely

Ruari Dunsmuir
Operations Officer – Central Highland
ruari.dunsmuir@nature.scot

Annex 1 – NatureScot advice on the scope of the EIA for the proposed Ballach wind farm

1. Landscape & visual

1.1. Effects on the Glen Strathfarrar National Scenic Area (NSA)

Based on the Scoping layout, height of the proposed turbines, and theoretical visibility of the Proposal shown on the supplied Zone of Theoretical Visibility (ZTV), we consider that the Proposal has the potential to significantly affect the Special Landscape Qualities (SLQs) of the Glen Strathfarrar NSA. We therefore advise that an Assessment of Effects on the Special Landscape Qualities (AESLQ) of the Glen Strathfarrar NSA is undertaken. We are happy to agree the scope of the assessment, potential assessment locations, and SLQs to be scoped in/ out once drafts and preliminary wirelines are shared with us to ensure that the assessment is focused.

We advise that given the siting, scale and resultant predicted theoretical visibility of the Proposal over the Strathfarrar NSA an Assessment of Effects on the Special Landscape Qualities (AESLQ) of the NSA will be required.

This assessment should include consideration of any aviation lighting and how the SLQs may be affected by this element of the Proposal. We are expecting to publish our new jointly drafted Aviation Lighting Assessment Guidance on Monday 25 November on our website and recommend this is considered by the Applicant (https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-standing-advice-and-guidance-documents).

We are in the process of finalising our Guidance on Assessment of Effects on Special Landscape Qualities and strongly recommend the Applicant is mindful of emerging guidance in the new year.

1.2. Effects on the Central Highlands Wild Land Area (WLA 24)

The Proposal lies immediately adjacent to the Central Highlands WLA 24 with visibility of the Proposal likely to extend across its eastern flanks. We advise that a Wild Land Impact Assessment will be required to fully understand the potential effects, with consideration of additional effects that this Proposal might have to the WLA as a result of the existing Fairburn wind farm. This assessment should be used to mitigate impacts on the WLA, however it is unlikely that we would object on this matter.

We advise that given the siting and predicted theoretical visibility of the Proposal over the Central Highlands WLA, a Wild Land Assessment will be required.

1.3. Locally designated landscapes

We defer to The Highland Council as to potential effects on locally designated Special Landscape Areas.

1.4. Cumulative effects

The Proposal would increase the visibility of wind farm development within the Glen Orrin and Gleann Goibhre area. We would like to highlight the potential for cumulative impacts between the Proposal, 36 turbines of up to 230m tip height, and the existing Fairburn wind farm, 20 turbines at 100m blade tip height. Consideration should be given to the density and layout of the turbines across the topography, and to the visual integration of these with the existing wind farm. Cumulative day time and night-time interactions between these developments will be a key consideration of the Cumulative Impact Assessment.

When considering which other wind farm developments to include within the cumulative assessment, we consider that the Highland Council are best placed to advise.

2. Protected areas

We recommend that the design and layout aim to avoid direct and indirect impacts to protected areas including those outlined below. Further information can be found on SiteLink at: https://sitelink.nature.scot/home

2.1. European sites

The status of the following sites mean that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") apply or, for reserved matters, The Conservation of Habitats and Species Regulations 2017. Further information on the legislative requirements of European sites can be found at: https://www.nature.scot/doc/legislative-requirements-european-sites. A Habitats Regulations Appraisal (HRA) would be required to assess potential impacts to these sites, and any future application would need to demonstrate there was no adverse impact on site integrity.

Glen Affric to Strathconon Special Protection Area (SPA)

The Proposal is located close to the Glen Affric to Strathconon SPA protected for its breeding golden eagle (*Aquila chrysaetos*) qualifying interest. Further information is available on our website at: https://sitelink.nature.scot/site/10233

Given the sensitive location of the Proposal close to the Glen Affric to Strathconon SPA and the number of golden eagle flights recorded over the site, the EIA Report will need to include a robust assessment of the impacts on golden eagle, not only in relation to the SPA, but also in the context of its population Natural Heritage Zone (NHZ) population and transient birds.

The nearest golden eagle territory was vacant in the 2015 National Survey but since then there has been a significant increase in the golden eagle population with many old territories re-occupied or new territories formed. Up to date information on the status of golden eagles in the NHZ is therefore necessary to allow a proper assessment.

Inner Moray Firth SPA

Potential osprey recorded on site are likely to be connected to the Inner Moray Firth SPA. Further information is available on our website at https://sitelink.nature.scot/site/8515

3. Ornithology

We note that ornithological field surveys were undertaken between October 2017 and September 2019 with a year's update survey between 2023 - 2024. NatureScot have not been consulted on the scope of the surveys prior to this Scoping Request. The original survey data is now out of date and the 2019 data may also be more than five years old by the time of submission. Further survey work in 2025 will be required to provide an adequate baseline for the assessment of the ornithological impacts and to conform with guidance in which we recommend survey for a minimum of two years to allow for variation in bird use between years.

Vantage point (VP) surveys and viewsheds, shown in Figure 9.2 do not conform to guidance. All the VPs are within the proposed turbine array. It is important to minimise the observer's effect on bird behaviour. For this reason, VPs are best located outside the survey area where possible. Where VPs are located within the survey area, they should not be used simultaneously with other VP locations which overlook them as the presence of an observer either sitting at or moving to/ from the VP will probably affect bird behaviour. The Applicant will need to provide sufficiently detailed information regarding the presence of surveyors and how this will not have biased the recorded flight activity as well as justification for the selection of VPs.

In addition, the viewsheds show eleven of the thirty-six turbines are not covered by the VP surveys. A further nine turbines appear to be so close to the boundaries of the modelled viewsheds with the recommended survey buffer around the turbines is not covered. Therefore, twenty of the thirty-six turbines (56%) are not adequately covered by the flight activity surveys. The VPs should cover the defined survey area encompassing the proposed turbine envelope and should extend to 500m beyond the outermost proposed turbines to deal with inaccuracies of position for flight line observations. This will also reduce the risk of failing to record birds that use the wind farm area only occasionally. If the final design includes turbines from outside of the VP viewsheds then our confidence in the collision risk modelling may be reduced and we may therefore not be able to rely on the assessment to inform our appraisal of the Proposal. The Applicant will need to provide justification why sufficient coverage could not be achieved and explain how this affects collision risk calculations. If we are not content with the justification provided, we may request that additional vantage point survey is undertaken.

The Applicant has not provided information on the distance above the ground used to model the viewsheds. Thus, there is the potential for the swept area of further turbines to have not being adequately covered. Based on the dimensions provided in the Scoping Report the swept area of the turbines will extend from a minimum of 45m (122.5m - 77.5m) to 230m. The Applicant therefore will need to provide a viewshed map that shows the visibility at 45m, or preferably less to allow for observer error, to allow us to assess whether the flight activity surveys undertaken so far are adequate to allow for an assessment of the potential impacts of this Proposal.

It should be noted we expect the operational time used in the collision risk modelling to be based on the wind farm being operational for 85% of the time as recommended in guidance.

Prior to submission of the EIA Report we advise the Applicant ensures that all survey methods and assessment have followed our guidance at: https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms. We advise that survey work and the desk study also cover access routes as well as any proposed habitat management or enhancement areas. This will allow the potential for disturbance and displacement to be assessed, especially for Schedule 1 species, and any constraints and/ or mitigation requirements to be identified.

All of our relevant guidance is available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/onshore-wind-energy/wind-farm-impacts-birds.

We would recommend the Applicant contact the RSPB and the Highland Raptor Study Group for current information from the proposed development site and appropriate buffers around it with regards to nest sites, alternative nest sites, roost sites, and recent breeding productivity. The Scoping Report makes no mention of surveys for roosting or display areas, and we recommend that these are also considered in accordance with our guidance.

Cumulative impacts on ornithological interests from other operational and consented wind farm developments should be assessed at the Natural Heritage Zone (NHZ) level. Please ensure the correct data

source is referenced for NHZ population figures. The Scoping Report refers to the incorrect Natural Heritage Zone, The Peatlands of Caithness and Sutherland NHZ 5. The Proposal is located within Northern Highlands NHZ 7.

The Proposal may impact on the NHZ 7 golden eagle population, both as an individual scheme and in combination with other developments. We therefore recommend that GET (Golden Eagle Topographical) modelling is undertaken to help with the assessment of impacts, including potential loss of foraging habitat. For further advice see: https://www.nature.scot/doc/naturescot-statement-modelling-support-assessment-forestry-and-wind-farm-impacts-golden-eagles.

A considerable number (144) red kite flights have been recorded on site. Up to date information on the North of Scotland red kite population with an assessment of the effect of this Proposal on the population both in isolation and in combination with other operational, consented, and planned schemes will be required. Preliminary analysis shows the impacts of persecution is still a major impact on the north of Scotland population however when the additional impacts of wind farms are included this species population has the potential to decline. The capacity to absorb additional mortality within the range of the North Scotland red kite population is now very limited and their status is of increasing concern.

4. Peatland

The Scoping Report notes that the site is comprised of heathland with areas of bog and small areas of marshy grassland with several lochs and smaller lochans located within and adjacent to the site. Phase 1 and NVC habitat surveys have been undertaken in summer 2024 and we recommend that these should cover the whole development site to assess impacts from the Proposal, help inform potential redesign or micro-siting and identify potential areas for habitat restoration and enhancement. Surveys should cover an appropriate buffer to account for hydrological changes as well as any areas where access tracks/ track upgrades and borrow pits may be proposed. Where Annex 1 or UKBAP Priority Habitats occur, we recommend surveys are carried out to NVC level. Target notes should be used to identify the presence of any notable plants including any nationally rare/ scarce species.

We recommend that survey results are used to inform the design and layout process, so that the Proposal avoids, where possible, sensitive habitats such as blanket bog. Where this is not possible, impacts should be minimised and suitable mitigation, restoration and/ or compensation measures be proposed. Assessment should consider the extent of habitat loss and damage, both direct and indirect, temporary and permanent, and suitable mitigation and/ or restoration measures be presented in a Habitat Management Plan and Peat Management Plan.

Based on the Scoping layout, turbines are proposed on areas mapped as Class 1 and 2 peatland. We recommend that the Applicant refers to our peatland guidance (available at: https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management). This includes, in Annex 1, a recommended method for assessment of peatland habitat condition which we recommend is used to help inform the design and layout process. The guidance also includes advice on the mitigation hierarchy, survey and assessment, and mitigation and enhancement, including peatland restoration techniques, Habitat Management Plans and the level of information which would be expected for a future application. Where there are significant effects on high quality peatlands we may object to a proposal.

NPF4 Policy 5 (Soils) provides protection for carbon-rich soils and peatlands. NPF4 Policy 5d requires that "*where development on peatland, carbon-rich soils or priority peatland is proposed, a detailed site-specific assessment will be required*". In addition to NVC habitat survey, development proposals on peat should be

supported by a site-specific and detailed peat survey, a Peat Management Plan and a Peat Landslide Hazard Risk Assessment (PLHRA). Links to current guidance relevant to peatland survey and assessment can be found at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-standing-advice-and-guidance-documents.

NPF4 Policy 3 (Biodiversity) also applies to all development proposals, so any proposal affecting carbon-rich soils and peatlands must take into account the requirements to conserve, restore and enhance biodiversity, including priority peatland habitats. We advise that site-specific assessments and surveys inform the project design and siting to ensure compliance with the mitigation hierarchy. Where impacts cannot be avoided, they should be minimised, and our current recommendation is that restoration to achieve offsetting (i.e. compensation rather than biodiversity enhancement) should be in the order of 1:10 (lost:restored), i.e. 1ha loss of peatland should result in measures to restore 10ha of peatland. The guidance recommends that any proposed enhancement should be in addition to this, for example 10% of the baseline assessment of the extent of priority peatland habitat.

5. Ecology

Protected species surveys

The Scoping Report notes the potential presence of several protected species. We recommend that surveys for all protected species follow the methods published on our website at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-protected-species. Our guidance contains detailed advice on survey methods (including timing of surveys, survey area and shelf-life), Species Protection Plans, mitigation, and licence applications. If protected species could be affected by the Proposal a Species Protection Plans should be included in the EIAR. The Species Protection Plan should include:

- measures proposed to minimise impacts on the species, including annotated maps and/ or photographs showing the location of any measures proposed and how they relate to survey information and construction work;
- a summary of any residual impacts once the above measures are taken into account; and
- details of any licensing requirements.

Note that pre-construction survey will usually be required for the species already considered at pre-application stage (i.e. their presence, or potential presence, presented a potential risk of damage or disturbance). Pre-construction surveys enable checks for new occupation, or changed distribution, further to the original survey, and so help ascertain whether protected species could be affected by the development. Pre-construction surveys can further inform mitigation measures in Species Protection Plans submitted as part of an application. If species had not required a protection plan at the application stage, but the pre-construction surveys identify new risks, then a plan will need to be prepared for those species.

We recommend consideration of mountain hare if suitable habitat is present.

Deer

As wild deer use the development site, the applicant should assess the implications of the Proposal on deer and the indirect impacts on other interests (e.g. protected areas, habitats, neighbours, roads, etc.). This should be presented in the assessment as part of the EIA Report, even if impacts are unlikely. The assessment may indicate the need for management to avoid adverse impacts. If so, we advise the need for a deer management statement, either as part of a HMP or as a stand-alone document. For some sites, the

modification of an existing Deer Management Plan covering a wider area may be more appropriate. We do not expect developers to exert control over land that they have no rights over. However, we encourage a collaborative approach with neighbouring landowners and managers to avoid adverse impacts on the interests of all parties. A deer management statement may be included amongst the EIA Report's submitted mitigation measures or produced to comply with a planning condition. Please see our guidance on what to consider and include in deer assessments and management at development sites (https://www.nature.scot/doc/guidance-planning-and-development-what-consider-and-include-deer-assessment-and-management).

6. Forestry

If felling is required to accommodate the Proposal, we recommend that the Applicant contacts Scottish Forestry to discuss the Control of Woodland Removal Policy and the implications this may have on the development.

7. Grid connection

Should details on the grid connection be known by the time the EIA Report is prepared we recommend these are included. This may have implications, both alone and cumulative, for the natural heritage interests highlighted above, in particular internationally and nationally protected areas, as well as other interests not included here.

8. Decommissioning

We recommend that the EIA process assesses the likely impacts of decommissioning. Although this can be brief it should still provide an appropriate level of detail on how the site infrastructure may be removed and how the site is intended to be restored.

A95

Stephen McFadden
Energy Consents Unit
The Scottish Government
Sent by email: Stephen.McFadden@gov.scot

13th November 2024

Dear Stephen,

THE ELECTRICITY ACT 1989
THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING OPINION REQUEST– BALLACH WIND FARM PROPOSAL

Thank you for consulting RSPB Scotland on the scoping opinion request regarding the proposed Ballach Wind Farm in the Highland Council. We hope that our comments presented below will be useful in the formation of the scoping opinion and to the Applicant in preparing any EIA Report.

RSPB Scotland is supportive of renewable energy, including onshore windfarms, as it is essential to achieve net zero. However, we are also facing a biodiversity crisis, with significant declines in the abundance and numbers of species in Scotland; RSPB Scotland thinks it is vital that windfarms are carefully sited and designed to ensure that impacts on nature are avoided where possible. NPF4 was adopted in February 2023 and acknowledges that the climate and nature crises are intrinsically linked. RSPB Scotland believes that developments should leave nature in a better state than before and is supportive of NPF4 Policy 3 which requires developments to deliver positive effects for biodiversity.

<u>The Habitats Regulations</u>

As shown in Scoping Report Figure 9.3, the proposed site boundary is within connectivity distance[1] to the Glenaffric to Strathconon SPA, the Inner Moray Firth SPA and the Cromarty Firth SPA. Due to the location and nature of the proposed development, RSPB Scotland thinks there is potential for this proposal to have a likely significant effect on the above mentioned SPAs. Consequently, the determining authority is required by the Conservation of Habitats and Species Regulations 2017

[1] NatureScot. 2016. *Assessing Connectivity with Special Protection Areas (SPAs).* Available: https://www.nature.scot/doc/assessing-connectivity-special-protection-areas

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The RSPB is part of BirdLife International, a network of passionate organisations, working together to save nature across the world.

Chair of Council: Kevin Cox **President:** Dr Amir Khan **Chair, Committee for Scotland:** Dr Vicki Nash **Director, RSPB Scotland:** Anne McCall
The Royal Society for the Protection of Birds (RSPB) is a registered charity: England and Wales no. 207076, Scotland no. SC037654 Registered address: The Lodge, Potton Road, Sandy, Bedfordshire, SG19 2DL

('the Habitats Regulations') to undertake an Appropriate Assessment of the effects of the proposal on the SPAs and their qualifying species in light of the conservation objectives of each SPA. As part of the EIA submission, the applicant must include sufficient information to inform the Appropriate Assessment.

Designated Sites and Birds of Conservation Concern

We agree with the designated sites which are proposed to be scoped into the assessment (Table 9.1) and have some further comments and recommendations to inform the EIA.

Glen Affric to Strathconon SPA - Golden Eagle

The Proposed Development lies 2km from the Glen Affric to Strathconon SPA, designated for breeding Golden Eagle. It is possible that breeding birds from this SPA, and immature birds, would use the proposed development site to forage and roost as it is within the 6km connectivity distance[2], as per NatureScot guidance.

Golden Eagle is listed on Schedule 1, 1A and A1 of the Wildlife and Countryside Act 1981 which means that the birds and their nest sites are protected from disturbance and interference all year round. We are aware of one likely Golden Eagle territory approximately 3km from the Proposed Development. The likely impacts of this development on Golden Eagle are loss of territory area and loss of possible foraging (on open ground) for both breeding and non-territorial birds. This should be assessed in the EIA.

Although Golden Eagle collisions with wind turbines are rare, presumed victims of collision have been found in Scotland; NatureScot may be able to advise further on reported numbers. We acknowledge that a Golden Eagle Topographical (GET) model has been produced for this site (Section 9.28). Although this GET model should not take precedence over observational data, particularly of breeding birds, the GET model can be used to predict landscape use by dispersing and non-breeding Golden Eagles. Survey and GET model results should be used to help ensure that the final design of the wind farm avoids the areas within the site that will most likely be used by Golden Eagles.

Inner Moray Firth SPA - Osprey

Breeding Osprey is a designated feature of the Inner Moray Firth SPA; this species has a core range of 10km[3]. We have records of breeding Osprey in the proximity to the Proposed Development. Information should be requested from the Highland Raptor Study Group to determine if any nests are active to inform the EIA.

Cromarty Firth SPA - Wintering Greylag Goose

Wintering Greylag Goose are a designated feature of the Cromarty Firth SPA, with a core foraging distance of 15-20km, therefore they should be considered in the EIA. This is further supported by Table 9.2 in which "unidentified goose" had 2 flights with a peak number of 100 individuals.

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[2] NatureScot. 2016. *Assessing Connectivity with Special Protection Areas (SPAs).* Available: https://www.nature.scot/doc/assessing-connectivity-special-protection-areas

[3] NatureScot. 2016. *Assessing Connectivity with Special Protection Areas (SPAs).* Available: https://www.nature.scot/doc/assessing-connectivity-special-protection-areas

Wider Countryside Birds of Conservation Concern

We have records of the following wider countryside birds in the vicinity of the proposed development site: Annex 1, Schedule 1 and Red Listed Hen Harrier, Annex 1 and Schedule 1 Red Kite, Red Listed Black Grouse, Red Listed Common Gull, Annex 1 Golden Plover, Annex 1, Schedule 1 and Red Listed Merlin, Red Listed Curlew, Red Listed Lapwing and Amber Listed Snipe.

Red Kite

The proposed development site and surrounding area is important for Red Kites, as shown by the survey results so far in which two Red Kite territories were reported in the raptor and diver survey area in 2019 (Section 9.16). Red Kite was also the most frequently recorded species in the 2018/2019 flight activity surveys with 144 flights (Section 9.24) and is currently the most frequently recorded in the updated flight surveys (Section 9.25) with 44 flights. Further information on breeding birds and winter roosts should be requested from the Highland Raptor Study Group.

We recommend impacts of disturbance and displacement should be considered in the EIA for this species. Collisions have been recorded at nearby wind farms in the Highlands, including the neighbouring Fairburn Wind Farm[4], and more information on these should be sought from NatureScot. We recommend every effort should be made to locate turbines away from areas of concentrated use to avoid impacts on this species and then mitigation options considered to reduce any impacts further. Requirements for construction and infrastructure should avoid active nests and roost sites.

Black Grouse

Black Grouse is a red listed species of conservation concern. RSPB Scotland holds records of Black Grouse leks in the proposed development area. Section 9.27 of the Scoping Report states that "Black grouse are present in the survey area, albeit in low numbers. A group of three males has been recorded lekking in the south of the survey area in 2024." Due to population decline, a lek of three males should be considered important.

We recommend the EIA includes an assessment of the impacts of disturbance, displacement, and collision risk for this species. Black Grouse are known to collide with turbine bases rather than the blades so this should be included in the collision risk assessment. Black Grouse are sensitive to disturbance during lekking, and infrastructure location should be designed to avoid potential displacement, ensuring a 750m buffer is in place around leks[5]. In addition, we recommend work should be planned to avoid disturbance during the lekking season (March to May inclusive). We would encourage the consideration of positive habitat management for the species within a 1.5km (minimum) radius of lek sites recorded. Promotion of heather and other dwarf shrubs and low-density native woodland planting adjacent to commercial forestry blocks may also help sustain the species along with areas of bog restoration to create wetter areas for feeding. This should be considered in any biodiversity enhancement actions.

[4] https://www.bbc.co.uk/news/10413334
[5] https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance

Curlew and other waders

The initial results provided in the Scoping Report for the Breeding Bird Survey in 2018 and 2019 show the importance of this site for breeding waders, with highs in 2018 of 4 pairs of Curlew and 12 pairs of Golden Plover (Section 9.11). Due to the age of this survey work, up to date data is required to fully understand the impacts to Curlew and other waders at this site.

Curlew was identified as a high conservation priority in a paper authored by RSPB and statutory agencies in 2015[6]. The research highlights that the UK supports 19-27% of the global population and the long-term trend shows a 64% decline from 1970 to 2014 (from BTO Breeding Bird Survey data[7]). This, combined with the bird's global status of Near Threatened, indicates that the curlew is one of the most pressing bird conservation priorities in the UK. This was emphasised by its classification as a red listed species of conservation concern in December 2015[8] and the recent publication of the updated version[9] sadly confirms it remains in this category. Curlews are territorial and habitually return to breed in the same areas of open ground dominated by rough damp grassland or heath. These habitats are abundant on and around this site. Curlews show avoidance behaviour up to 800m from turbines[10] . Their breeding densities may be reduced by up to 42% within a 500m turbine buffer and there is currently no evidence of recovery to pre-construction levels during operation[11] [12]. We recommend a displacement assessment of breeding pairs is undertaken as part of the EIA; infrastructure should be located to avoid the areas with highest breeding density. The mitigation hierarchy should be followed and mitigation and compensatory actions for this species should be included within a Habitat Management Plan if avoidance of impacts is not possible.

We note other wader species such as Golden Plover, Redshank, Snipe and Common Sandpiper were also recorded breeding on the site. These species should also be included in the assessment due to their declining populations. As with Curlew, the mitigation hierarchy should be followed and breeding and feeding areas should be excluded from the development and if avoidance isn't possible then mitigation and compensatory actions should be included in the habitat management plan.

<u>Survey Methodology</u>

---

[6] Brown, D., Wilson, J., Douglas, D., Thompson, P., Foster, S., McCulloch, N., Phillips, J., Stroud, D., Whitehead, S., Crockford, N., & Sheldon, R. 2015. The Eurasian Curlew – the most pressing bird conservation priority in the UK? Brit. Birds 108: 660–668.

[7] https://www.bto.org/volunteer-surveys/bbs/latest-results/population-trends

[8] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746

[9] https://britishbirds.co.uk/sites/default/files/BB_Dec21-BoCC5-IUCN2.pdf

[10] Pearce-Higgins ,J.W., S.L., Langston, R.H.W., Bainbridge, I.P. and Bullman, R. (2009), The distribution of breeding birds around upland wind farms,. Journal of Applied Ecology, 46: 1323-1331

[11] Pearce-Higgins ,J.W., Stephen, L., Douse, A. and Langston, R.H.W (2012) Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49:386-394.

[12] O'Connell, M.J., Thomas, C.J., Twiss, S.D., Downie, I.S., Evans, P.R. & Whitfield, D.P. (1996). Functional Ecology of Peatland Animals in the Flow Country of Northern Scotland. I. Habitat Requirements of Breeding Waders (Charadrii). RASD Report. Scottish Natural Heritage, Edinburgh.

A scoping exercise should help inform survey design and it is therefore disappointing to note that surveys were conducted prior to this exercise. We do not agree that the baseline surveys conducted are sufficient to inform a robust assessment of the potential effects to ornithology, the reasons for this are stated below.

Section 9.1 of the Scoping Report states that as the original bird surveys were undertaken in 2017 and 2019 and that as the data is only valid for five years a further year of survey was conducted between 2023-2024 to update the previous baseline. However, we would strongly recommend that a second year of bird data is collected to account for variation between years and now that the habitat baseline has changed (as per NatureScot guidance[13]), and due to the sensitivity and proximity of the site to the SPA designated species highlighted above.

It is unclear from Section 9.26 what year the Black Grouse surveys were conducted and whether a second year of survey is to be repeated; we recommend this detail is clarified in the EIA. As per NatureScot guidance[14] we recommend two years of survey effort is carried out for Black Grouse to inform the EIA.

Based on the information provided in the Scoping Report, it appears that wintering bird surveys have not been conducted. We recommend that wintering bird surveys are carried out and these should include raptor (Golden Eagle, Hen Harrier and Red Kite) and goose roost surveys and winter walkovers. For Golden Eagle, Hen Harrier and Red Kite, roost surveys should include the area within a 2km buffer of the site boundary as per NatureScot guidance[10].

NatureScot survey guidance recommends that "the main breeding and wintering bird survey areas should extend at least 500m beyond the development/planning application boundary"[15] . However, we note the access track does not appear to have been included in all surveys (Figure 9.1) despite it being stated in Section 9.13 that "A 2019 survey of the access track included a report of four pairs of Golden Plover, three pairs of Snipe, and single pairs of Wigeon and Common Sandpiper as well as an assemblage of common passerine species." Updated surveys should include the entire site boundary and 500m. This should also be included in winter raptor roost counts as the forest may be used by roosting Red Kite.

We recommend that information is provided within the EIA Report to demonstrate that the survey coverage and data meet NatureScot requirements, are robust and accurate, including:

- Full information on the VP work undertaken, including dates, times and weather conditions.
- Maps showing diver, wader and raptor breeding, foraging and roosting areas.
- Worked example(s) of collision risk calculations.
- Provision of raw data for independent verification of collision risk calculations.

<u>Assessment of Impacts</u>

[13] https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

[15] https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

The EIA should consider all the components of the proposal including the 36 turbines, the energy storage system, anemometry mast, borrow pits, access tracks (including the route on public roads to get the turbines on site), on site tracks, drainage, grid connection, substation and temporary construction buildings/storage compounds. It should also assess the impacts of all phases of the project including site selection, design, construction, operation and maintenance. Disturbance, displacement, loss of suitable habitat (breeding, wintering and foraging) and collision risk should be assessed for all scoped-in species, both during construction and operation. This should not only include impacts from the wind turbines but also new tracks and infrastructure as well as any existing road widening or upgrades.

We would like to note here that the Proposed Development borders the site of the proposed Fairburn Wind Farm Extension. We expressed concern that the proposed Fairburn Wind Farm extension overlaps the conservation management plan area for the consented Fairburn Wind Farms. This conservation management area should be considered in the assessment and ensure that construction works and operation do not undermine the aims and objectives of this conservation management plan.

Cumulative and In-combination Impacts

It is stated in Section 9.37 that "An assessment will be made of the potential for cumulative effects on any valued ornithological receptors identified in the assessment in combination with other similar developments within 10 km of the Development site". We do not agree with this, as restricting the ornithological assessment to a 10km radius of the Site would not adequately consider cumulative population effects. A robust cumulative assessment of collision risk, disturbance, displacement, and barrier effects should take account of all operational, consented and proposed wind energy schemes as well as other relevant plans or projects that could impact on bird populations. The scale of this assessment should be at both the NHZ level (NHZ7: Northern Highlands) and include all designated sites with connectivity to the application site.

Note, it is stated in Section 9.32 that "for non-designated sites, magnitude is assessed in respect of an appropriate scale: the Peatlands of Caithness and Sutherland Natural Heritage Zone" this is incorrect, the Proposed Development is within NHZ7, Northern Highlands.

As well as all wind farms within NHZ7, including the neighbouring operational Fairburn Wind Farm and the proposed Fairburn Extension (which is adjacent to the Proposed Development, sharing a border, not 5km away as stated in Section 3.5) (ECU00004542); other relevant in-combination plans such as overhead line grid connections, such as the proposed Spittal to Loch Buidhe to Beauly 400 kV Overhead Line (1km from the proposed development) (ECU00006008) should be considered. Woodland creation projects should also be included when assessing cumulative loss of habitats, this should include the adjacent Fairburn Orrin valley woodland creation.

NatureScot guidance[16] states that "all plans or projects in the area", and "Any associated development (i.e. **grid connections** or track construction) should be considered within the cumulative impact assessment." [emphasis added]. Although it is appreciated that the grid connection for this proposed windfarm will be subject to a separate consenting regime (Section 2.3.4), to ignore this aspect which will be required should consent be granted for the windfarm, is to understate the full impact that would result from such a development.

[16] https://www.nature.scot/doc/guidance-assessing-cumulative-impacts-onshore-wind-farms-birds

Peat and Priority Peatland Habitats

As shown on the NatureScot Carbon and Peatland Map 2016[17] and as stated in Section 11.4, the majority of the site is comprised of Class 1(Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value) and Class 2 (Nationally important carbon-rich soils, deep peat and priority peatland habitat). These areas are potentially of high conservation value. Policy 5 of NPF4 seeks to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development. Policy 4 of NPF4 seeks to protect, restore and enhance natural assets, including protected sites, and states that development proposals which by virtue of type, location or scale will have an unacceptable impact on the natural environment, will not be supported.

RSPB Scotland notes that peat soils are likely to underlie much of the proposed development site and are pleased that an investigation of peat depths is to be undertaken as part of the EIA.

Section 11.11 of the Scoping Report states "If deep peat is localised, the most appropriate form of peat management may be to avoid siting infrastructure within deep peat areas through careful and iterative infrastructure design". We are pleased with this and agree that impacts on deep peat should be avoided through careful siting and design, and all of the infrastructure components should be sited where peat depths are less than 0.5m.

Based on the information provided in the Scoping Report of the NVC Results figures 8.3a and 8.3b, it appears that a number of turbines are proposed for siting on Priority Peatland Habitats. This includes on M1 and M3 "Priority peatland communities that should be completely avoided"[18] as well as M2, the Globally rare M17 and M19 "Montane bogs – priority peatland which should be avoided". Infrastructure components should be sited to avoid priority peatland habitats, and careful siting and design should minimise impacts on these habitats.

In relation to peatland, recent NatureScot guidance[19] states "restoration to achieve offsetting (i.e. compensation rather than biodiversity enhancement) would be in the order of 1:10 (lost: restored)"; plus "an additional 10% of the baseline assessment of the extent of priority peatland habitat for biodiversity enhancement". If the overall predicted impacts of the proposal were shown to be acceptable, potential for the restoration of suitable areas of blanket bog should be explored as part of the applicant's biodiversity enhancement proposals.

Outline Habitat Management Plan (OHMP) and Biodiversity Enhancement

We believe that development should leave nature in a better state than before it took place and welcome NPF4's commitment to deliver positive effects for biodiversity through development.

[17] https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/
[18] https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management
[19] Advising on peatland, carbon-rich soils and priority peatland habitats in development management | NatureScot

Policy 1 of National Planning Framework 4 (NPF4) states that 'when considering all development proposals significant weight will be given to the global climate and **nature crises**' (emphasis added).

NPF4 Policy 3 states:

> 'Development proposals for national or major development or for development that requires an Environmental Impact Assessment will only be supported where it can be demonstrated that the proposal will conserve and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention'.

It goes on to list a number of criteria which applicants must demonstrate they have met, including 'significant biodiversity enhancements are provided, **in addition to** (emphasis added) any proposed mitigation'. Scottish Government guidance on biodiversity was issued in November 2023[20] to assist with the implementation of NPF4 Policy 3 for EIA, major and national development. We recommend this is referred to.

The Applicant should give early consideration as to how positive effects for biodiversity would be delivered once impacts are mitigated and/or compensated.

The HMP (or other document) should include a comprehensive monitoring programme for any habitat improvements, migrating and breeding birds on the site and a protocol for reporting collisions to NatureScot.

In addition to the production of a HMP, a Deer Management Plan (DMP) should be produced.

We hope you find these comments helpful. Should you wish to discuss of any of the above please do not hesitate to contact me.

Yours sincerely,

REDACTED

Anna Jemmett

Conservation Officer

Anna.jemmett@rspb.org.uk

[20] https://www.gov.scot/publications/scottish-government-draft-planning-guidance-biodiversity

A103

Scottish Forestry
Coilltearachd na h-Alba

Glèidhteachais a Gàidhealtachd's nan Eilean
"Fearann – coilleach"
Rathad Fodderty
Inbhir Pheofharain

Highland and Islands Conservancy
"Woodlands"
Fodderty Way
Dingwall

IV15 9XB

highland.cons@forestry.gov.scot
Tel: 0300 067 6950

Conservator
Neach Dion Arainneachd
John Risby

19th November 2024

Stephen McFadden
Scottish Government
Energy Consents Unit
by email: stephen.mcfadden@gov.scot / EconsentsAdmin@gov.scot

Re. **ECU00005219**

Dear Stephen,

THE ELECTRICITY ACT 1989 - THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT)(SCOTLAND) REGULATIONS 2017

SCOPING OPINION REQUEST– BALLACH WIND FARM PROPOSAL

Thank you for consulting Scottish Forestry on the Scoping Report for the proposed **BALLACH WIND FARM PROPOSAL** (proposed development). Scottish Forestry is the Scottish Government agency responsible for policy, support and regulation of the forestry sector in Scotland. As such we comment on the potential impact of development proposals on forests and woodlands.

The first consideration for all woodland removal decisions should be whether the underlying purpose of the proposals can reasonably be met without resorting to woodland removal. Scottish Government's Policy on Control of Woodland Removal clearly sets out a strong presumption in favour of protecting Scotland's woodland resources.
https://forestry.gov.scot/support-regulations/control-of-woodland-removal

In line with Scottish Government's wider objective to protect and expand Scotland's woodland cover, applicants are expected to develop their proposal with minimal woodland removal. Woodland removal should be allowed only where it would achieve significant and clearly defined additional public benefits.

The following criteria for determining the acceptability of woodland removal should be considered relevant to this application –

- ***Woodlands with a strong presumption against removal***

Only in exceptional circumstances should the strong presumption against woodland removal be overridden. Proposals to remove these types of woodland should be judged on their individual merits and such cases will require a high level of supporting evidence. Where woodland removal is justified, the Compensatory Planting (CP) area must exceed the area of woodland removed to compensate for the loss of environmental value.

- ***Woodland removal with a need for compensatory planting***
  Design approaches that reduce the scale of felling required and/or converting the type of woodland to another type (such as from tall conifer plantation to low-height, slow growing woodland), must be considered from the earliest stages, rather than removing the woodland completely. The purpose of any required CP is to secure, through new woodland on site (replanting) or off site (on appropriate sites elsewhere), at least the equivalent woodland-related net public benefit embodied in the woodland to be removed.

National Planning Framework 4 - Policy 6 Forestry, Woodlands and trees identifies several themes that should be considered relevant to this application –

b) Development proposals will not be supported where they will result in:
i. Any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition;
ii. Adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value, or identified for protection in the Forestry and Woodland Strategy;
iii. Fragmenting or severing woodland habitats, unless appropriate mitigation measures are identified and implemented in line with the mitigation hierarchy;

c) Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered.

d) Development proposals on sites which include an area of existing woodland or land identified in the Forestry and Woodland Strategy as being suitable for woodland creation will only be supported where the enhancement and improvement of woodlands and the planting of new trees on the site (in accordance with the Forestry and Woodland Strategy) are integrated into the design.

Conclusion
The development does not appear to impact on woodlands, the access is described as utilising exiting tracks which are through woodland. If at a later stage there is an impact on trees or woodlands due to the proposed upgrading of access then the policies set out in the letter should be applied.

Scottish Government's policy on control of woodland removal: implementation guidance February 2019 https://forestry.gov.scot/support-regulations/control-of-woodland-removal provides guidance on the level and detail of information Scottish Forestry will expect within the EIA Report, to help us reach an informed decision on the potential impact of the proposed development. Detailed information on any compensatory planting proposals should also be provided.

Scottish Forestry
Coilltearachd na h-Alba

All felling, restocking and compensatory planting proposals must be compliant with the UK Forestry Standard. https://forestry.gov.scot/sustainable-forestry/ukfs-scotland

The applicant should note that any compensatory planting required as a result of the proposed development, may also need to be considered under The Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017. https://forestry.gov.scot/support-regulations/environmental-impact-assessment and should follow the process for preparing a woodland creation proposal, as set out in our guidance booklet: Woodland Creation Application Guidance. https://forestry.gov.scot/support-regulations/woodland-creation

Any additional felling which is not part of the planning application will require permission from Scottish Forestry under the Forestry and Land Management (Scotland) Act 2018 (the Act). For areas covered by an approved Long Term Forest Plan (LTFP), the request for additional felling (and subsequent restocking) areas needs to be presented in the form of LTFP amendment. https://forestry.gov.scot/support-regulations/felling-permissions

Please don't hesitate to contact me if you have any questions regarding Scottish Forestry's response.

Yours sincerely
REDACTED

Dunstan Cribb
Operations Manager (Regulations and Development)
Highland and Islands Conservancy

A106

Wednesday, 02 October 2024

Development Operations
The Bridge
Buchanan Gate Business Park
Cumbernauld Road
Stepps
Glasgow
G33 6FB

Development Operations
Freephone Number - 0800 3890379
E-Mail - DevelopmentOperations@scottishwater.co.uk
www.scottishwater.co.uk
Follow Us

Local Planner
Energy Consents Unit
5 Atlantic Quay
Glasgow
G2 8LU

Dear Customer,

Ballach Wind Farm, Within the Erchless and Farley Est, Kilmorack, IV4 7JU
Planning Ref: ECU00005219
Our Ref: DSCAS-0118834-N5V
Proposal: Erection and operation of a wind farm and associated infrastructure

Please quote our reference in all future correspondence

Audit of Proposal

Scottish Water has no objection to this proposal. Please read the following carefully as there may be further action required. Scottish Water would advise the following:

Drinking Water Protected Areas

A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.

Surface Water

For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.

There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges.

In order to avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should refer to our guides which can be found at https://www.scottishwater.co.uk/Help-and-Resources/Document-Hub/Business-and-

Developers/Connecting-to-Our-Network which detail our policy and processes to support the application process, evidence to support the intended drainage plan should be submitted at the technical application stage where we will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.

Next Steps:

All developments that propose a connection to the public water or waste water infrastructure are required to submit a Pre-Development Enquiry (PDE) Form via our Customer Portal prior to any formal technical application being submitted, allowing us to fully appraise the proposals

I trust the above is acceptable however if you require any further information regarding this matter please contact me on **0800 389 0379** or via the e-mail address below or at planningconsultations@scottishwater.co.uk.

Yours sincerely,

Ruth Kerr
Development Services Analyst
PlanningConsultations@scottishwater.co.uk

Scottish Water Disclaimer:

"It is important to note that the information on any such plan provided on Scottish Water's infrastructure, is for indicative purposes only and its accuracy cannot be relied upon. When the exact location and the nature of the infrastructure on the plan is a material requirement then you should undertake an appropriate site investigation to confirm its actual position in the ground and to determine if it is suitable for its intended purpose. By using the plan you agree that Scottish Water will not be liable for any loss, damage or costs caused by relying upon it or from carrying out any such site investigation."

Supplementary Guidance

- Scottish Water asset plans can be obtained from our appointed asset plan providers:
    - Site Investigation Services (UK) Ltd
    - Tel: 0333 123 1223
    - Email: sw@sisplan.co.uk
    - www.sisplan.co.uk

- Scottish Water's current minimum level of service for water pressure is 1.0 bar or 10m head at the customer's boundary internal outlet. Any property which cannot be adequately serviced from the available pressure may require private pumping arrangements to be installed, subject to compliance with Water Byelaws. If the developer wishes to enquire about Scottish Water's procedure for

checking the water pressure in the area, then they should write to the Development Operations department at the above address.

- If a connection to the public sewer and/or water main requires to be laid through land out-with public ownership, the developer must provide evidence of formal approval from the affected landowner(s) by way of a deed of servitude.

- Scottish Water may only vest new water or waste water infrastructure which is to be laid through land out with public ownership where a Deed of Servitude has been obtained in our favour by the developer.

- The developer should also be aware that Scottish Water requires land title to the area of land where a pumping station and/or a Sustainable Drainage System (SUDS) proposed to vest in Scottish Water is constructed.

- Please find information on how to submit application to Scottish Water at our Customer Portal.

ScotWays
Upholding public access

Stephen.McFadden@gov.scot

Stephen McFadden
Consents Manager
Energy Consents Unit
The Scottish Government

Our Ref: 11059
13/11/2024

Dear Mr McFadden,

ECU ref: ECU00005219
THE ELECTRICITY ACT 1989

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT)(SCOTLAND) REGULATIONS 2017

SCOPING OPINION REQUEST – BALLACH WIND FARM PROPOSAL

Thank you for your email of 1 October 2024 seeking comments on the scoping report for the above proposal. We gratefully acknowledge the additional time allowed for our response.

ScotWays records

The enclosed map shows that right of way HI41/HR100 as recorded in the National Catalogue of Rights of Way (CROW) crosses or is close to the application site as shown on Figure 8.1 *Site Location*.

The enclosed map shows that our book *Scottish Hill Tracks* describes route number 279 which crosses or is close to the application site as shown on Figure 8.1 *Site Location*.

In searching our records at this scoping stage, we have focussed solely on the **immediate area** of the proposed application. If required by the applicant to inform their Environmental Impact Assessment (EIA), maps of a wider search area are available from the Society, alongside a more detailed response.

Other Access to Land

You should be aware that other forms of public access to land may affect the proposed application site. More detail about these other types of access is set out in the enclosed Catalogue of Rights of Way Guidance Notes.

ScotWays is a registered trade mark of the Scottish Rights of Way and Access Society, a company limited by guarantee.
Registered Company Number: SC024243. Scottish Charity Number: SC015460.

Wind Farms and public access

It is our understanding that there is very little guidance regarding the siting of turbines in relation to established paths and rights of way, so we use the following starting principle in considering what could be reasonable:
"a minimum distance, equivalent to the height of the blade tip, from the edge of any public highway (road or other public right of way) or railway line."

ScotWays considers the above sets out a reasonable principle for a recommended minimum separation distance. There could also be site specific factors which would lead us to prefer a larger minimum separation distance; these could include the affected route being one of Scotland's Great Trails or it being known for equestrian use, for example. ScotWays is likely to object to any proposal where the above principle is not followed, including where a micro-siting allowance could lead to turbine encroachment upon a route because it has been insufficiently buffered. We note the scoping layout shown on Figure 1 and request that, in any subsequent application, information is provided regarding separation distances between turbines and the above noted routes. The present layout appears to show turbines proposed in close proximity to the routes.

Recreational amenity

As well as direct impacts of development upon public access, ScotWays has an interest in impacts on recreational amenity, so this includes the impact of wind farm development on the wider landscape. We anticipate that the applicant will take into account both recreational amenity and landscape impacts in developing their proposals for this site. We will consider these issues further should this scoping stage lead to a planning application.

Cumulative Impact

As ScotWays is aware of a number of wind turbine proposed in this general area, we are particularly concerned that the cumulative impact of these proposed developments is taken into account.

Comment

Figure 6.5 includes '*National Recreational Routes'* : in the documentation there is reference to both core paths and rights of way however there appears no corresponding Figure to show these local routes. Those routes, and their users, are likely to be more directly impacted that those shown on Figure 6.5 so would require consideration.

It should be noted that the actual alignment of HI41 may have migrated from *Geata Gleann Goibhr* to a route promoted in Scottish Hill Tracks. That said, this is within the area proposed for turbines and the applicant should be aware that the route does use the track that it appears will be used to access the site from the A831.

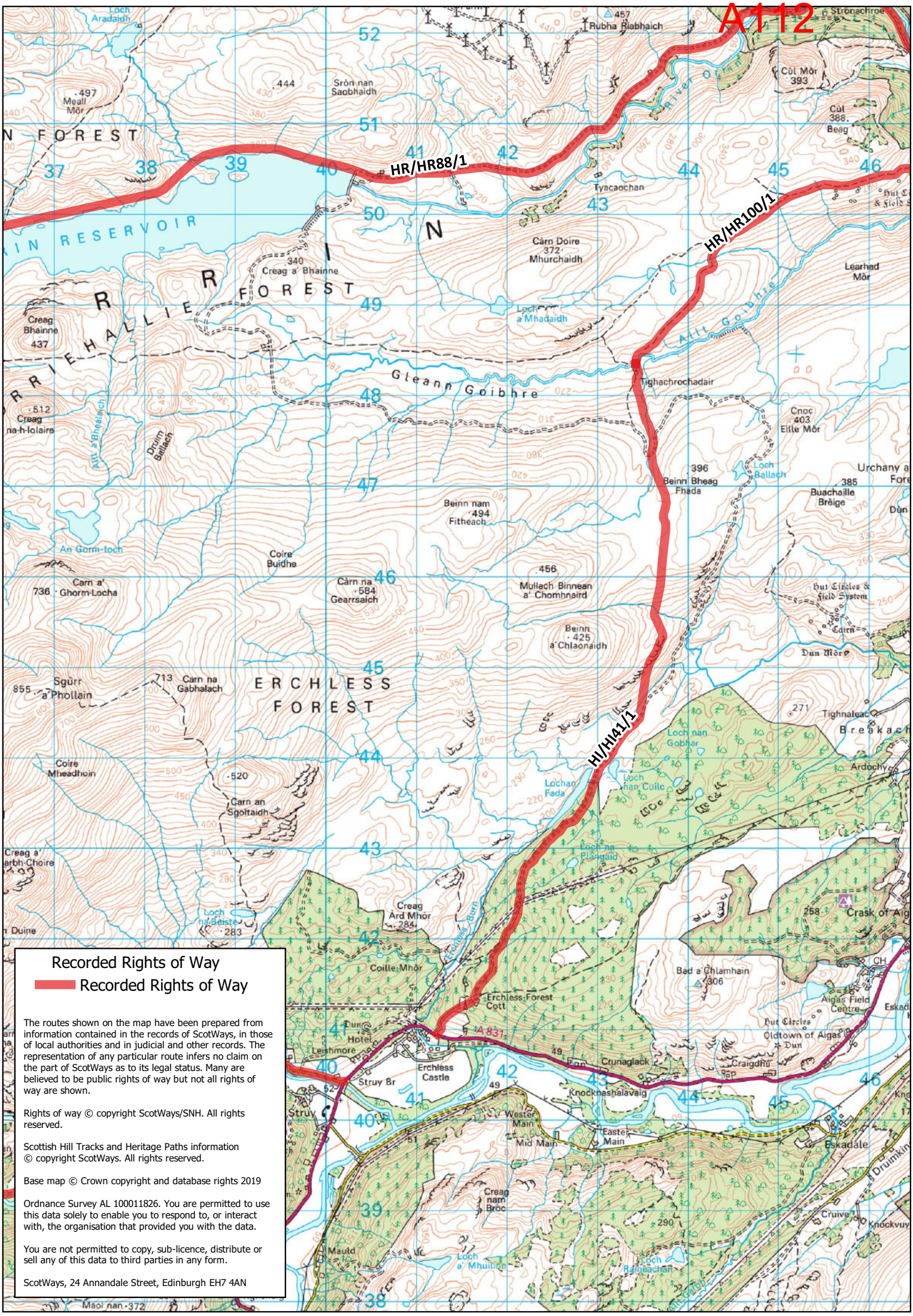
Under section 3 of the Land Reform (Scotland) Act 2003, there is a duty upon landowners to use and manage land responsibly in a way which respects public access rights. Under section 14 of the same Act, access authorities have a duty to uphold access rights. Accordingly, we suggest that the applicant may wish to approach the relevant authority's access team for their input when drawing up their Access Management Plan for their proposed development.

I hope the information provided is useful to you. Please do not hesitate to contact us if you have any further queries.

Yours sincerely,

REDACTED

Lynda Grant
Access Officer



The routes shown on the map have been prepared from information contained in the records of ScotWays, in those of local authorities and in judicial and other records. The representation of any particular route infers no claim on the part of ScotWays as to its legal status. Many are believed to be public rights of way but not all rights of way are shown.

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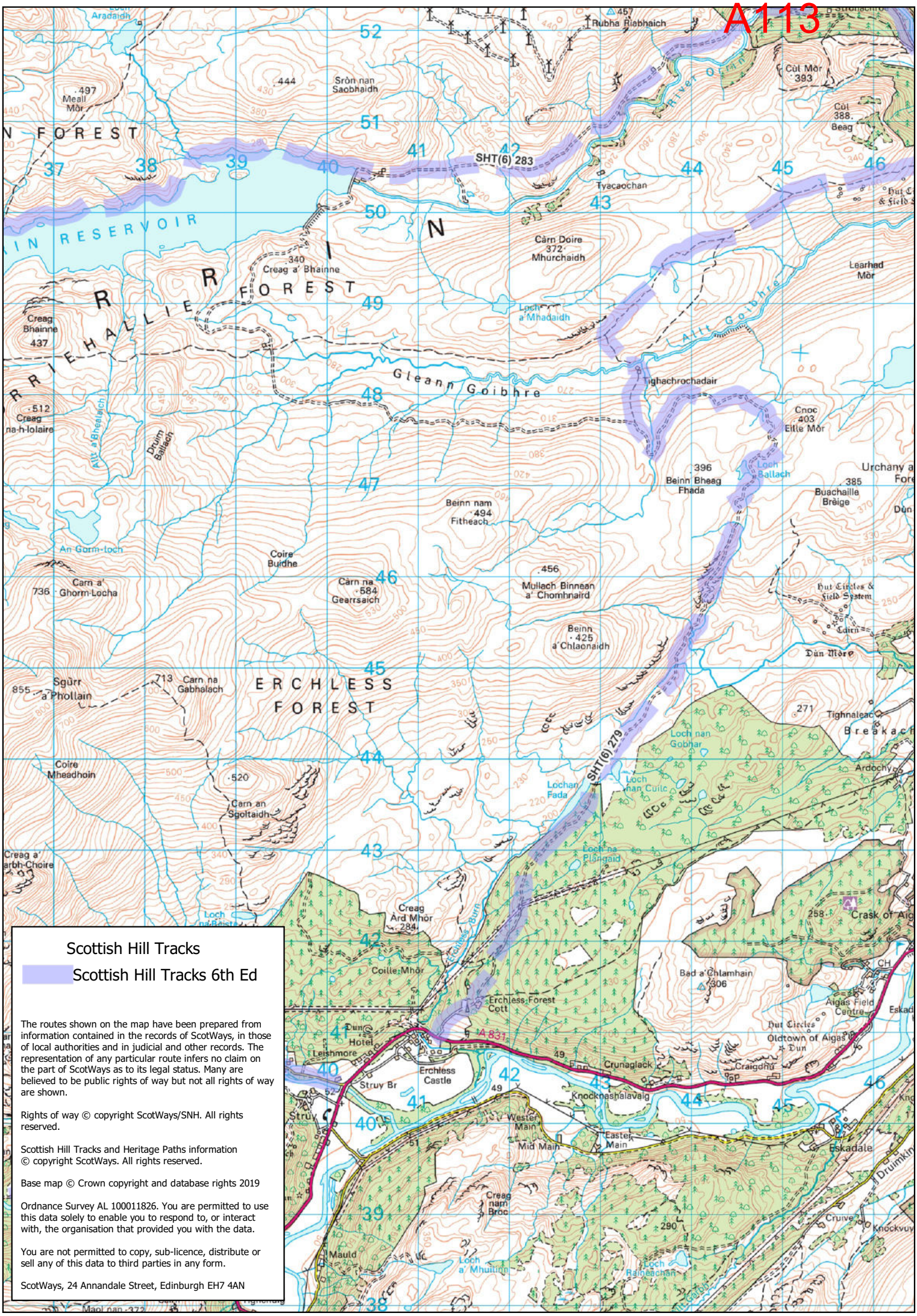
Scottish Hill Tracks and Heritage Paths information © copyright ScotWays. All rights reserved.

Base map © Crown copyright and database rights 2019

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You are not permitted to copy, sub-licence, distribute or sell any of this data to third parties in any form.

ScotWays, 24 Annandale Street, Edinburgh EH7 4AN



Scottish Hill Tracks

Scottish Hill Tracks 6th Ed

The routes shown on the map have been prepared from information contained in the records of ScotWays, in those of local authorities and in judicial and other records. The representation of any particular route infers no claim on the part of ScotWays as to its legal status. Many are believed to be public rights of way but not all rights of way are shown.

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ScotWays, 24 Annandale Street, Edinburgh EH7 4AN

ScotWays
Upholding public access

CROW Guidance Notes - Windfarm Developments

These notes explain what is shown on the map(s) provided with our comments and provide information about the public right of access to land in Scotland. All maps are provided on a 1:50,000 scale base.

What is the Catalogue of Rights of Way (CROW)?

CROW was created by ScotWays in the early 1990s with the help of Scottish Natural Heritage (now NatureScot) and local authorities and is an amalgamation of rights of way information from a number of different sources. Mapped at 1:50,000 scale, the catalogue does not include all rights of way – many of these are known only to local people and come to ScotWays' notice only when a problem arises.

CROW is continually updated to take account of new information as it comes to ScotWays' attention.

What is a Recorded Right of Way?

Any right of way that we record in the Catalogue of Rights of Way.

Where any Recorded Rights of Way pass through or close to the wind farm application site a map will be provided showing them.

What is an Other Route?

Any path that we record in the Catalogue of Rights of Way that does not appear to meet the criteria to be a right of way.

Where any Other Routes pass through or close to the wind farm application site a map will be provided showing them.

What is a Heritage Path?

A historic route that forms part of the transport heritage of Scotland. Such routes reflect our cultural and social development and include drove roads, military roads, Roman roads, pilgrim routes and trade routes.

These routes may or may not be rights of way, core paths or carry some other type of designation.

Find out more about the Heritage Paths project at http://www.heritagepaths.co.uk

Where any Heritage Paths pass through or close to the wind farm application site a map will be provided showing them.

What is a Scottish Hill Track?

First published in 1924, our book *Scottish Hill Tracks* is a record of the network of paths, old roads and rights of way which criss-cross Scotland's hill country, from the Borders to Caithness.

The Scottish Rights of Way and Access Society, 24 Annandale Street, Edinburgh EH7 4AN (Registered Office)
0131 558 1222 info@scotways.com www.scotways.com

ScotWays is a registered trade mark of the Scottish Rights of Way and Access Society, a company limited by guarantee.
Registered Company Number: SC024243. Scottish Charity Number: SC015460.

These publicised routes may or may not be rights of way, core paths or carry some other type of designation.

Copies of our book *Scottish Hill Tracks* can be purchased from the ScotWays webshop: https://www.scotways.com/shop

Where any *Scottish Hill Tracks* routes pass through or close to the wind farm application site a map will be provided showing them.

Disclaimer

The routes shown on the CROW maps provided have been prepared from information contained in the records of ScotWays, local authorities, judicial and other records. The inclusion of a route in CROW is not in itself definitive of its legal status.

Other Public Access Information

You should be aware that other forms of public access to land may affect the wind farm application site.

Unrecorded Rights of Way

Our records only show the rights of way that we are aware of. Scots law does not require a right of way to be recorded in a specific document or register. Any route that meets the following criteria will be a right of way. This could include any paths, tracks or desire lines within your area of interest. A right of way:

1. Connects public places.
2. Has been used for at least 20 years.
3. Follows a more or less defined route.
4. Has been used by the public without judicial interruption or the landowner's permission.

Core Paths

The Land Reform (Scotland) Act 2003 requires all access authorities to create a system of routes within their area. These are known as core paths and are recorded in the authority's core paths plan. It is anticipated that applicants will have consulted the relevant access authority's core paths plan to check whether any core paths cross or are close to the wind farm application site, and will also have consulted the authority's access team.

The General Right of Access

Irrespective of the presence or absence of rights of way and core paths, the land in question may be subject to the access rights created by Section 1 of the Land Reform (Scotland) Act 2003. Unless the land falls into one of the excluded categories in Section 6 of this Act, the public has a right of access to the land, and land owners/managers have a duty under the Act's Section 3 to consider this in any decisions made about the use/management of the land.

Other Promoted Routes

There may be a promoted route running through or close to any wind farm application site. Such routes will usually be clearly marked with signposts or waymarking and may feature in guidebooks, leaflets, on local information boards and on websites. The two main types of nationally promoted routes are:

Scotland's Great Trails: https://www.scotlandsgreattrails.com
National Cycle Network: https://www.sustrans.org.uk/map-ncn

Public and Private Roads

The Roads (Scotland) Act 1984 created the terms 'public road' and 'private road'. Public roads are those roads which are on the List of Public Roads and which, importantly, the roads authority is required to manage and maintain. Private roads are those roads which are not on the List of Public Roads and thus there is no duty on the roads authority to manage or maintain them. There is a public right of passage over these roads and the owner(s) of a private road may not restrict or prevent the public's right of passage over the road.

If required, the local roads authority should be contacted by the applicant for more information on public and private roads that may cross or pass close to the application site.

More Information on Outdoor Access Law

If you would like to know more about outdoor access law, visit our website (https://scotways.com/outdoor-access/) or get a copy of our book "*The ScotWays Guide to the Law of Access to Land in Scotland"* by Malcolm M Combe (https://www.scotways.com/shop).

Development and Planning Applications

When proposing to develop a site, it is advisable that the applicant reviews the current amount and type of public access across it and presents this as an access management plan as part of their application. This should include rights of way, core paths, other paths and tracks, and take account of how the statutory right of access currently affects the site.

The plan should then set out the effect that the proposed works, both during construction and upon completion, would have on the patterns of public access identified. Any good practice guidance associated with the proposed type of development should be considered, e.g. for windfarms the NatureScot "*Good Practice during Wind Farm Construction, Part 8 Recreation and Access"* and *"Siting and Designing Wind Farms in the Landscape"*, and the policies contained within any local statutory plans.

Depending upon the proposals, there may be specific legal processes that must be followed to divert any paths or tracks whether temporarily or permanently. These will be in addition to getting planning consent for the proposal. We recommend that applicants contact the access team at the relevant access authority for advice in this regard.

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Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Stephen McFadden
Planning Department
ECU

By email only to: Econsents_Admin@gov.scot

Our Ref: PCS-20003209
Your Ref: ECU00005219

SEPA Email Contact:
planning.south@sepa.org.uk

11 October 2024

Dear Stephen McFadden

Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
ECU00005219
Scoping Opinion Request– Ballach Wind Farm Proposal
Located approximately 4km northwest of Kilmorack within the Erchless and Farley estates in the local authority area of the Highland Council

Thank you for consulting SEPA for an Environmental Impact Assessment (EIA) scoping opinion in relation to the above development. We welcome engagement with the applicant at an early stage to discuss any of the issues raised in this letter and would especially welcome further pre-application engagement once the further peat probing, peat condition assessment and habitat survey work has been completed and the layout developed further as a result.

Our position and advice, given below, is based on the determining authority ultimately determining that the proposal is classed as development that could be supported for the purposes of assessment under Policies 5 and 22**,** as defined in National Planning Framework 4. If this is not the case, please advise so we can re-consider our position and advice.

Living Wage Employer
UKAS TESTING 1327

Chair
Lisa Tennant

CEO
Nicole Paterson

SEPA
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4 Parklands Avenue
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Advice for the planning authority / determining authority

To **avoid delay and potential objection** the EIA submission must contain a series of scale drawings of sensitivities, for example peat depth, peat condition, Groundwater Dependent Terrestrial Ecosystems (GWDTE), proximity to watercourses, overlain with proposed development. This is necessary to ensure the EIA process has informed the layout of the development to firstly avoid, then reduce and then mitigate significant impacts on the environment. We request that the issues covered in Appendix 1 below, be addressed to our satisfaction in the EIA process. This provides details on our information requirements and the form in which they must be submitted.

We have also provided site specific comments in the following section which provides pre-application advice and can help the developer focus the scope of the assessment.

1. Site specific comments

1.1 In this case, where much of the site is on peat, we expect the application to be supported by a comprehensive site specific peat management plan. The peat probing and condition assessment should cover all locations where infrastructure, including all temporary construction infrastructure and any borrow pits, is proposed. It should be clearly demonstrated that the cable route corridor, location of individual tower hardstandings and supporting infrastructure such as tracks avoids the areas of deepest peat and any near natural condition habitat.

1.2 The results of the NVC survey show the potential for there to be Groundwater Dependent Terrestrial Ecosystems (GWDTE) within the development site. The buffers for excavation around GWDTE are set out in Appendix 1 (Section 5) of this letter. Figure 8.4 of the Scoping Reports indicates that some development, and therefore potentially excavation, would occur within the GWDTE buffers. Once further investigations into whether the habitats are actually groundwater dependent, and the location of proposed excavation further refined, we would welcome further engagement on this matter.

1.3 Provided watercourse crossings are designed to accommodate the 1 in 200 year event plus climate change and other infrastructure is located well away from watercourses we do not foresee from current information a need for detailed information on flood risk. However, should any of the track upgrades and new temporary tracks require landraising within a flood extent then a detailed flood risk assessment and appropriate mitigation may be required.

2. Regulatory advice for the applicant

2.1 Details of regulatory requirements and good practice advice, for example in relation to engineering works in the water environment and waste management, can be found on the regulations section of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the local compliance team at: nhni@sepa.org.uk

If you have queries relating to this letter, please contact us at planning.north@sepa.org.uk including our reference number in the email subject.

Yours sincerely
Georgia Burborough
Senior Planning Officer
Planning Service

Ecopy to: stephen.mcfadden@gov.scot

Disclaimer: This advice is given without prejudice to any decision made on elements of the proposal regulated by us, as such a decision may take into account factors not considered at this time. We prefer all the technical information required for any SEPA consents to be submitted at the same time as the planning or similar application. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further planning application or similar application and/or neighbour notification or advertising. We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue. For planning applications, if you did not

specifically request advice on flood risk, then advice will not have been provided on this issue. Further information on our consultation arrangements generally can be found on our website planning pages - www.sepa.org.uk/environment/land/planning/

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Appendix 1: Detailed scoping requirements

Please note that some of the planning guidance referenced in this response is being reviewed and updated to reflect the National Planning Framework 4 (NPF4) policies. For example the Flood Risk Standing Advice and Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. It still provides useful and relevant information, but some parts may be updated further in the future.

This appendix sets out our minimum information requirements and we would welcome discussion around these prior to formal submission to avoid delays. There may be opportunities to scope out some of the issues below depending on the site. Evidence must be provided in the submission to support why an issue is not relevant for this site. If there is a significant length of time between scoping and application submission, the developer should check whether our advice has changed.

1. Site layout

1.1 Each of the drawings requested below must detail all proposed upgraded, temporary and permanent infrastructure. This includes all tracks, excavations, buildings, borrow pits, pipelines, cabling, site compounds, laydown areas, storage areas and any other built elements. All drawings must be based on an adequate scale with which to assess the information.

1.2 The layout should be designed to minimise the extent of new works on previously undisturbed ground. For example, a layout which makes use of lots of spurs or loops is unlikely to be acceptable, cabling must be laid in ground already disturbed such as verges, and existing built infrastructure must be re-used or upgraded where possible.

1.3 A comparison of the environmental effects of alternative locations of infrastructure elements may be required.

2. Water environment

2.1 The proposals should demonstrate how impacts on local hydrology have been minimised and the site layout designed to minimise watercourse crossings and avoid

other direct impacts on water features. Measures should be put in place to protect any downstream sensitive receptors.

2.2 The submission must include a set of drawings showing:

a) All proposed temporary or permanent infrastructure overlain with all lochs and watercourses;

b) A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works;

c) A map showing the location, size, depths and dimensions of all borrow pits overlain with all lochs and watercourses within 250m and showing a site-specific buffer around each loch or watercourse proportionate to the depth of excavations. The information provided needs to demonstrate that a site specific proportionate buffer can be achieved.

2.3 Further advice and our best practice guidance are available within the water engineering section of our website. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

3. Flood risk

3.1 Advice on flood risk is available at Flood Risk Standing Advice and reference should also be made to Controlled Activities Regulations (CAR) Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities.

3.2 Crossings must be designed to accommodate the 0.5% annual exceedance probability flows (with an appropriate allowance for climate change), or information provided to justify smaller structures.

3.3 If it is considered the development could result in an increased risk of flooding to a nearby receptor, then a flood risk assessment (FRA) must be submitted. Our Technical Flood Risk Guidance for Stakeholders outlines the information we require

to be submitted in an FRA.

4. Peat and peatland

4.1 Where proposals are on peatland or carbon rich soils (CRS), NPF4 Policy 5 sets the intention that CRS are protected, peatlands are restored and disturbance to soils from development is minimised. Peatland in near natural condition generally experiences low greenhouse gas emissions, is accumulating and may be sequestering carbon, has high value for supporting biodiversity, helps to protect water quality and contributes to natural flood management, irrespective of whether that peatland is designated for nature conservation purposes or not.

4.2 It should be clearly demonstrated that the assessment has informed careful project design and ensured, in accordance with relevant guidance and the mitigation hierarchy in NPF4, that adverse impacts are first avoided and then minimised through best practice.

4.3 The submission should include a series of layout drawings at a usable scale showing all permanent and temporary infrastructure, with extent of excavation required. These plans should be overlaid on the following:

a) Peat depth survey showing peat probe locations, colour coded using distinct colours for each depth category. This must include adequate peat probing information to inform the site layout in accordance with the mitigation hierarchy in NPF4, which may be more than that outlined in the Peatland Survey – Guidance on Developments on Peatland (2017);

b) Peat depth survey showing interpolated peat depths;

c) Peatland condition mapping – the Peatland Condition Assessment photographic guide lists the criteria for each condition category and illustrates how to identify each condition category.

4.4 The detailed series of layout drawings above should clearly demonstrate that development proposals avoid any near natural peatland and that all proposed excavation is on peat less than 1m deep.

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4.5 The layout drawings should also demonstrate that peat excavation has been avoided on sites where this is possible. On other sites where complete avoidance of peat and carbon rich soils is not possible then it should be clearly demonstrated that the deepest areas of peat have been avoided and the volumes of peat excavated have been reduced as much as possible, first through layout and then by design making use of techniques such as floating tracks.

4.6 The Outline Peat Management Plan (PMP) must include:

a) A table setting out the volumes of acrotelmic, catotelmic and amorphous peat to be excavated. These should include a contingency factor to consider variables such as bulking and uncertainties in the estimation of peat volumes;

b) A table clearly setting out the volumes of acrotelmic, catotelmic and amorphous excavated peat: (1) used in making good site specific areas disturbed by development, including borrow pits (quantities used in making good areas disturbed by development must be the minimum required to achieve the intended environmental benefit and materials must be suitable for the proposed use), (2) used in on and off site peatland restoration, and (3) disposed of, and the proposed means of disposal (if deemed unavoidable after all other uses of excavated peat have been explored and reviewed);

c) Details of proposals for temporary storage and handling of peat - Good Practice during Wind Farm Construction outlines the approach to good practice when addressing issues of peat management on site and minimising carbon loss;

d) Suitable evidence that the use of peat in making good areas disturbed by development, including borrow pits, is genuine and not a waste disposal operation, including evidence on the suitability of the peat and evidence that the quantity used matches and does not exceed the requirement of the proposed use. If peat is to be used in borrow pits on site, SEPA will require sections and plans including the phasing, profiles, depths and types of material to be used;

e) Use of excavated peat in areas not disturbed by the development itself is now not a matter SEPA provides planning advice on. Please refer to Advising on

peatland, carbon-rich soils and priority peatland habitats in development management | NatureScot 2023, and the Peatland ACTION – Technical Compendium which provides more detailed advice on peatland restoration techniques. Unless the excavated peat is certain to be used for construction purposes in its natural state on the site from where it is excavated, it will be subject to regulatory control. The use of excavated peat off-site, including for peatland restoration, will require the appropriate level of environmental authorisation. Excavated peat will be waste if it is discarded, or the holder intends to or is required to discard it. These proposals should be clearly outlined so that SEPA can identify any regulatory implications of the proposed activities. This will allow the developer and their contractors to tailor their planning and designs to accommodate any regulatory requirements. Further guidance on this may be found in the document Is it waste - Understanding the definition of waste.

5. GWDTE and existing groundwater abstractions

5.1 Groundwater Dependent Terrestrial Ecosystems (GWDTE) are protected under the Water Framework Directive. Excavations and other construction works can disrupt groundwater flow and impact on GWDTE and existing groundwater abstractions. The layout and design of the development must avoid impacts on such areas.

5.2 A National Vegetation Classification (NVC) survey should be submitted which includes the following information:

a) A set of drawings demonstrating all GWDTE and existing groundwater abstractions are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. The survey needs to extend beyond the site boundary where the distances require it.

b) If the minimum buffers cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater

Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice and the minimum information we require to be submitted.

5.3 Please note that due to discrepancies in habitat definition and ambiguity in correspondence with NVC types we do not accept the use of The UK Habitat Classification System (UKHab) as an alternative to NVC.

6. Forest removal and forest waste

6.1 If forestry is present on the site, the site layout should be designed to avoid large scale felling, as this can result in large amounts of waste material and a peak in release of nutrients which can affect local water quality.

6.2 The submission must include drawings with the boundaries of where felling will take place and a description of what is proposed for this timber in accordance with Use of Trees Cleared to Facilitate Development on Afforested Land – Joint Guidance from SEPA, SNH and FCS.

7. Pollution prevention and environmental management

7.1 The submission must include a schedule of mitigation, which includes reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils and peat at any one time) and regulatory requirements. Please refer to the Guidance for Pollution Prevention (GPPs) and our water run-off from construction sites webpage for more information.

8. Life extension, repowering and decommissioning

8.1 Proposals for life extension, repowering and/or decommissioning must demonstrate accordance with SEPA guidance on the life extension and decommissioning of onshore wind farms. Table 1 of the guidance provides a hierarchical framework of environmental impact based upon the principles of sustainable resource use, effective mitigation of environmental risk (including climate change) and optimisation of long term ecological restoration. The submission must demonstrate how the hierarchy of environmental impact has been applied, within the context of latest knowledge and best practice, including justification for not selecting lower impact options when life extension is not proposed.

8.2 The discarding of materials as waste should be avoided. However, if there is an intention to discard materials then further guidance on this may be found in the document Is it waste - Understanding the definition of waste.

A128

From:	Rupert H Clarke
To:	Stephen McFadden
Cc:	Georgina Parker; Lee Carlyle; Gordon Beckley; Farm; david; David Fraser; Chris Ballance
Subject:	BALLACH WIND FARM PROPOSAL - ECU00005219
Date:	07 November 2024 15:23:12

Dear Mr McFadden,

Thank you for sight of the proposed Scoping Report. There is a lot of detail to be provided which will be beneficial but there are two areas that stand out to us as lacking specific consideration:

Vehicle Access. The A 831 is a narrow, winding route and there is only just enough space for two cars to pass in some areas, especially near the proposed site access. Meeting a bus or timber lorry requires drivers to reverse to a passing place. Bringing large vehicles with turbine blades or transformers will destroy the road and effectively close it for other traffic. How will this be managed? Will the road be widened and strengthened? Can all deliveries be made at night? We assume they will widen the entrance to the access track?

Battery Storage. The site includes a BEES. These battery installations can self-ignite and are impossible to extinguish. We already have had problems with massive forest fires in this area leading to peat smouldering thereafter for months , or even years. We do not need any additional Fire hazards in this area and if such a BEES is installed how do they propose to deal with it if it does catch fire or get damaged? There is a limited, domestic, Fire Service here and if the BEES is fire damaged how will they contain the toxic liquid and ash that will otherwise pollute local water sources that are used for drinking supplies snd surrounding ground that is thick with bio-diverse species about which the Scottish Government is alleged to be concerned?

Regards

R Humphrey Clarke
Chairman of Strathglass Community Council

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REDACTED

A129

Development Management and Strategic Road Safety
Roads Directorate

George House, 36 North Hanover Street, Glasgow G1 2AD
REDACTED
Alan.Kerr@transport.gov.scot

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Stephen McFadden
Consents Manager
Energy Consents Unit
The Scottish Government
stephen.mcfadden@gov.scot

Energy Consents Unit
Reference:
ECU00005219

Date: 07 November 2024

Dear Stephen,

ELECTRICITY ACT 1989

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING OPINION REQUEST – BALLACH WIND FARM PROPOSAL

Introduction

The Scoping Opinion request dated 01 October 2024, for the proposed Ballach Wind Farm, has been passed to Jacobs for review in their role as Development Management Advisor and Auditor to Transport Scotland.

This scoping response is generally focused on matters related to the trunk road network and is primarily informed by the information provided in the Ballach Wind Farm Environmental Impact Assessment (EIA) Scoping Report, dated August 2024.

Development Proposals

As advised in Chapter 3 of the Scoping Report, the proposed development site would be located approximately 4 km northwest of Kilmorack. Chapter 4 confirms that the wind farm is proposed to comprise up to 36 wind turbines with a mix of tip heights up to 200 m and 230 m to blade tip, and associated infrastructure, including a battery energy storage compound.

OBSERVATION 1: It is assumed that the battery energy storage compound and its associated transport and access impacts will also be assessed as part of the EIA.

It is acknowledged that the site is intended to be operational for 35 years, as advised in Section 4.2 of the Scoping Report, and that development construction is anticipated to occur over a period of approximately 18 months, as advised in Section 4.9 of the Scoping Report.

OBSERVATION 2: The Scoping Report does not appear to confirm the anticipated opening year of the proposed development. This shall be confirmed in the EIA.

Baseline Conditions

Paragraphs 10.2-10.3 of the Scoping Report confirm that turbine components are anticipated originate from the Port of Invergordon, and be delivered by road via the A9(T) to the A9(T) / A835 Tore Roundabout.

Paragraph 10.4 of the Scoping Report notes that baseline traffic flow information is to "be obtained via new surveys on relevant roads via an Automated Traffic Counter (ATC) that would be in place for a one-week period."

OBSERVATION 3: Count data for the trunk road may be available from Transport Scotland. However, should data not be available then it is acknowledged that new ATC surveys may be commissioned. The location of the counts shall be agreed with Transport Scotland in advance of any surveys.

OBSERVATION 4: Any existing trunk road traffic data that may inform the traffic and transport assessment can be requested via traffic.data@mobiie.co.uk. Transport Scotland would highlight that Department for Transport (DfT) traffic count data is not an appropriate source of information for the assessment of trunk road traffic impacts. As stated in the DfT website data disclaimer, "traffic estimates for individual road links and small areas are less robust, as they are not always based on up-to-date counts made at these locations. Where other more up-to-date sources of traffic data are available (e.g. from local highways authorities), this may provide a more accurate estimate of traffic at these locations. It is the responsibility of the user to decide which data are most appropriate for their purpose, and if DfT road link level traffic estimates are used, to make a note of the limitations in any published material".

OBSERVATION 5: Transport Scotland are primarily concerned with trunk road network impacts. The suitability of information informing the assessment of effects on the local road network is regarded as a matter for consideration by the Planning Authority.

OBSERVATION 6: The baseline traffic data utilised must be representative of typical conditions.

OBSERVATION 7: The Scoping Report make no reference to traffic accident data. This should be considered within the EIA and trunk road data shall be obtained from Transport Scotland via accidentdatarequests@transport.gov.scot. The extents of the accident assessment study area must be clearly defined, with the end points of assessed road links specified, i.e., the locations beyond which no assessment has been undertaken. A plan should be provided to illustrate these extents, the locations of the accidents identified, and the severity of identified accidents. The assessment should identify whether any accident clusters are present within the study area and whether development traffic is likely to cause or exacerbate any road safety issues. Details of any proposed mitigation measures should also be provided.

Likely Significant Effects During Construction

Paragraph 10.5 of the Scoping Report states that "The most identifiable traffic and transport characteristic associated with wind farm developments is the need to transport the wind turbine components to the site", and that these would be delivered via the following road route:

- From the Port of Invergordon to the A9(T).
- Southbound on the A9(T) to the Tore roundabout, then west along the A835(T) towards Muir of Ord.
- Southbound on the A862 towards Beauly and then west along the A831.

OBSERVATION 8: It is noted that the A832 heads west from Tore Roundabout towards Muir of Ord. The EIA should clarify the proposed route from Tore Roundabout.

OBSERVATION 9: It is the responsibility of the applicant and their agents to justify the proposed access strategy.

Paragraph 10.6 of the Scoping Report confirms that “A Swept Path report and model has been provided by AECOM Ltd to assess the capacity of the road network to accommodate the delivery of any abnormal loads associated with the proposed development.”

OBSERVATION 10: A full Abnormal Loads Assessment (ALA) shall be submitted as supporting information, to be prepared and submitted alongside the EIA Transport and Access chapter.

OBSERVATION 11: The following aspects should be confirmed in the ALA:

- Port of entry for shipping of wind turbine components.
- The number and dimensions of abnormal loads and transporting vehicle, i.e., weight limits, length etc.
- All trunk roads to be used by abnormal load vehicles.
- A route review should be undertaken considering the horizontal and vertical alignment of the preferred route(s), defining locations where a detailed swept path assessment is required.
- Swept paths analysis are required for turbine blades and turbine tower sections, and associated drawings must be provided.
- Key organisations to be consulted along the proposed routes should be identified.
- Initial consideration of: The maximum axle loading on structures in consultation with the relevant roads agencies; clear heights in consultation with utility providers and transport agencies; roadworks or closures that could affect the passage of the loads; underground services on the proposed route; satisfaction of Police Scotland and local authority to the proposed route(s); lay-by areas that can be utilised for temporary parking; and lay-bys that can be used to let traffic pass slow moving abnormal loads.
- Any other obstructions that may restrict transportation of abnormal loads.
- Details of measures to mitigate the impacts of abnormal load movements.
- Drawings providing details of proposed mitigation measures.
- Geometry and visibility at access point(s) to / from trunk road.
- Abnormal Loads Management Plan introducing measures that could help reduce the impact of abnormal load convoys.

The ALA must consider the full extent of the proposed abnormal loads route between the Port of Entry and the proposed development.

Paragraph 10.7 of the Scoping Report also highlights the need to transport general construction material to the site, transported by Heavy Goods Vehicles (HGVs) which would lead to “a temporary increase in traffic volumes on the surrounding road network”, while acknowledging that the increase would be “dependant on the scale of the proposed development, final material requirements, final sourcing of materials and final construction phasing plan, all of which are unknown at this time.” It is also noted that traffic would be generated by workers travelling to and from the site. This is accepted.

Paragraph 10.8 of the Scoping Report references the IEMA ‘Guidelines for the Environmental Assessment of Road Traffic’ and the methodology therein used “for identifying significant environmental effects where a proposed development is likely to give rise to changes in traffic flows.”

OBSERVATION 12: The methodology shall be based on the guidance defined in the IEMA guidelines for 'Environmental Assessment of Traffic and Movement' published in July 2023.

It is noted that the rules extracted from IEMA Guidelines, summarised in paragraphs 10.9-10.11 of the Scoping Report, will be used to "identify road links within the study area where a full assessment will be required".

OBSERVATION 13: The following potential environmental effects should be assessed:

- Severance of communities
- Road vehicle driver and passenger delay
- Non-motorised user delay and amenity
- Fear and intimidation on and by road users
- Road user and pedestrian safety
- Hazardous / large loads

Likely Significant Effects During Operation

Paragraphs 10.13-10.14 note the minimal traffic activity associated with the operational phase and the intention that "operational traffic is scoped out of the EIAR." This is accepted.

Design and Mitigation

Paragraph 10.15 of the Scoping Report highlights that "It is sometimes possible to mitigate likely significant effects via project design" and that regarding construction traffic and transport that "this mitigation equates to suitable phasing of the proposed development". It also confirms that "vehicle movements to and from the site would be controlled by a Traffic Management Plan (TMP)", to be issued as a post-consent, pre-commencement condition. This is noted.

OBSERVATION 14: A commitment to preparing a Construction Traffic Management Plan should be made in the EIA.

Proposed Scope of Assessment

Paragraph 10.18 of the Scoping Report notes that "It is proposed to discuss the detailed scope of the transport assessment directly with The Highland Council Roads Officer for the area and with Transport Scotland in relation to the A9."

OBSERVATION 15: Any further Scoping Discussions with Transport Scotland shall consider any impact on any part of the trunk road network. It is noted that preceding paragraphs of Chapter 10 of the Scoping Report also reference the A835(T).

The subsequent bullet points in the Scoping Report suggest the following likely key elements:

- "Preparation of an Abnormal Loads Assessment to confirm the proposed route to site from the Port of Delivery to the site access point, which will be from A831 south of the development site boundary, and any potential pinch points on the A9/A835/A831."
- "Calculation of increased traffic generation on the surrounding road network during construction of the wind farm based on material and staffing requirements."
- "Assessment of the environmental effects of increased traffic generation on the surrounding road network that is likely to be used during construction."
- "Assessment of the effects associated with increased traffic through local small settlements including the residential properties along [road name] and the settlements either side of the [road name] corridor."

OBSERVATION 16: See OBSERVATION 11 and 12 regarding requirements of the ALA.

OBSERVATION 17: It is noted that the Scoping Report does not confirm anticipated assessment assumptions, e.g., the volume / percentage of construction material required to be transported to the development site. Full details of these must be provided in the EIA, supported by appropriate justification. Regarding the volume of material required to be transported to site, Transport Scotland would advise that a worst-case scenario shall be assessed.

OBSERVATION 18: The EIA chapter shall detail the potential number of daily, weekly, and total delivery numbers for the proposed development, providing confirmation of: estimated construction employee trips, the number, size, and weight of construction deliveries, and the anticipated schedule for deliveries.

OBSERVATION 19: The proposed construction traffic distribution and assignment shall be fully justified in the EIA chapter.

OBSERVATION 20: Anticipated operating hours and any associated restrictions must also be confirmed in the EIA.

OBSERVATION 21: Transport Scotland would advise that the anticipated schedule for deliveries should set out construction traffic volumes per month throughout the construction period.

OBSERVATION 22: It is noted that the fourth bullet point has not replaced the [road name] reference with the actual road name and / or number.

OBSERVATION 23: The study area road links must be clearly defined, with the points beyond which the effects of development traffic would likely be diluted also clearly specified. A plan should be provided to clearly illustrate the study area extents.

Paragraph 10.20 of the Scoping Report references the 1993 ‘Guidelines for the Environmental Assessment of Road Traffic’ and the Institute of Highways and Transportation (1994) Guidelines for Traffic Impact Assessment.

OBSERVATION 24: As highlighted in OBSERVATION 13, the methodology shall be based on the guidance defined in the IEMA guidelines for ‘Environmental Assessment of Traffic and Movement’ published in July 2023.

OBSERVATION 25: The Institute of Highways and Transportation (1994) Guidelines for Traffic Impact Assessment were superseded by Transport Scotland’s ‘Transport Assessment Guidance’ published in 2012.

Paragraphs 10.21-10.23 reference the methodology to be adopted further. While generally accepted, this should be reconsidered to apply the methodology provided in the IEMA guidelines for ‘Environmental Assessment of Traffic and Movement’.

As noted in paragraph 10.24 of the Scoping Report, it is accepted that a formal Transport Assessment will not be required.

Paragraph 10.25 of the Scoping Report notes that “Any significant cumulative traffic impacts associated with other developments commencing in tandem with the proposed development would also be considered.” This is accepted.

OBSERVATION 26: Confirmation should be sought regarding committed developments that may need to be considered. Full details of cumulative impacts should be set out, including a programme indicating the worst-case combined trip generation and associated percentage impact relative to baseline traffic levels, both in terms of total traffic and the percentage

increase in HGVs. Should impacts exceed assessment thresholds, full assessment of effects should be undertaken.

Chapter 10 of the Scoping Report concludes that "Where significant effects are identified, measures to prevent, reduce and, where possible, offset those adverse effects will be proposed. Measures likely to be utilised include:

- Instructing abnormal loads and HGVs, including site personnel as appropriate, to use only the approved access route(s) to the Site.
- No parking of construction plant, equipment and vehicles off-site on public highways.
- Establishing a construction traffic management plan for the development which could be secured via a suitably worded planning condition."

OBSERVATION 27: Transport Scotland would advise that the EIA chapter should identify primary, secondary and / or tertiary mitigation relied upon in the assessment of significant environmental effects.

OBSERVATION 28: The traffic and transport assessment should assess residual impacts associated with the proposed development.

We trust this is satisfactory, but should you have any queries please do not hesitate to contact us.

Yours sincerely

REDACTED

Alan Kerr

Transport Scotland
Development Management and Strategic Road Safety

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Technical Appendix 6.1 – Landscape and Visual Impact Assessment Methodology and Glossary

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1.1 Introduction

1.1.1 This appendix describes the methodology used within the landscape and visual impact assessment (LVIA) for the proposed Ballach Wind Farm (the 'proposed development') which comprises up to 20 turbines up to a maximum blade tip height of up to 200 / 230m and associated infrastructure.

1.1.2 This appendix has been structured as follows:

- Overview of LVIA Methodology;
- Integrated Design and Assessment;
- Assessing Landscape Effects;
- Assessing Visual Effects;
- Assessing Cumulative Landscape and Visual Effects;
- Evaluation of Significance and Nature of Effect;
- Residential Visual Amenity Assessment;
- Night-time Assessment;
- Wild Land Assessment; and
- Production of Zones of Theoretical Visibility (ZTV) and Visualisations.

1.2 Overview of LVIA Methodology

1.2.1 The LVIA assesses the likely effects of the proposed development on the landscape and visual resource, encompassing effects on landscape elements, characteristics and landscape character, designated landscapes, visual effects and cumulative effects.

1.2.2 Essentially, the landscape and visual effects (and whether they are significant) are determined by an assessment of the nature or 'sensitivity' of each receptor or group of receptors and the nature of the effect or 'magnitude of change' that would result from the proposed development. The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the proposed development. This is combined with an assessment of the magnitude of change which takes account of factors such as the size and scale of the proposed change and the geographical extent. Other factors regarding the nature of the effect such as the duration of change and whether the effect is cumulative are also noted. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual effect as well as the nature of that effect can be evaluated and the significance of the effect determined.

1.2.3 The resulting level of effect is described in terms of whether it is significant or not significant and the type or nature of effect is described as either direct or indirect; temporary or permanent (reversible); cumulative; and positive, neutral or negative. The assessment has also considered the cumulative effects resulting from the proposed development in combination with other existing and consented wind farms, and wind farms at the planning application stage.

1.2.4 The time period for the assessment covers phases of development related to the construction of the proposed development and associated infrastructure, its operation for a period of 35 years, and decommissioning.

1.2.5 LVIA unavoidably involves a combination of both quantitative and subjective assessment and wherever possible a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

Technical guidance and best practice

1.2.6 The methodology for the LVIA accords with the Landscape Institute and IEMA *Guidelines for Landscape and Visual Impact Assessment,* 3rd Edition (GLVIA 3), 2013, including Technical Guidance Note LITGN-2024-01 (see below). In addition to planning policy documents and other supporting technical guidance, the LVIA methodology includes, but is not limited to the following:

- *Siting and Designing Windfarms in the Landscape*, Version 3a, Scottish Natural Heritage (SNH), August 2017;
- *Guidance: Spatial Planning for Onshore Wind Turbines – natural heritage considerations*, Version 3a, SNH, June 2015;
- *Visual Representation of Windfarms*, Version 2.2, SNH, February 2017;
- *Guidance: Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments*, SNH, 2021;
- Guidance: *General pre-application and scoping advice for onshore wind farms*, NatureScot (February 2024);
- *Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Impact Assessment Third edition* (GLVIA3) Technical Guidance Note LITGN-2024-01 Landscape Institute, 2024;
- *Visualisation Standards for Wind Energy Developments*, Highland Council, July 2016;
- *Special landscape Qualities - Guidance on Assessing Effects*, NatureScot, January 2025, and
- *Guidance on Aviation Lighting Impact Assessment*, NatureScot, November 2024.

Defining the LVIA Study Area

1.2.7 The NatureScot guidance[1] advises that the LVIA Study Area for wind turbines of this height should be based on an area 45km distance from each of the proposed turbine locations as illustrated in **Figure 6.1**. The LVIA Study Area covers an area based on a minimum 45km distance from each of the proposed turbines, unless otherwise agreed through consultation.

1.2.8 It is important to note that the boundary of the LVIA Study Area is not the limit of potential visibility. Rather, it is an area defined by NatureScot, on the basis of research, to determine a suitable LVIA Study Area for the assessment of wind farms which will contain all likely significant landscape and visual effects.

[1] Visual Representation of Wind Farms, Version 2.2, SNH (2017).

Desk-based and site survey work

1.2.9 The LVIA is informed by desk-based studies and site and field survey work undertaken within the LVIA study area.

1.2.10 A preliminary desk-based assessment was undertaken of landscape and visual receptors using a range of map-based data and related computer and digital analysis including ZTV, digital and / or surface terrain modelling and wireframe and street view software. This information used to inform initial assessments and focus the site and field survey work and likely locations for viewpoint photography and sequential route assessment.

1.2.11 The field studies have included documented visits to all relevant landscape and visual receptors to assess the likely effects of the proposed development in the field, checking data, 'ground truthing' and examining landscape elements, characteristics / character and views / visual amenity.

1.2.12 Site and field survey activities include:

- Site survey verification of landscape elements within the Site Boundary where potentially significant effects are likely;
- Field survey verification of the ZTV from landscape and visual receptor locations and transport and recreational routes through the LVIA study area;
- Micro-siting of viewpoint locations and recording of panoramic baseline photography and subsequent visual assessment from the assessment viewpoints; and
- Field survey assessment and verification of likely landscape, visual and cumulative effects.

1.2.13 The viewpoint photography and visual assessment surveys were undertaken between July 2024 and April 2025.

1.2.14 All site survey work was undertaken in fair weather conditions with good to excellent visibility.

1.3 Integrated Design and Assessment

1.3.1 Design is an integrated and iterative part of the LVIA process. In particular the advice from the relevant local planning authority and the following documents, is relevant to the design in terms of the turbine scale, location / layout and where required aviation warning lights:

- SNH, February 2017. *Siting and Designing Wind Farms in the Landscape,* Guidance (Version 3);
- SNH, 2019. *Landscape Character Types and Descriptions*; and
- NatureScot, November 2024, *Guidance on Aviation Lighting Impact Assessment.*

Potential effects during Construction

1.3.2 A range of potential effects on the landscape and visual resource are likely during the construction of the proposed development. An appraisal of the potential effects helps to define the scope of the LVIA and develop an integrated design and mitigation response which can be embedded into the proposed development. The potential effects likely to result from construction are described below.

- **Landscape Effects**:

- Effects on landscape elements, features and patterns (including, but not limited to soils, landform, ground vegetation, hedgerows / field boundaries, trees / forestry and buildings) as a result of land preparation including site clearance and earthworks.
- Effects on landscape character and key characteristics, including perceptual characteristics and qualities as a result of construction activities. The construction activities are likely to include the presence of construction staff and machinery, cranes, vehicle movements, contractors' facilities and site access associated with the proposed development.
- Effects on the special landscape qualities and integrity of designated landscapes as a result of the above construction activities.

- **Visual Effects**:
  - Effects on the views and visual amenity experienced by people undertaking various activities at various locations, distances and directions from the proposed land preparation and construction activities. These visual effects could be experienced from one location or sequentially as part of a route through the landscape such as a cycle route or long-distance footpath.
- **Cumulative effects**:
  - Cumulative effects could occur as a result of multiple wind farm construction activities affecting a landscape or visual receptor.

1.3.3 Mitigation and design responses may include a range of design decisions about the location, form, process and timing of construction related infrastructure / operations to mitigate potential landscape and visual effects (avoid, reduce or compensate) as well as reference to a range of best practice behaviours and processes undertaken as part of construction site operation.

Potential Effects during Operation

1.3.4 The potential effects during operation relate principally to the presence of the proposed development and its on-going maintenance during the 35-year operational period. This is likely to lead to long-term (reversible) effects on landscape and visual receptors.

1.3.5 Mitigation and design responses may include landscape / architectural design strategies which aim to control the physical appearance of the proposed development in terms of its scale, form, colour and number of components. Examples include Landscape Mitigation Plans, choice of project colour scheme, or focus on particular aspects such as a Lighting Strategy to reduce effects on the night-time environment.

1.3.6 Landscape Mitigation Plans illustrate and explain a range of landscape design and management techniques that may be employed to mitigate the effects of proposed development by enhancing and controlling its landscape setting and visual appearance. Examples include landscape planting and management plans, habitat management plans and integrated forestry design and management plans, all of which can relate to 'on-site' and off-site' interventions.

Potential Effects during Decommissioning

1.3.7 The proposed development would be decommissioned and the land reinstated, leading to a whole or partial reversal of the landscape and visual effects.

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1.4 Assessing Landscape Effects

1.4.1 Landscape Effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows:

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern here. is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The study area should include the site itself and the full extent of the wider landscape around it which the development may influence in a significant manner."

1.4.2 In accordance with GLVIA 3 the term 'landscape' encompasses areas of 'townscape' and coastal areas of 'seascape'. Areas of landscape are relevant to this assessment and they are described as follows.

Landscape character

1.4.3 GLVIA 3, paragraph 5.4, advises that in rural landscapes Landscape Character Assessment should be regarded as the main source for baseline studies and identifies the following factors which combine to create areas of distinct landscape character:

- *"the elements that make up the landscape in the study area including:*
  - *physical influences – geology, soils, landform, drainage and water bodies;*
  - *landcover, including different types of vegetation and patterns and types of tree cover; and*
  - *the influence of human activity, including landuse and management, the character of settlements and buildings, and pattern and type of fields and enclosure.*
- *The aesthetic and perceptual aspects of the landscape – such as, for example, its scale, complexity, openness, tranquillity or wildness;*
- *The overall character of the landscape in the study area, including any distinctive Landscape Character Types or Areas that can be identified, and the particular combinations of elements and aesthetic and perceptual aspects that make each distinctive, usually by identification as key characteristics of the landscape."*

Landscape effects

1.4.4 The potential landscape effects, occurring during the construction, operation and decommissioning periods of the proposed development may therefore include, but are not restricted to the following:

- **Changes to landscape elements**: The addition of new elements (wind turbines for example) or the removal of existing elements such as trees, vegetation and buildings and other characteristic elements or valued features of the landscape character;
- **Changes to landscape qualities:** Degradation or erosion of landscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of the landscape character or contribute to the landscape value;
- **Changes to landscape character:** Landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall landscape character within a particular area;

- **Changes to designated or mapped landscapes:** Including nationally and locally designated landscapes and Wild Land Areas (WLA) that would affect the special landscape qualities underpinning these areas and their integrity; and
- **Cumulative landscape effects:** Where more than one development of a similar type may lead to a cumulative effect.

1.4.5 Development may have a direct effect on the landscape as well as an indirect effect which would be perceived from the wider landscape, outside the immediate site area and its associated landscape character/ designation. Landscape effects also have to be recognised in terms of natural and man-made processes which can change or alter the landscape over time.

Evaluating landscape sensitivity to change

1.4.6 The assessment of sensitivity takes account of the landscape value and the susceptibility of the receptor to the proposed development.

1.4.7 Landscape sensitivity often varies in response to both the type and phase of the development proposed and its location, such that sensitivity needs to be considered on a case-by-case basis. It should not be confused with 'inherent sensitivity' where areas of the landscape may be referred to as inherently of 'high' or 'low' sensitivity. For example, a National Park may be described as inherently of high sensitivity on account of its designation and value, although it may prove to be less sensitive or susceptible to particular development, and of variable sensitivity across its geographical area. Alternatively, an undesignated landscape may be of high sensitivity to a particular development regardless of the lack of local or national designation.

Value of the Landscape Receptor

1.4.8 The value of a landscape receptor is a reflection of the value that society attaches to that landscape. The assessment of the landscape value is classified as high, medium or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following range of factors:

- **Landscape designations:** A receptor that lies within the boundary of a recognised landscape related planning designation will be of increased value, depending on the proportion of the receptor that is affected and the level of importance of the designation which may be international, national, regional or local. The absence of designation does not however preclude value, as an undesignated landscape receptor may be valued as a resource at a local level;
- **Landscape quality:** The quality of a landscape receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which its valued attributes have remained intact. A landscape with consistent, intact, well-defined and distinctive attributes is considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of elements has detracted from its character; and
- **Landscape experience:** The experiential qualities that can be evoked by a landscape receptor can add to its value. These responses relate to a number of factors including cultural associations that may exist in art, literature or history; the recreational value of the landscape, or the iconic status of the landscape in its own right; and its contribution of other values such as nature conservation or archaeology.

Landscape Susceptibility to Change

1.4.9 The susceptibility of a landscape receptor to change is a reflection of its ability to accommodate the changes that will occur as a result of the proposed development without undue consequences for the maintenance of the baseline situation and / or the achievement of landscape planning policies and strategies. Some landscape receptors are better able to accommodate development than others due to certain characteristics that are indicative of capacity to accommodate change. These characteristics may or may not also be special landscape qualities that underpin designated landscapes.

1.4.10 The assessment of the susceptibility of the landscape receptor to change is classified as high, medium or low and the basis for this assessment is made clear using evidence and professional judgement. Indicators of landscape susceptibility to the type of development proposed (wind farm construction, operation and decommissioning) are based on the following criteria:

- **Overall Strength and Robustness:** Collectively the overall characteristics and qualities of a particular landscape result in a strong and robust landscape that is capable of reasonably accommodating the proposed development without undue adverse effects on the special landscape qualities (in the case of a designated landscape) or the key characteristics for which an area of landscape character or a particular element it is valued.
- **Landscape Scale and Topography:** The scale and topography are large enough to physically accommodate the development footprint without the requirement of invasive earthworks or drainage. Topographical features such as narrow valleys or more complex and small-scale landforms such as drumlins, incised river valleys / gorges, cliffs or rock outcrops are likely to be more susceptible to this type of development than broad, homogenous topography.
- **Openness** in the landscape may increase susceptibility to change because it can result in wider visibility of the proposed development, however open landscape may also be larger in scale and simple, which would decrease susceptibility. Conversely enclosed landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility.
- **Land Cover Pattern:** Ancient and mature or long-established vegetation such as mature trees, woodland and protected hedgerows are likely to be more susceptible to the proposed development, particularly where these elements form part of a valued characteristic landscape pattern or feature. Conversely grassland / or forestry are likely to be less susceptible to wind farm development.
- **Skyline:** Prominent and distinctive skylines and horizons with important landmark features that are identified in the landscape character assessment, are generally considered to be more susceptible to wind farm development in comparison to broad, simple skylines which lack landmark features or contain other infrastructure features.
- **Relationship with other Development and Landmarks:** Contemporary landscapes where there are existing wind energy developments or other forms of development (industry, mineral extraction or electrical grid connections) that already have a characterising influence result in a lower susceptibility to development in comparison to areas characterised by smaller scale, historic development and landmarks (historic villages with dense settlement patterns and associated buildings such as church towers). It should be noted that existing wind energy development is time limited and subject to decommissioning.

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- **Rationale:** Some site locations have an obvious visual rationale for the proposed development in terms of the available space, access, simplicity and relationship to other similar forms of development. Conversely a site may appear overly constrained and require greater engineering or additional construction activity to accommodate the proposed development with lower design quality and few embedded environmental measures.
- **Remoteness, Naturalness, Wildness / Tranquillity**: Notably landscapes that are acknowledged to be particularly scenic, wild or tranquil are generally considered to be more susceptible to development in comparison to ordinary, cultivated or forested / developed landscapes where perceptions of 'wildness' are less tangible. Landscapes which are either remote or appear natural may vary in their susceptibility to development.
- **Landscape Context and Adjacent Landscapes:** The extent to which the proposed development will influence landscape receptors across the study area relates to the associations that exist between the landscape receptor within which the proposed development is located and the landscape receptor from which the proposed development is being experienced. In some situations, this association will be strong, where the landscapes are directly related. For example, adjacent areas of landscape character may share or 'borrow' a high number of common characteristics. Landscape elements may be linked to or associated with wider landscape patterns such as individual trees forming part of an avenue or pattern of woodland corpses, for example. In other situations, the association between adjacent landscapes will be weak. The context and visual connection to areas of adjacent landscape character or designations has a bearing on the susceptibility to development.

Landscape Sensitivity Rating

1.4.11 An overall sensitivity assessment of the landscape receptor is made by combining the assessment of the value of the landscape character receptor and its susceptibility to change. The evaluation of landscape sensitivity is described as 'High', 'Medium' or 'Low' and is drawn from the consideration of a range of criteria that indicate landscape value and susceptibility. The basis for the assessment is made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor.

1.4.12 Criteria that tend towards higher or lower sensitivity are set out in **Table 6.1.1**.

Table 6.1.1 Landscape Sensitivity to Change

Value / Susceptibility criteria	**High** ⟷ **Level of value/susceptibility ranging from 'High' to 'Medium' to 'Low'** ⟷ **Medium** ⟷ **Low**	
Value – Landscape Value is determined by a range of indicators/criteria with examples as follows:		
Designation	Designated landscapes/elements with national policy level protection or defined for their natural beauty. Evidence that the landscape/element is valued or used substantially for recreational activity.	Landscapes without formal designation. Despoiled or degraded landscape with little or no evidence of being valued by the community. Elements that are uncharacteristic such as non-natives or self-seeded vegetation that may need to be cleared.

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Value / Susceptibility criteria	High ⟷ Level of value/susceptibility ranging from 'High' to 'Medium' to 'Low' ⟷ Low	Medium ⟷ Level of value/susceptibility ranging from 'High' to 'Medium' to 'Low' ⟷ Low
Quality	Higher quality landscapes/elements with consistent, intact and well-defined, distinctive attributes.	Lower quality and indistinct landscapes/elements or features that detract from its inherent attributes.
Rarity	Rare or unique landscape character types, features or elements.	Widespread or 'common' landscape character types, features or elements.
Aesthetic/ scenic	Aesthetic/scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to landscape character.	Limited wildlife, ecological or cultural heritage features, or limited contribution to landscape character.
Perceptual qualities	Landscape with perceptual qualities of wildness, remoteness or tranquillity.	Limited or no evidence that the landscape is used for recreational activity.
Cultural associations	Landscape with strong cultural associations that contributes to scenic quality.	Landscape with few cultural associations.
Susceptibility – determined by a range of indicators / criteria with examples as follows:		
Strength and robustness	Fragile landscape vulnerable and lacking the ability to accommodate change.	Robust landscape, able to accommodate change or loss of features without undue adverse effects.
Landscape Scale	A smaller scale landscape that may require further engineering to accommodate the proposed development.	A landscape of a suitably large enough scale to accommodate the proposed development.
Openness/ Enclosure	An open landscape with limited screening and higher susceptibility to the proposed development.	An enclosed landscape with screening and lower susceptibility to the proposed development.
Reinstatement	Higher value, characteristic landcover and elements that cannot be easily reinstated or replaced.	Lower value, non-characteristic landcover and elements capable of rapid reinstatement or replacement.
Skyline	Distinctive undeveloped skylines with landmark features.	Developed, nondistinctive skylines.
Association	Weak and indirect association. Other development may be of a smaller scale or historic.	Strong or direct association other similar contemporary developments/landscape character.
Rationale	Landscape with numerous environmental and technical constraints and fewer environmental measures.	Strong landscape rationale and opportunity with high degree of design quality and/or environmental measures.
Perceptual Qualities	Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated/settled or developed landscapes are likely to have a lower susceptibility.

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Value / Susceptibility criteria	High ⟷ Level of value/susceptibility ranging from 'High' to 'Medium' to 'Low' ⟷ Medium ⟷ Low	
Landscape Context	Adjacent landscape character context connected by borrowed character and views.	Host landscape character is separate from surrounding/adjacent landscape character
Sensitivity	**Sensitivity drawn from consideration of the Value and Susceptibility criteria with the final conclusion on the level of Sensitivity ranging from 'High' to 'Medium' to 'Low'.**	

Landscape Magnitude of Change

1.4.13 The magnitude of change affecting landscape receptors is an expression of the scale of change that would result from the proposed development. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. as short / medium / long-term and temporary or permanent).

Size or Scale of Change

1.4.14 This criterion relates to the size or scale of change to the landscape that would arise as a result of the proposed development, based on the following factors:

- **Landscape Elements**: The degree to which the pattern of elements that makes up the landscape character would be altered by the proposed development, through the loss, alteration or addition of elements in the landscape. The magnitude of change would generally be higher if the features that make up the landscape character are extensively removed or altered, and / or if many new components are added to the landscape.
- **Landscape Characteristics**: The extent to which the effect of the proposed development change, (physically or perceptually) the key characteristics of the landscape which may be important to its distinctive character. This may include, for example, the scale of the landform, its relative simplicity, complexity or irregularity, the nature of the landscape context, the grain or orientation of the landscape, the degree to which the receptor is influenced by external features and the juxtaposition of the proposed development in relation to these key characteristics.
- **Landscape Character / Designation**: The degree to which landscape character receptors would be changed by the addition of the proposed development. If the proposed development is located in a landscape receptor that is already affected by other similar development, this may reduce the magnitude of change if there is a high level of integration and the developments form a unified and cohesive feature in the landscape. In the case of designated landscapes, the degree of change is considered in light of the effects on the special landscape qualities which underpin the designation and the effect on the integrity of the designation.

  All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for 'protection' or 'accommodation' of development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape character areas and their overall integrity. Developmental change may be time limited or permanent.

- **Distance**: The size and scale of change is also strongly influenced by the proximity of the proposed development to the receptor and the extent to which the development can be seen as a characterising influence on the landscape. Consequently, the scale or magnitude of change is likely to be lower in respect of landscape receptors that are distant from the proposed development and / or screened by intervening landform, vegetation and built form to the extent that the scale of their influence on landscape receptors is small or limited. Conversely, landscapes closest to the proposed development are likely to be most affected. Host landscapes (where the proposed development is located within a 'host' landscape character unit) would be directly affected whilst adjacent areas of landscape character would be indirectly affected.

Geographical Extent

1.4.15 Landscape effects are described in terms of the geographical extent or physical area that would be affected (described as a linear or area measurement). This should not be confused with the scale of the development or its physical footprint. The manner in which the geographical extent of the landscape effect is described for different landscape receptors is explained as follows:

- **Landscape Elements**: The geographical extent of landscape elements may be objectively measured in terms of numbers, area or linear measurement. For example, the number of trees, area of woodland / or length of hedgerow affected may be recorded.
- **Landscape Character / Characteristics**: The extent of the effects on landscape character will vary depending on the specific nature of the proposed development. This is not simply an expression of visibility or the extent of the ZTV. It is a specific assessment of the extent of landscape character that would be changed by the proposed development in terms of its character, key characteristics and elements.
- **Landscape Designations and Wild land**: In the case of a designated landscape or Wild Land Area, this refers to the extent the special landscape qualities of the designation, or wild land qualities, are affected and whether this can be defined in terms of area or linear measurements, or subjectively (with the support of panel and / or peer review) and whether the integrity of the designation is affected.

Duration and Reversibility

1.4.16 The duration and reversibility of landscape effects is based on the period over which the proposed development is likely to exist (during construction and operation) and the extent to which it would be removed (during decommissioning) and the effects reversed at the end of that period. Long-term, medium-term and short-term landscape effects are defined as follows:

- Permanent Development: No decommissioning, removal or reinstatement is planned.
- Temporary Development: This includes time limited development, such as a longer period of operation where decommissioning for example forms part of the proposed development or temporary phases of the development such as construction or decommissioning works:
  - Long-term – more than 10 years – essentially assessed as though 'permanent';
  - Medium-term – 6 to 10 years; and
  - Short-term – 1 to 5 years.

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1.4.17 Reversibility is a separate, but linked consideration concerning the prospects and practicality of a particular effect being reversed. Some forms of development, such as housing can be considered as permanent, whereas other forms of development such as wind farms can be considered as reversible because they have a limited operational life and after their removal the land would be restored. Mineral workings for example may be partially reversible with the landscape restored, although not completed to the same state as the original. In the case of the proposed development, the application is for a 40 year operation period, beyond which the project would be decommissioned or a new application submitted, and many of the effects would be reversed.

Landscape Magnitude of Change Rating

1.4.18 The 'magnitude' or 'degree of change' resulting from the proposed development is described as 'High', 'High – Medium', 'Medium', 'Medium – Low', 'Low', 'Low – Very Low', 'Very Low' or 'Zero'. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. as short / medium / long-term and temporary or permanent). The basis for the assessment of magnitude for each receptor is made clear using evidence and professional judgement.

1.4.19 The levels of magnitude of change that can occur are defined in **Table 6.1.2**.

Table 6.1.2 Landscape Magnitude of change Ratings

Magnitude of landscape change	Examples of Landscape Magnitude
High	Size / Scale: A large-scale change and major loss of key landscape elements / characteristics or the addition of large scale or numerous new and uncharacteristic features or elements that would affect the landscape character and the special landscape qualities of a landscape designation. Directly affecting a host landscape receptor or indirectly affecting a nearby receptor. Geographical extent: The size or scale of change would typically, but not always affect a large geographical extent or area and may be close to the proposed development.
High - Medium	Intermediate rating with combination of criteria from high or medium magnitude.
Medium	Size / Scale: A medium scale change and moderate loss of some key landscape elements / characteristics or the addition of some new medium scale uncharacteristic features or elements that could partially affect the landscape character and the special landscape qualities of a landscape designation. Directly affecting a host landscape receptor or indirectly affecting a nearby receptor. Geographical extent: The size or scale of landscape change would typically, but not always affect a more localised geographical extent at an intermediate distance from the proposed development.
Medium - Low	Intermediate rating with combination of criteria from medium or low magnitude.
Low	Size / Scale: A small-scale change and minor loss of a few landscape elements / non key characteristics, or the addition of some new small-scale features or elements of limited characterising influence on landscape character / designations.

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Magnitude of landscape change	Examples of Landscape Magnitude
	Geographical extent: There may be a small partial change in landscape character, typically, but not always affecting a localised geographical extent at some distance from the proposed development.
Low - Very Low	Intermediate rating with combination of criteria from low or very low magnitude.
Very Low to Zero	Size / Scale: A very small-scale change that may include the loss or addition of some landscape elements of limited characterising influence. The landscape characteristics and character would be unaffected. Geographical extent: Typically affecting a very small geographical extent at greater distance from the proposed development.

Evaluating landscape effects and significance

1.4.20 The level of landscape effect is evaluated through the combination of landscape sensitivity and magnitude of change. Once the level of effect has been assessed, and the nature of the effect determined (whether this is direct / indirect; its duration, whether this is temporary / permanent; and whether it is beneficial / neutral / adverse or cumulative) a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix illustrated in **Table 6.1.5** which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the proposed development and their conclusion, will be presented in a comprehensive, clear and transparent manner.

Significant Landscape Effects

1.4.21 A significant effect would occur where the combination of the variables results in the proposed development having a defining effect on the landscape receptor, or where changes of a lower magnitude affect a landscape receptor that is of particularly high sensitivity. A major loss or irreversible effect over an extensive area of landscape character, affecting landscape elements, characteristics and / or perceptual aspects that are key to a nationally valued landscape are likely to be significant as described in GLVIA 3 paragraph 5.56.

Non-Significant Landscape Effects

1.4.22 A non-significant effect would occur where the effect of the proposed development is not defining, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics. Equally a small-scale change experienced by a receptor of high sensitivity may not significantly affect the special landscape quality or integrity of a designation. Reversible effects, on elements, characteristics and character that are of small-scale or affecting lower value receptors are unlikely to be significant as described in GLVIA 3 paragraph 5.56.

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1.5 Assessing Visual Effects

1.5.1 Visual Effects are concerned wholly with the effect of the development on views, and the general visual amenity and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows:

1.5.2 *"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern here. is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views as a result of the change or loss of existing elements of the landscape and / or introduction of new elements."*

1.5.3 Visual effects are identified for different receptors (people) who would experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:

- Visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view; and
- Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

1.5.4 The level of visual effect (and whether this is significant) is determined through consideration of the sensitivity of each visual receptor (or range of sensitivities for receptor groups) and the magnitude of change that would be brought about by the construction, operation and decommissioning of the proposed development.

Zone of Theoretical Visibility (ZTV)

1.5.5 Plans mapping the Zone of Theoretical Visibility (ZTV) are used to analyse the extent of theoretical visibility of development or part of a development, across the LVIA Study Area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which would otherwise preclude visibility.

1.5.6 The ZTVs provide a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

Viewpoint Analysis

1.5.7 Viewpoint analysis is used to assist the assessment and is conducted from selected viewpoints within the LVIA Study Area. The purpose of this is to assess both the level of visual effect for particular receptors and to help guide the design process and focus the assessment. A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By considering the viewpoints in order of distance it is possible to define a threshold or outer geographical limit, beyond which it would be reasonable to assume that significant effects would be unlikely.

1.5.8 The assessment involves visiting the viewpoint location and viewing wirelines and photomontages prepared for each viewpoint location. The fieldwork is conducted in periods of fine weather with good visibility and considers seasonal changes such as reduced leaf cover or hedgerow maintenance.

1.5.9 Viewpoint analysis prepared for each viewpoint is presented as supporting evidence in an appendix to the LVIA (**Technical Appendix 6.2**). A summary table of the findings is also provided in order of distance from the development site. This summary table assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identifies areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood.

Evaluating Visual Sensitivity to Change

1.5.10 In accordance with paragraphs 6.31-6.37 of GLVIA 3, the sensitivity of visual receptors is determined by a combination of the value of the view and the susceptibility of the visual receptors to the change likely to result from the proposed development on the view and visual amenity.

Value of the view

1.5.11 The value of a view or series of views reflects the recognition and importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view is classified as high, medium or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

- **Formal recognition**: The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view would be increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area, which implies a greater value to the visible landscape.
- **Informal recognition**: Views that are well-known at a local level and / or have particular scenic qualities can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited and appreciated by a large number of people would generally have greater importance than one gained by very few people.

Susceptibility to Change

1.5.12 Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the proposed development. A judgement to determine the level of susceptibility therefore relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, classified as high, medium or low and based on the following criteria:

- **Nature of the viewer**: The nature of the viewer is defined by the occupation or activity of the viewer at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, motorists, and people taking part in recreational activity or working. Viewers, whose attention is focused on the landscape, or with static long-term views, are likely to have a higher sensitivity. Viewers travelling in cars or on trains would tend to have a lower sensitivity as their

view is transient and moving. The least sensitive viewers are usually people at their place of work as they are generally less sensitive to changes in views.

- **Experience of the viewer**: The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the proposed development may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position and over a long or short duration. For example, if the principal outlook from a settlement is aligned directly towards the proposed development, the experience of the visual receptor would be altered more notably than if the experience relates to a glimpsed view seen at an oblique angle from a car travelling at high speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the proposed development.

Visual Sensitivity Rating

1.5.13 An overall level of sensitivity is applied for each visual receptor or view, classified as 'High', 'Medium' or 'Low' by combining individual assessments of the value of the view and the susceptibility of the visual receptor to change. Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, is assessed in terms of their sensitivity. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor. Criteria that tend towards higher or lower sensitivity are set out in **Table 6.1.3**.

Table 6.1.3 Visual sensitivity to change

Value / Susceptibility criteria	**Level of value / susceptibility ranging from 'High' to 'Medium' to 'Low'** **High** ⟷ **Medium** ⟷ **Low**	
Value – Landscape Value is determined by a range of indicators/criteria with examples as follows:		
Map/tourist information	Specific viewpoint identified in OS maps and/or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
Facilities	Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
Planning recognition	View afforded protection in planning policy.	View is not afforded protection in planning policy.
Landscape value	View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
Recognition	View has informal recognition and well-known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
Art/Literature	View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.

Value / Susceptibility criteria	Level of value / susceptibility ranging from 'High' to 'Medium' to 'Low' High ⟷ Medium ⟷ Low	
Scenic Quality	View has high scenic qualities relating to the content and composition of the visible landscape.	View has low scenic qualities relating to the content and composition of the visible landscape.
Susceptibility – determined by a range of indicators / criteria with examples as follows:		
Activity of the viewer	Viewer who is likely or liable to be influenced by the proposed development such as residents, walkers, or tourists, whose main attention and interest may be on their surroundings.	Viewer who is un or less likely to be influenced by the proposed development such as viewers whose attention is not focused on their surroundings (e.g. people at work, or team sports).
Nature of the View	Residents that gain static, long-term views of the development in their principal outlook.	Mobile viewers whose views are transient and dynamic (e.g. travelling in cars or on trains with glimpsed views).
Direction/ Field of View	A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest.
Visual amenity	Viewers are focused on the experience of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case.
Sensitivity	**Sensitivity drawn from consideration of the Value and Susceptibility criteria to level of Sensitivity ranging from 'High' to 'Medium' to 'Low'.**	

Visual Magnitude of Change

1.5.14 The visual magnitude of change is an expression of the scale of change that would result from the visibility of the proposed development. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. as short / medium / long-term and temporary / permanent).

Size or Scale of Change

1.5.15 An assessment is made of the size or scale of change in the view that is likely to be experienced as a result of the proposed development, based on the following criteria:

- **Distance**: The distance between the visual receptor / viewpoint and the proposed development. Generally, the greater the distance, the lower the magnitude of change, as the proposed development would constitute a smaller-scale component of the view due to the effects of perspective.
- **Size**: The amount and size of the proposed development that would be seen. Visibility may range from small or partial to whole visibility of the proposed development. Generally, the larger and greater number of elements (wind turbines and access tracks) of the proposed development that appear in the view, the higher the magnitude of change.

This is also related to the degree to which development may be wholly or partly screened by landform, vegetation (seasonal) and / or built form. Conversely open views are likely to reveal more of a development, particularly where this is a key characteristic of the landscape.

- **Scale**: The scale of the change in the view, with respect to the loss or addition of features in the view and changes in its composition. The scale of the proposed development may appear larger or smaller relative to the scale of the receiving landscape.
- **Field of View** The vertical / horizontal field of view (FoV) and the proportion of view that is affected by the proposed development. Generally, the more of the proportion of a view that is affected, the higher the magnitude of change would be. If the proposed development extends across the whole of the view, the magnitude of change would generally be higher as the full view would be affected. Conversely, if the proposed development extends over a narrow part of an open view, the magnitude of change is likely to be reduced as the proposed development would not affect the whole view or outlook. This can in part be described objectively by reference to the horizontal / vertical FoV affected, relative to the extent and proportion of the available view.
- **Contrast**: The character and context within which the proposed development would be seen and the degree of contrast or integration of any new features with existing landscape elements, in terms of scale, form, mass, line, height, colour, luminance and motion. Developments which contrast or appear incongruous in terms of colour, scale and form are likely to be more visible and have a higher magnitude of change.
- **Consistency of image**: The consistency of image of the proposed development in relation to other developments. The magnitude of change for the proposed development is likely to be lower if it appears broadly similar to other developments in the landscape in terms of its scale, form and general appearance. New development is more likely to appear as logical components of the landscape with a strong rationale for their location.
- **Skyline / Background**: Whether the proposed development would be viewed against the skyline or a background landscape may affect the level of contrast and magnitude. For example, skyline developments may appear more noticeable, particularly where they affect open and undeveloped horizons. Conversely, development may also appear more noticeable when viewed against a darker background landscape, such as forestry. In these cases, the magnitude of change would tend to be higher.

  If the proposed development adds to an already developed skyline the magnitude of change would tend to be lower.
- **Number**: Generally, the greater the number of separate development components seen simultaneously or sequentially, the higher the magnitude of change and this may lead to whole project effects (for example the visual effect of the turbines and the substation). Further cumulative effects would occur in the case of separate, existing developments and their spatial relationship to each other would affect the magnitude of change. For example, development that appears as an extension to an existing development would tend to result in a lower magnitude of change than a separate, new development.
- **Nature of Visibility**: The nature of visibility is a further factor for consideration. The proposed development may be subject to various phases of development change and the manner in which the development may be viewed could be intermittent or continuous and / or seasonally, due to periodic management or leaf fall.

Geographical Extent

1.5.16 The geographic extent over which the visual effects would be experienced is also assessed. This is distinct from the size or scale of effect and is described in terms of the physical area or location over which it would be experienced (described as a linear or area measurement). The extent of the effects would vary according to the specific nature of the proposed development and is principally assessed through ZTV, field survey and viewpoint analysis of the extent of visibility likely to be experienced by visual receptors. The geographical extent of visual effects is described as per the following examples:

- The geographical extent can be described as an area measurement or proportion of the total receptor affected. For example, effects on people within a particular area such as a golf course or area of common land can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people within that area. The geographical extent of that visual effect can be expressed as approximately '5 hectares' or '10%' of the common land or a golf course area.
- The geographical extent can be described as a linear measurement (metres or kilometres) according to the length of route affected. For example, effects on people travelling on a route through the landscape such as a road or footpath can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people along that route. The geographical extent of that visual effect can be expressed as approximately '2km' or '10%' of the total length of the route.
- The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone. (An example of a 'specific viewpoint' is a public viewpoint recommended in tourist literature such as a well visited hill summit. An example of an 'illustrative viewpoint' is a particular location within a built up or well vegetated area where an uncharacteristically open view exists).

Duration and Reversibility

1.5.17 The duration or time period over which a visual effect is likely to occur is judged on a scale of 'short', 'medium' or 'long' term and is assessed for the proposed development as per the method described in section 1.4.

1.5.18 Reversibility is a separate, but linked consideration, also assessed for the proposed development as per the method described in section 1.4.

Visual Magnitude of Change Rating

1.5.19 The 'magnitude' or 'degree of change' resulting from the proposed development is described as 'High', 'High – Medium', 'Medium', 'Medium – Low', 'Low', 'Low – Very Low', 'Very Low' or 'Zero'. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. as short / medium / long-term and temporary / permanent). The basis for the assessment of magnitude for each receptor is made clear using evidence and professional judgement and some examples of the levels of magnitude of change that can occur on views are defined in **Table 6.1.4**.

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Table 6.1.4 Visual Magnitude of change

Magnitude of landscape change	Examples of Visual Magnitude
High	Size and Scale: A very large - large and dominant change to the view. Number: Involving the loss/addition of a large number of features / elements. Distance: Typically appearing closer to the viewer in the fore to mid-ground. FoV: Affecting a large vertical and wide horizontal FoV. Nature of Visibility: Multiple phase development, continuously and sequentially visible. Contrast: Strong degree of contrast with surroundings, little / no screening. Skyline: Visible on the skyline as a new feature. Consistency of Image: Contrasting with other developments, lacking in visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, affecting a large area or length / proportion of route. May also be experienced from a specific viewpoint.
High - Medium	Intermediate rating with combination of criteria from high or medium magnitude of change category.
Medium	Size and Scale: A medium and prominent change to the view. Number: Involving the loss/addition of a number of features / elements. Distance: Typically appearing in the middle ground. FoV: Affecting a medium vertical and a medium horizontal FoV. Nature of Visibility: Multiple phase development, intermittently and sequentially visible. Contrast: Contrast with surroundings and may benefit from some screening. Skyline: Visible on the skyline along with other features. Consistency of Image: Different from other existing developments, some visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, affecting a medium area or length / proportion of route. May also be experienced from a specific viewpoint.
Medium - Low	Intermediate rating with combination of criteria from medium or low magnitude of change category.
Low	Size and Scale: A small / noticeable change, could be missed by the casual observer. Number: Involving the loss/addition of a small number of features / elements. Distance: Typically appearing in the background. FoV: Affecting a small vertical and a narrow horizontal FoV. Nature of Visibility: Simple, single development, intermittently and infrequently visible. Contrast: Some parity / 'fits' with surroundings and some screening. Skyline: Partly visible on a developed skyline or not visible on the skyline. Consistency of Image: Similar from other developments with visual rationale, appearing reasonably well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity, affecting a smaller area or length / proportion of route. May also be experienced from a specific viewpoint.
Low – Very Low	Intermediate rating with combination of criteria from low or very low magnitude of change category.

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Magnitude of landscape change	Examples of Visual Magnitude	
Very Low to Zero	Size and Scale: Number: Distance: FoV: Nature of Visibility: Contrast: Skyline: Consistency of Image:	A small or negligible change, need to 'look for it'. Involving the loss/addition of a small number of features / elements. Typically appearing in the far distance. Affecting a small vertical and a very narrow horizontal FoV. Simple, single development, intermittently and infrequently visible. Blends with surroundings and / or is well screened. Partly visible on a developed skyline or not visible on the skyline. Similar from other developments with strong visual rationale, appearing well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity, affecting a smaller area or length / proportion of route. May also be experienced from a specific viewpoint.

Evaluating visual effects and significance

1.5.20 The level of visual effect is evaluated through the combination of visual sensitivity and magnitude of change. Once the level of effect has been assessed, and the nature of the effect determined (whether this is direct / indirect; its duration, whether this is temporary / permanent; and whether it is beneficial / neutral / adverse or cumulative) a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix illustrated in **Table 5.1.5** which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the proposed development and their conclusion, is presented in a comprehensive, clear and transparent manner.

Significant Visual Effects

1.5.21 A significant effect is more likely to occur where a combination of the variables results in the proposed development having a defining effect on the view or visual amenity or where changes affect a visual receptor that is of high sensitivity as described in GLVIA 3 paragraph 6.44.

Non-Significant Visual Effects

1.5.22 A non-significant effect is more likely to occur where a combination of the variables results in the proposed development having a non-defining effect on the view or visual amenity or where changes affect a visual receptor that is of low sensitivity as described in GLVIA 3 paragraph 6.44.

Weather conditions

1.5.23 The assessment of visual effects is undertaken in clear weather with good to excellent visibility. This means that the viewpoint assessment represents a fair assessment of the likely visual effects.

1.6 Assessing Cumulative Landscape and Visual Effects

1.6.1 The assessment of cumulative effects is essentially the same as for the main assessment of the 'solus' or primary landscape and visual effects, in that the level of landscape and

visual effect is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change. Cumulative assessment, however, considers the magnitude of change posed by multiple developments.

1.6.2 A cumulative landscape or visual effect simply means that more than one type of development is present or visible within the landscape. Other forms of existing development and land-use such as woodland and forestry, patterns of agriculture, built form, and settlements already have a cumulative effect on the existing landscape that is already accepted or taken for granted. These features often contribute strongly to the existing character, forming a positive or adverse component of the local landscape. Landscapes, however will have a finite capacity for cumulative development, beyond which further new development would result in landscape character change and could result in the creation of a 'wind farm landscape' where wind farms have become the dominant characteristic.

1.6.3 Detailed guidance on the cumulative assessment of wind farm development is provided in the NS document '*Guidance: Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments'* (2021). This assessment distinguishes between 'additional' cumulative effects that would result from adding the proposed development to other cumulative wind farm development and 'combined' cumulative effects that assess the total cumulative effect of the proposed development and other cumulative wind farm development. In the latter case a significant cumulative effect may result from the proposed development or one of more other existing, under-construction or consented wind farms, or other wind farm applications. In those cases, the main contributing wind farm(s) is identified in the assessment.

1.6.4 Types of cumulative effect are defined as follows:

- Cumulative Landscape Effects: Where more than one wind development may have an effect on a landscape designation or particular area of landscape character;
- Cumulative Visual Effects: the cumulative or incremental visibility of similar types of development that may combine to have a cumulative visual effect. These can be further defined as follows:
  - Simultaneous or combined: where two or more developments may be viewed from a single fixed viewpoint simultaneously, within the viewer's field of view and without requiring them to turn their head[2];
  - Successive or repetitive: where two or more developments may be viewed from a single viewpoint successively as the viewer turns their head or swivels through 360°; and
  - Sequential: where a number of developments may be viewed sequentially or repeatedly at increased frequency, from a range of locations when travelling along a route within the LVIA Study Area.

1.6.5 The NatureScot document '*Siting and Designing Wind farms in the Landscape' (Version 3a)* explains that the development of multiple wind farms within a particular area may create different types of cumulative effect, that can be described as follows:

- *"The wind farms are seen as separate isolated features within the landscape character type, too infrequent and of insufficient significance to be perceived as a characteristic of the area;*

[2] Note: A person's field of view is variable but is approximately 90° when facing in one direction.

- *The wind farms are seen as a key characteristic of the landscape, but not of sufficient dominance to be a defining characteristic of the area; [a landscape with wind farms] and*
- *The wind farms appear as a dominant characteristic of the area, seeming to define the character type as a 'wind farm landscape character type."*

1.6.6 Wind farm development that results in the creation of a '*wind farm landscape*' as opposed to a '*landscape with wind farms'* or '*landscape with occasional wind farms*' is likely to be assessed as significant. Equally the 'additional effect' of wind farm development, adding to a scenario where there are already a number of other existing or consented wind farms, may be less than the effect of the proposed development either on a 'solus' or primary basis or in an area where there are few or no wind farms existing. This is because wind farm development has already been established as a characterising influence and the additional effect of further development may or may not alter this.

1.6.7 Whilst the CLVIA considers other wind farm development, it should not be considered as a substitute for individual LVIA assessment in respect of each of the other cumulative developments included in the CLVIA.

Defining the Cumulative Study Area

1.6.8 The cumulative study area is the same as the LVIA Study Area as illustrated in **Figure 6.1**. The cumulative assessment considers the effects of other existing, under-construction, consented and application wind energy sites on the landscape and visual receptors within the LVIA Study Area. In determining which wind energy developments should be included in the CLVIA the assessors may draw on the advice from consultees and other wind energy development within a wider search area (up to 60km radius from the proposed turbines).

1.6.9 Those developments at pre-planning or scoping stage are excluded in accordance with NatureScot 2021 guidance unless there is a justified / exceptional circumstance for their inclusion in the assessment. However, two scoping stage wind farms within 10km of the proposed development have been included in the wirelines, but only the scoping stage Fairburn Extension has been included in the cumulative assessment in line with the same NatureScot guidance given its location adjacent to the proposed development.

Predicting Cumulative Landscape Effects

1.6.10 The assessment considers the extent to which the proposed development, in combination with others, may change landscape character through either an 'additional' or 'in combination' effect on characteristic elements, landscape characteristics and quality of the baseline landscape character. Identified cumulative landscape effects are described in relation to each individual Landscape Character Type/Area and for any designated landscape areas assessed within the LVIA Study Area.

Predicting Cumulative Visual Effects

1.6.11 The assessment of cumulative visual effects involves reference to the cumulative visibility ZTV maps and the cumulative viewpoint analysis. The cumulative visibility of other existing and consented wind energy developments and applications is established in the first instance using the computer programme (Resoft Wind Farm© software) to identify areas where wind energy developments are theoretically visible. Cumulative visibility maps are analysed to identify the visual receptor locations and routes where cumulative

visual effects on the landscape and people may occur as a result of the proposed development.

1.6.12 With potential receptor locations identified, cumulative effects on individual receptor groups are then explored through viewpoint analysis, which involves site visits informed by wireline illustrations that include other wind energy developments. The computer programme itself can also be used to 'drive' particular routes to assess the visibility of different wind energy developments and inform the assessment of sequential cumulative effects that may occur along a route or journey and compared to actual visibility experienced along a route on site.

Evaluation of Cumulative Landscape and Visual Effects

1.6.13 The evaluation of cumulative effects is assisted by the matrix illustrated in **Table 6.1.5,** which is used to guide the assessment.

1.6.14 The cumulative assessment has been prepared to ensure that, as well as the 'solus' or primary effect of the proposed development (LVIA) the 'additional' cumulative effects and the 'combined' cumulative effect (CLVIA) is also reported to account for two cumulative Scenarios as follows:

- **Proposed development:** Assessed on an individual basis (the LVIA). This part of the assessment may take account of other existing forms of wind farm development that may be present in the landscape, whilst recognising that their influence on landscape character is likely to be time limited. It does not consider the additional or combined cumulative effects and only reports of the effect of the proposed development alone;
- **Scenario 1: Existing + Consented + the proposed development**: The additional and combined cumulative effects of the existing and consented wind energy developments with the proposed development are assessed; and
- **Scenario 2: Existing + Consented + Applications + the proposed development**: The additional and combined cumulative effects of the existing and consented wind energy developments and applications (and one at scoping stage – Fairburn Extension), with the proposed development are assessed.

1.6.15 In addition, the cumulative assessment takes account of the timescales, as far as practicable, for the operation of the existing and consented developments.

1.6.16 Due to the numbers of other developments involved, the overall cumulative effects may be greater than for the primary effect or additional effect for the proposed development assessed in the main LVIA. The resulting level of cumulative effect may remain at the same level of effect or increase to a higher level of effect. The point at which these effects become significant or not significant in landscape and visual terms is still a matter for professional judgement, although four scenarios or combinations of cumulative effect, taking account of other wind energy development can occur as follows:

- A significant effect from the proposed development is predicted in addition or combination with another significant effect attributed to other development(s). The effect is still termed significant and cumulative but is a greater level of effect than for either development individually.
- A significant effect from the proposed development is predicted in addition or combination with another non-significant effect attributed to other development(s). The effect is still termed significant and cumulative but is attributed to the proposed development and is a greater level of effect than for either development individually.

- A non-significant effect from the proposed development is predicted in addition or combination with another significant effect attributed to other development(s). The effect is still termed significant and cumulative but is attributed to the other wind energy development(s) and is a greater level of effect than for either development individually.
- A non-significant effect from the proposed development is predicted in addition or combination with another non-significant effect attributed to other development(s). The effect is still termed cumulative and is a greater level of effect than for either development individually; the combined effect, however, may or may not be significant.

1.6.17 The nature of a cumulative effect may also be described as direct / indirect, temporary / permanent, or beneficial / adverse. The probability of a cumulative effect occurring may also be described (certain, likely or uncertain / unknown) according to whether the developments in question are existing / under construction, consented or at the application stage.

1.7 Evaluation of Significance and Nature of Effect

1.7.1 The matrix presented in **Table 6.1.5** is used as a guide to illustrate the LVIA process. In line with the emphasis placed in GLVIA 3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone.

1.7.2 The landscape and visual assessment unavoidably, involves a combination of quantitative and qualitative assessment and wherever possible cross references will be made to objective evidence, baseline figures and / or to photomontage visualisations to support the assessment conclusions. Often a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach. Importantly each effect results from its own unique set of circumstances and have been assessed on a case-by-case basis. The matrix should therefore be considered as a guide and any deviation from this guide will be clearly explained in the assessment.

1.7.3 In accordance with the relevant EIA Regulations, it is important to determine whether the effects, assessed as a result of the proposed development, are likely to be significant. Significant landscape and visual effects will be highlighted in bold in the text and in most cases, relate to all those effects that result in a '**Substantial**', '**Major**' or a '**Major to Moderate**' effect as indicated in **Table 6.1.5** (and shaded dark grey). '**Moderate**' levels of effect (shaded grey) can also be assessed as significant, subject to the assessor's opinion that should be clearly explained as part of the assessment.

1.7.4 White or un-shaded boxes in **Table 6.1.5** indicate a non-significant effect. In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None' or 'No View'. Intermediate levels of magnitude or effect are also used in the LVIA and are shown in **Table 6.1.5** in italics, for example *High – Medium* magnitude or *Substantial to Major* level of effect.

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Table 6.1.5 Evaluation of Landscape and Visual Effects

Magnitude of Change	Landscape and Visual Sensitivity			
	High	**Medium**	**Low**	**Very Low**
High	**Substantial**	**Major**	Moderate	Not used
High - Medium	***Substantial to Major***	***Major to Moderate***	*Moderate to Minor*	
Medium	**Major**	Moderate	Minor	
Medium - Low	***Major to Moderate***	*Moderate to Minor*	*Minor*	
Low	Moderate	Minor	Negligible	
Low – Very Low	*Moderate to Minor*	*Negligible*	*Negligible*	
Very Low	Minor	Negligible	Negligible	
Zero	None / No View			

Type or Nature of Effect

1.7.5 In accordance with the EIA Regulations the type or nature of effect is also described in terms of whether it is direct or indirect; its duration (temporary / permanent or reversible) cumulative; and whether the effect is positive, neutral or negative.

1.7.6 Transboundary effects are not relevant to this assessment as the LVIA Study Area for the proposed development would not overlap with the territory of another country.

Direct and indirect effects

1.7.7 GLVIA, paragraph 5.2 notes that landscape may be directly and indirectly affected by development and defines indirect effects as "*Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in rime from the source of the effects*".

1.7.8 Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor. Indirect landscape effects may also affect the host landscape as well as other landscapes, often separated by distance from the proposed development, as a consequence of views that affect the perceptual aspects of their character and key characteristics.

1.7.9 Visual effects are generally all considered as direct effects. An indirect visual effect may however be used to define a visual effect on a view that is not in the direction of the main view of the viewer as described by the following examples:

- Road users generally face the road directly ahead in the direction of travel and visual effects affecting those views may be described as direct effects. Where the visual effect is experienced in views oblique to the direction of travel they may be described as indirect; and
- Designed landscapes and vistas / viewpoints may be orientated in a particular direction and visual effects affecting those views may be described as direct effects.

Where the visual effect is experienced in views oblique to the direction of the designed or main / primary view they may be described as indirect.

1.7.10 Secondary effects (or effects subsequent to an initial effect) are covered in this assessment by indirect effects.

Positive (beneficial) and negative (adverse) effects

1.7.11 Wind farms give rise to a wide range of opinions, from strongly adverse to strongly beneficial. However, LVIA is not an assessment of public opinion, although a precautionary approach has been taken, which assumes that the nature of the effects would be adverse or neutral unless otherwise stated.

1.7.12 Guidance provided by the in GLVIA 3 on the nature of effect (i.e. beneficial or adverse) states that *'in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity'*, but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

1.7.13 In relation to many forms of development, the LVIA will identify 'beneficial' and 'adverse' effects by assessing these under the term 'Nature of Effect'. The landscape and visual effects of large-scale infrastructure are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects can be measured as being categorically 'beneficial' or 'adverse'. In some disciplines, such as noise or ecology, it is possible to quantify the effect in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

1.7.14 As a starting point, unless stated otherwise, the effects considered in the assessment will be considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant, based on the following definitions:

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The proposed development contributes to the landscape by virtue of good design or the introduction of new landscape planting. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components.
- Neutral effects occur where the proposed development fits with the existing landscape character or visual amenity. The proposed development neither contributes to or detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where the effects are so limited that the change is hardly noticeable (very low magnitude). A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.
- Adverse effects are those that detract from the landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

Probability of Effect

1.7.15 The probability of cumulative effects is variable. Those effects related to existing wind energy development and those under construction are considered as certain; effects related to development with planning consent are considered as likely. Wind energy development sites for which there is a submitted planning application are considered as uncertain with an even greater level of uncertainty attached to pre-planning application sites.

1.8 Residential Visual Amenity Assessment

1.8.1 There are no residential properties within 2km of the proposed turbines. As agreed through consultation and in line with the Landscape Institute's *Residential Visual Amenity Assessment* Technical Note 2/19, 15 March 2019, a RVAA has been scoped out of the assessment.

1.9 Night-time Assessment

1.9.1 The night-time assessment is supported by a baseline night-time environment or darkness survey and ZTV plots, baseline photography, wirelines and photomontages from selected viewpoints. These visualisations help to assess both the level of night-time visual impact for particular receptors and focus the assessment.

1.9.2 The night-time assessment is reported in **Technical Appendix 6.3**.

Night-time Viewpoint Analysis

1.9.3 A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By arranging the viewpoints in order of distance it is possible to define a threshold or outer limit, beyond which there would be no further significant effects.

1.9.4 The night-time viewpoint analysis involves visiting the viewpoint locations during periods between dusk and dawn and viewing wirelines and photomontages prepared for each viewpoint location. The fieldwork is conducted in periods of fine weather with clear skies and considers seasonal changes such as reduced leaf cover or hedgerow maintenance.

Baseline Night-time Environment or Darkness Survey

1.9.5 During site visits a baseline night-time environment survey or 'darkness survey' is carried out at each viewpoint location. The purpose of the darkness survey is to establish the existing light levels perceived by the landscape architects at the viewpoints and determine their sensitivity to change. The following observations are recorded:

- Areas of darkness with no artificial light;
- Direct artificial lighting (where the light source is directly visible from the viewpoint);
- Indirect artificial lighting (where the light source is not visible but the light emanating from the light source is visible as in the case of 'sky glow');
- Static lighting, for example emanating from a residential property or street light; and
- Mobile or transient lighting, for example associated with moving vehicles, trains or aircraft.

1.9.6 Baseline photographs at each of the night-time assessment viewpoints are recorded.

Assessment of Night-time Sensitivity

1.9.7 In terms of landscape effects, a key determinant of the value and susceptibility of a landscape is the degree to which the landscape character can be discerned at night and the quality of the baseline 'darkness' – essentially is the area unlit or lit? There is a limited period of the night, during the twilight periods just after sunset or just before dawn when the landscape character maybe partially perceived and during periods when there are clear skies and under conditions such as a full moon. During these limited periods it may be possible to discern sufficient number of the key landscape characteristics, in particular, topography / skyline and some of the perceptual qualities, although other features such as colour, pattern, texture will be muted or not discernible. As darkness progresses these features cease to be visible. The susceptibility of the landscape at night is therefore variable and reduces from its highest or most susceptible during the day, through the twilight period, until the night when susceptibility would be at its lowest, during periods of greatest darkness.

1.9.8 The value of the landscape at night is recognised in designations that include National Parks and Dark Sky Parks and more rarely in relation to local landscape designations and particular landscape character types, although the landscape value of non-designated landscapes is usually lower.

1.9.9 In terms of visual effects, the susceptibility of the receptor is primarily influenced by the activity of the viewer. A number of tourist locations are likely to be closed to the public during the hours of darkness, residents are most likely to be indoors, and people in settlements and road users may be influenced by the streetlights and vehicle lights, reducing their sensitivity. Hill walkers and people viewing the landscape from recognised viewpoints are less likely or unlikely to be present at those locations during the night. This small group of receptors however, could be considered as of High sensitivity, particularly in locations such as dark sky park viewpoints.

1.9.10 The value of the specific views and visual amenity at night is also recognised in designations that include National Parks and Dark Sky Parks but more rarely documented in local landscape designations, although in all cases the value is likely to be high.

1.9.11 Factors affecting the susceptibility and value of landscape and visual receptors are combined to determine the sensitivity of the receptor and afforded a rating of High, Medium, Low or Very Low in a similar manner to that set out in **Tables 6.1.1** and **6.1.3**.

Assessment of Night-time Magnitude

1.9.12 The magnitude of change assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. short / medium / long-term and temporary or permanent).

1.9.13 Mitigating factors such as an approved Lighting Design Strategy and the specification of particular aviation warning light attributes are documented as part of the Project Description within the night-time assessment.

1.9.14 The number of lights likely to be visible as well as their intensity can be described in objective terms and ZTVs indicating the theoretical visibility of numbers of lights and their intensity is mapped in order to assist the assessment process. Other objective factors include the FoV and the distance over which the lights may be seen. More subjectively the proposed development is considered against the baseline or darkness survey in terms of whether the proposed lighting would contrast with an unlit area or assimilate with other

lights in a landscape or view that may already have multiple light sources. In this manner the assessment has to consider the degree to which the proposed development would affect the landscape character or designation, as far as that can be perceived at night.

1.9.15 In visual terms, a further consideration is the numbers of viewers which are likely to experience the views and visual amenity at night. It is reasonable to assume that the numbers of tourists and hill walkers, viewing the landscape at night for example, will tend to be few in number or rare, with most tourist destinations closed during the hours of darkness for example. Exceptions may include specific viewpoints within a Dark Sky Park. Walkers and road users out at night, will also themselves tend to be sources of light from torches and vehicle headlights and thus affect the baseline or darkness survey.

1.9.16 The 'magnitude' or 'degree of change' resulting from the proposed development is described as 'High', 'High – Medium', 'Medium', 'Medium – Low', 'Low', 'Low – Very Low', 'Very Low' or 'Zero'. in similar terms to the descriptions set out in **Tables 6.1.2** and **6.1.4**.

Evaluation of Night-time Level of Effects and Significance

1.9.17 The level effect is evaluated through the combination of sensitivity and magnitude of change. Once the level of effect has been assessed, and the nature of the effect is determined (whether this is direct / indirect; its duration, temporary / permanent; and whether it is beneficial / neutral / adverse or cumulative) a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix illustrated in **Table 6.1.5** which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the proposed development and their conclusion, is presented in a comprehensive, clear and transparent manner.

1.10 Wild Land Assessment

1.10.1 The assessment methodology is based on NatureScot's Technical Guidance: *Assessing Impacts on Wild Land Areas* (August 2023). The method and general approach to the wild land assessment is described in paragraphs 4 and 12 and is based on GLVIA 3 methodology as follows:

"*This guidance sets out a methodology and general principles for assessing the impact of development and other proposals on WLAs, as they are experienced from within the WLA, not from outwith*."

"*The method described employs the general approach and principles set out within the Guidelines for Landscape and Visual Impact Assessment (GLVIA)3. The assessment of effects of a proposal on a WLA is an exercise distinct from landscape and visual impact assessment (LVIA) that can draw on but should not duplicate its information. The assessment should consider effects on the physical attributes and perceptual responses that contribute to the WLA qualities identified in the WLA descriptions*."

"*Each of the WLA descriptions set out their particular wild land qualities, with the physical attributes and perceptual responses contributing to it identified. These descriptions should form the starting point for an assessment of impacts on a WLA*."

[3] Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Landscape Institute and IEMA (May 2013), hereafter referred to as' GLVIA 3'

1.10.2 The assessment of night-time effects on Wild Land is based on a combination of the wild land assessment methodology and the night-time assessment methodology noted in section 1.9.

1.10.3 The wild land assessment is reported in **Technical Appendix 6.4**.

1.11 Production of ZTVs and Visualisations

1.11.1 Zones of Theoretical Visibility (ZTVs) and visualisations (wirelines / wirelines and photomontages) are graphical images produced to assist and illustrate the LVIA and the cumulative assessment. The methodology used for viewpoint photography and photomontages accords with the NatureScot guidance *Visual Representation of Wind Farms*, Version 2.2, February 2017 and *Visualisation Standards for Wind Energy Developments*, Highland Council, July 2016, whilst the methodology for the ZTV's and night-time visualisations follow the SNH guidance *Visual Representation of Wind Farms*, Version 2.2, February 2017. Further, additional guidance is provided by the Landscape Institute Technical Guidance Note: *Visual Representation of Development Proposals*, 17 September 2019.

Methodology for Production of ZTVs

1.11.2 The ZTVs are calculated using Resoft Wind Farm© software to generate the zone of theoretical visibility of the proposed development. This software creates a 3D computer model of the existing landscape and the proposed development using digital terrain data as follows:

- Ordnance Survey Terrain 50: Used to produce the main or standard ZTV plot and wirelines, these tiles provide a digital record of the existing landform of Great Britain, or Digital Terrain Model (DTM) at 10m elevation intervals based on 50m grid squares and models representing the specified geometry and position of the proposed turbines. The computer model includes the entire LVIA Study Area and takes account of the effects caused by atmospheric refraction and the Earth's curvature; and
- Ordnance Survey Terrain 5: Used to produce a more detailed ZTV plot or wireline for limited areas, often used where there are small undulations or crags within the landscape. These tiles provide a digital record of the existing landform of Great Britain based on 5m grid squares and models representing the specified geometry and position of the proposed turbines. The computer model includes the central LVIA Study Area and takes account of atmospheric refraction and the Earth's curvature.

1.11.3 The resulting ZTV plots are overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing/graphic design software.

1.11.4 The same computer software is also used to calculate cumulative ZTV plots based on the intervisibility of the proposed development with other existing, consented and application wind farms included in the CLVIA. In addition to the methods as described above, the layouts and geometries of the surrounding existing, consented and application wind farms are loaded into the same computer programme.

Methodology for Baseline Photography

1.11.5 Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline or similar visualisation in the field. The viewpoint location is micro-sited to avoid as far as reasonable foreground clutter and photographed during fair weather and light conditions. A photographic record is taken to record the view and the details of the

viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy.

1.11.6 The following photographic information is recorded:

- Date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~5-10 m;
- GPS recorded Above Ordnance Datum (AOD) height data;
- The focal length of lens is confirmed;
- Horizontal field of view (in degrees); and
- Bearing to Target Site (proposed development).

1.11.7 All photographs included in this assessment were recorded with a digital SLR camera set to produce photographs equivalent to that of a manual 35 mm SLR camera with a fixed 50mm or 75mm focal length lens as required.

1.11.8 All the resulting visualisations have been prepared to show other cumulative wind energy development in order that they may assist the cumulative assessment as well as the LVIA.

1.11.9 All viewpoints within 10km have also illustrated the site infrastructure, where visible, such as access tracks, for example, within the resulting visualisations. In this instance, only viewpoints 4, 5 and 8 have infrastructure visible.

1.11.10 Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the proposed development, based on current information and photomontage methodology.

Weather Conditions

1.11.11 GLVIA 3 para 8.22 states:

"*In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*

- *representative of those generally prevailing in the area; or*
- *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible".*

1.11.12 In preparing photomontages for the LVIA, photographs will be taken in favourable weather conditions that are representative of the weather conditions generally and where possible, will be taken during periods of 'good' or 'excellent' visibility conditions.

Methodology for Production of Visualisations

1.11.13 Each view has been illustrated with a photograph, a wireline and / or a photomontage indicating the proposed development. Definitions of each of these are described as follows:

- Baseline photograph: A photograph of the existing view recorded in fair weather conditions and usually presented as a panorama as required by the relevant NatureScot or THC guidance.
- Wireline or Wireframe: A computer generated model of the landscape and the proposed development.

- Photomontage is a visualisation which superimposes an image of a proposed development (in this case the wireline or wireframe) upon the baseline photograph, which is then rendered by computer software to produce an image of how the proposed development would appear from that viewpoint. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed.

Baseline Photograph Production

1.11.14 Photographs are then taken using a digital SLR camera in combination with a panoramic head equipped tripod. Detailed information is then recorded on site to enable the accurate alignment of the photographs with the wireline model (data such as: GPS grid co-ordinates; ground level information; compass bearings; and any other known references and viewpoint information).

1.11.15 To create the baseline panorama, the photographs from the viewpoint are then digitally joined using Adobe Photoshop or PTGui software to form a planar or cylindrical projection image or panorama using computer software to remove 'barrel distortion' caused by the camera lens. There are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day or from location that avoid foreground clutter or other vertical features such as telegraph poles, particularly where this is a true representation of the view from that viewpoint area.

Wireline or Wireframe Production

1.11.16 The wirelines and photomontages are produced using Resoft Wind Farm© software to generate a perspective view of the wind farm. This software creates a 3D computer model of the existing landscape and the proposed development using digital terrain data and models representing the specified geometry and position of the proposed turbines. The computer model includes the entire LVIA Study Area, and all visualisations take account of the effects caused by atmospheric refraction and the Earth's curvature. The computer model does not take account of the screening effects of any intervening objects and forestry, unless specified (see individual figures).

1.11.17 A wireline of the proposed development and the existing landform is generated for each viewpoint within the LVIA Study Area. These wirelines are used to assist the assessment on location at each viewpoint, the position of which, if required, is adjusted on site to achieve the most visible vantage-point of the proposed development (e.g. to avoid buildings, forestry, other features, potentially interfering with the view).

Photomontage Production

1.11.18 Visualisations will be produced for the agreed viewpoints identified in the LVIA and photomontages will aim to provide a photorealistic image of the appearance of the proposed development. 3D model representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.

1.11.19 Visualisations that illustrate the proposed development are produced using a range of computer software, most commonly in this case Resoft WindFarm©. Others such as True View and 3D AutoCAD or Studio Max are also used for example.

1.11.20 The photomontage is produced by digitally combining or superimposing the wireline / wireframe or computer generation 3D model of the landscape and the proposed development onto the baseline photograph and rendering this in order to add colour, texture and lighting effects.

1.11.21 To produce the photomontage, the wireline turbines are rendered to appear 'life-like' taking into account the time of the photography and weather conditions occurring on the day.

1.11.22 The completed panoramas, wirelines, photomontages and accompanying data are then presented as figures using desktop publishing/graphic design software.

Limitations of Visualisations

1.11.23 The photomontage visualisations used in the LVIA are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs. NatureScot guidance advises that beyond 20km the visibility of turbines in the printed photomontages is difficult to see or reproduce realistically.

1.11.24 The photomontage visualisations of the proposed development have a number of limitations when using them to form a judgement on visual effect. These include:

- A visualisation can never show exactly what a proposed development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images provided give a reasonable impression of the scale and the distance to the proposed development but can never be 100% accurate to the as constructed effect;
- A static image cannot convey movement such as turbine blade rotation or other features such as the movement of water or the reflection from the sun. The assessment however will take account of turbine movement by examining animated versions of the photomontages on screen and / or other examples of existing wind farm development on site;
- The viewpoints illustrated are representative of views in the area but cannot represent visibility at all locations;
- To form the best impression of the effects, these images are best viewed at the viewpoint location shown;
- The visualisations must be printed and viewed at the correct size as indicated on the figures;
- Images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression; and
- It is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression.

Printing of Maps and Visualisations

1.11.25 All electronic visualisations and maps should be printed out and viewed at the correct scale as noted on the document.

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1.12 Glossary of Terms and Abbreviations

Note: Descriptions marked with an asterisk are repeated from the GLVIA 3 glossary.

Term/abbreviation	Definition
AOD	Above Ordnance Datum
AoV / FoV	Angle of View / Field of View
Artificial light	Light produced by electrical means.
BT	Blade Tip
Beneficial or Adverse Types of Landscape Effect	The landscape effects may be beneficial, neutral, or adverse. In landscape terms – a beneficial effect would require development to add to the landscape quality and character of an area. Neutral landscape effects would include low or negligible changes that may be considered as part of the 'normal' landscape processes such as maintenance or harvesting activities. An adverse effect may include the loss of landscape elements such as mature trees and hedgerows as part of construction leading to a reduction in the landscape quality and character of an area.
Beneficial or Adverse Types of Visual Effect	The visual effects may be beneficial, neutral, or adverse. In visual terms – beneficial or adverse effects are less easy to define or quantify and require a subjective consideration of a number of factors affecting the view, which may be beneficial, neutral, or adverse. Opinions as to the visual effects of wind energy developments vary widely, however it is not the assumption of this assessment that all change, including substantial levels of change is an adverse experience. Rather this assessment has considered factors such as the visual composition of the landscape in the view together with the design and composition, which may or may not be reasonably, accommodated within the scale and character of the landscape as perceived from the receptor location.
Candela	A unit of measure of luminous intensity, in a given direction.
CLVIA	Cumulative Landscape and Visual Impact Assessment
Constant light	Uninterrupted light source over a given time period.
Cumulative effects	Additional changes caused by a proposed development in conjunction with other similar developments or as a combined effect of a set of developments, taken together' (Scottish Natural Heritage, 2012)
Cumulative landscape effects	Effects that 'can impact on either the physical fabric or character of the landscape, or any special values attached to it' (Scottish Natural Heritage, 2012)
Cumulative visual effects: In combination In succession Sequentially	Effects that can be caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one viewpoint' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments' (Scottish Natural Heritage 2012) • In combination:

Term/abbreviation	Definition
	Where two or more developments are or would be within the observer's arc of vision at the same time without moving his/her head (GLVIA 3, 2013 Table 7.1). • In succession: Where the observer has to turn his/her head to see the various developments – actual and visualised (GLVIA 3, 2013 Table 7.1). • Sequential cumulative effect. Occurs where the observer has to move to another viewpoint to see the same or different developments. Sequential effects may be assessed for travel along regularly used routes such as major roads or popular paths (GLVIA 3, 2013 Table 7.1).
Darkness survey	Visual survey the night-time environment and the identification of artificial light sources.
Development*	Any proposal that results in change to the landscape and/or visual environment.
Degree of change	A combination of the scale, extent and duration of an effect also defined as 'magnitude'.
Designated Landscape*	Areas of landscape identified as being of importance at international, national or local levels, either defined by statue or identified in development plans or other documents.
Direct light	The artificial light source is visible. Note that light emanating from the window of a building is considered to be a 'direct' light source.
EIA	Environmental Impact Assessment
Elements*	Individual parts which make up the landscape, such as, for example, trees, hedges and buildings.
Enhancement*	Proposals that seek to improve the landscape resource of the site and its wider setting beyond its baseline condition.
Environmental fit	The relationship of a development to identified environmental opportunities and constraints in its setting.
Feature*	Particularly prominent or eye-catching elements in the landscape such as tree clumps, church towers or wooded skylines OR a particular aspect of the project proposal.
FoV	Field of View – the horizontal angle of the view illustrated in a visualisation.
GDL	Garden and Designed Landscape
Geographical Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.

Term/abbreviation	Definition
GLVIA 3	Guidelines for Landscape and Visual Impact Assessment, Third Edition, published jointly by the Landscape Institute and Institute of Environmental Management and Assessment, 2013.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
HH	Hub Height
Historic Landscape Characterisation (HLC) and Historic Land-use Assessment (HLA)	Historic characterisation is the identification and interpretation of the historic dimension of the present-day landscape or townscape within a given area. HLC is the term used in England and Wales, HLA is the term used in Scotland.
Indirect effects*	Direct effects relate to the host landscape and concern both physical and perceptual effects on the receptor. Indirect effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of visual or perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct result of the development but are often produced away from it or as a result of a complex pathway.
Indirect light	The light source is not visible but the light emanating from the source is apparent.
Infrared light	A type of light not visible to the human eye.
Iterative design process	The process by which project design is amended and improved by successive stages of refinement which respond to growing understanding of environmental issues.
Key characteristics	Those combinations of elements which are particularly important to the current character of the landscape and help to give an area its particularly distinctive sense of place.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related to but not the same as land use.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Landscape Character Area (LCA)*	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Assessment	The process of identifying and describing variation in the character of the landscape, and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscapes distinctive. The process results in the production of a Landscape Character Assessment.
Landscape Character Types (LCTs)*	Distinct types of landscape which are relatively homogenous in character. They are generic in nature in that they may occur in different areas in different parts

Term/abbreviation	Definition
	of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns, and perceptual and aesthetic attributes.
Landscape capacity	The amount of specified development or change which a particular landscape and the associated visual resource is able to accommodate without undue negative effects on its character and qualities. (NE 2019)
Landscape character*	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape classification	A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape.
Landscape constraints	Components of the landscape resource such as views or mature trees recognised as constraints to development. Often associated with landscape opportunities.
Landscape effects*	Effects on the landscape as a resource in its own right. An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern here is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. (GLVIA 3 2013, Para 5.1).
Landscape fit	The relationship of a development to identified landscape opportunities and constraints in its setting.
Landscape patterns	Spatial distributions of landscape elements combining to form patterns, which may be distinctive, recognisable and describable e.g. hedgerows and stream patterns.
Landscape quality (condition)*	A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape qualities	A term used to describe the aesthetic or perceptual and intangible characteristics of the landscape such as scenic quality, tranquillity, sense of wildness or remoteness. Cultural and artistic references may also be described here.
Landscape receptors *	Defined aspects of the landscape resource that have the potential to be affected by a proposal
Landscape resource	The combination of elements that contribute to landscape context, character, and value.
Landscape sensitivity	The sensitivity of the landscape to a particular development considers the susceptibility of the landscape and its value.

Term/abbreviation	Definition
Landscape strategy	The overall vision and objectives for what the landscape should be like in the future, and what is thought to be desirable for a particular landscape type or area as a whole, usually expressed in formally adopted plans and programmes or related documents.
Landscape value*	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons. The value of the Landscape Character Types or Areas that may be affected, based on review of any designations at both national and local levels, and, where there are no designations, judgements based on criteria that can be used to establish landscape value.
Level of effect	Determined through the combination of sensitivity of the receptor and the proposed magnitude of change brought about by the development.
LLA	Local Landscape Area
Lux	A unit of illumination, the amount of light on a surface per unit area.
Magnitude (of effect)*	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short term or long term in duration.
Mitigation	Measures which are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible remedy identified effects. (GLVIA 3, 2013 Para 3.37).
Natural light	Light supplied by the sun, directly or indirectly, the moon and stars.
NatureScot / SNH	NatureScot, previously known as Scottish Natural Heritage (SNH).
NSA	National Scenic Area
Perception	Combines the sensory (that we receive through our senses) with the cognitive (our knowledge and understanding gained from many sources and experiences).
Perceptual Aspects	A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity. (GLVIA 3, 2013 Box 5.1)
Photomontage*	A visualisation which superimposes an image of the proposed development upon a photograph or series of photographs.
Probability of Effect	The probability of a landscape and visual effect occurring as a result of this Development should be regarded as certain, subject to the stated project design and the continuance of the existing, baseline landscape resource, including known changes such as other permitted wind farm development. The probability of cumulative effects however is variable. Whereas those effects related to existing wind energy development and those under construction are considered as certain, effects related to development with planning consent are only considered as likely. Wind energy development sites for which there is a submitted planning application are considered as

Term/abbreviation	Definition
	uncertain and other wind energy development for which no planning application has been made are considered as uncertain / unknown, as the level of uncertainty would be greater.
Proximity activated lighting	Lighting which is turned on by the detection of moving objects, such as aircraft detected by radar.
Rarity	The presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type. (GLVIA 3 2013, Box 5.1)
RD	Rotor Diameter
Receptor	Physical landscape resource, special interest, or viewer group that will experience an effect.
Recreation Value*	Evidence that the landscape is valued for recreational activity where experience of the landscape is important. (GLVIA 3 2013, Box 5.1)
Representativeness*	Whether the landscape contains a particular character and/or features or elements which are considered particularly important examples.
Residual effects	Likely environmental effects, remaining after mitigation.
Scale Indicators	Landscape elements and features of a known or recognisable scale such as houses, trees, and vehicles that may be compared to other objects, where the scale of height is less familiar, to indicate their true scale.
Scenic quality	Depends upon perception and reflects the particular combination and pattern of elements in the landscape, its aesthetic qualities, its more intangible sense of place or 'genius loci' and other more intangible qualities. (GLVIA 3 2013, Box 5.1)
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
Sense of Place (genius loci)	The essential character and spirit of an area: 'genius loci' literally means 'spirit of the place'.
Sensitivity*	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
Significant Effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. The significance of an effect gives an indication as to the degree of importance (based on the magnitude of the effect and the sensitivity of the receptor) that should be attached to the impact described.

Term/abbreviation	Definition
	Whether or not an effect should be considered significant is not absolute and requires the application of professional judgement. Significant – 'noteworthy, of considerable amount or effect or importance, not insignificant or negligible'. The Concise Oxford Dictionary. Those levels and types of landscape and visual effect likely to have a major or important / noteworthy or special effect of which a decision maker should take particular note.
Sky glow	The brightness of the night sky in a built-up area as a result of light pollution, apparent as a diffuse artificial light in the sky above major towns and cities.
SNH	Scottish Natural Heritage Now known as NatureScot.
Susceptibility*	The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.
Sustainability*	The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.
Temporary or permanent effects	Effects may be considered as temporary or permanent. In the case of wind energy development the application is for a 40 year period after which the assessment assumes that decommissioning will occur and that the site will be restored. For these reasons the development is referred to as long term and reversible.
Time depth	Historical layering – the idea of landscape as a 'palimpsest', a much written-over asset of landscape.
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of urban open space, including green spaces, and the relationship between buildings and open spaces.
True View Visuals	A mobile 3D augmented reality (AR) tool used to aid with the assessment. The True View Visuals tool indicates visibility of the proposed development to assist in confirming viewpoint positions as well as indicating limited or no visibility of turbines in particular locations. Whilst the images are indicative only, the AR tool provides a comparable image to the accurate wirelines produced.
Type or Nature of effect	Whether an effect is direct or indirect, temporary or permanent, beneficial (positive), neutral or adverse (negative) solus or cumulative.
Viewpoints	Selected for illustration of the visual effects fall broadly into three groups: Representative Viewpoints: selected to represent the experience of different types of visual receptor, where larger numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ – for example certain points may be chosen to represent the view of users of particular public footpaths and bridleways. Specific Viewpoints: chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor

Term/abbreviation	Definition
	attractions, such as landscapes with statutory landscape designations or viewpoints with particular cultural landscape associations. Illustrative Viewpoints: chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations. (GLVIA 3 2013, Para 6.19)
Visual amenity	The overall views and surroundings, which provide a visual setting or backdrop to the activities of people living, working, participating in recreational activities, visiting or travelling through an area.
Visual dominance	A visual effect often referred to in respect of residential properties that in relation to development would be subject to blocking of views, or reduction of light / shadowing, and high levels of visual intrusion.
Visual effect*	Effects on specific views and on the general visual amenity experienced by people.
Visual Receptors*	Individuals and/or defined groups of people who have the potential to be affected by a proposal.
Visual sensitivity	The sensitivity of visual receptors such as residents, relative to their location and context, to visual change proposed by development.
Visualisation	Computer visualisation, photomontage, or other technique to illustrate the appearance of the development from a known location.
WLA	Wild Land Area
Wireline / Wireframe	A computer-generated line drawing of the DTM (digital terrain model) and the proposed development from a known location.
Zone of Theoretical Visibility (ZTV)*	A map, usually digitally produced, showing areas of land within which, a development is theoretical visible.

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Technical Appendix 6.2 - Viewpoint Analysis

1.1 Introduction

1.1.1 The viewpoint analysis is used to assist the design and further define the scope of the assessment process. In particular, the outer distance from the proposed development, within which significant effects may be likely has been identified. This has been used to focus the baseline information and detailed reporting of the Landscape and Visual Impact Assessment (LVIA) in **Chapter 6: Landscape and Visual**.

1.2 Viewpoint and Cumulative Viewpoint Analysis

1.2.1 The viewpoint analysis has been conducted from 27 viewpoint locations as illustrated in **Figures 6.18-6.44**. Three of these viewpoints were identified for the night-time assessment and the views from these locations are illustrated in **Figures 6.3.I-K** and assessed in separate appendix (**Technical Appendix 6.3**). The figures accord with Scottish Natural Heritage, V*isual Representation of Wind Farms: Good Practice Guidance, Version 2.2*, February 2017 and Highland Council, *Visualisation Standards for Wind Energy Developments*, July 2016.

1.2.2 Cumulative wind farm development, included within the 45km study area, that would be theoretically visible from each viewpoint has been illustrated in the wirelines.

Geographical Extent of Likely Significant Visual Effects

1.2.3 The outer distance from the proposed development, within which significant effects may be likely has been identified by the viewpoint analysis of the proposed development. Further, cumulative viewpoint analysis has identified a likely threshold for significant cumulative visual effects that would result from the proposed development, in addition to, or in combination with other existing and consented wind energy developments and applications.

Potential for Day-time Significant Effects: proposed development

1.2.4 The viewpoint analysis indicates that significant visual effects are likely to affect limited locations within approximately 15km distance from the proposed development (subject to a clear view of the proposed turbines, landform and vegetation screening), as indicated by Viewpoints 1, 3, 4, 5, 8, 11, 12, 13, 15 and 17. Significant visual effects would be limited to views from the southwest, southeast, east and northeast of the proposed development.

1.2.5 The greatest magnitude of change is visible at Viewpoint 4 (High-Medium magnitude) (all other viewpoints are assessed as Medium magnitude or less). There is no High magnitude of change assessed at any viewpoint which is as a result of the surrounding low hills around the Site of the proposed development.

1.2.6 The effects on all ten viewpoints (and an additional viewpoint 10) would also be cumulative and further cumulative analysis is provided below.

1.2.7 There would be no significant visual effects from the remaining 17 viewpoints as a result of the proposed development.

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Potential for Day-time Significant Cumulative Effects

1.2.8 The proposed development would contribute to a significant, cumulative visual effect at 11 of the assessment viewpoints (Viewpoints 1, 3, 4, 5, 8, 10, 11, 12, 13, 15 and 17), six of which (Viewpoints 1, 4, 10, 11, 12 and 17) are also significantly affected by the existing Fairburn Wind Farm and / or the scoping Fairburn Extension Wind Farm. In addition, there would be a significant cumulative effect at Viewpoint 8 due to the application Fanellan substation. There would be no significant cumulative visual effects as a result of the proposed development from the remaining viewpoints.

1.2.9 Three viewpoints (16, 21 and 24) are significantly affected as a result of other wind farms and not the proposed development.

1.2.10 Importantly these levels of effect are indicative of a visual effect on a particular viewpoint location, and they should not be assumed to translate into visual effects on the overall visual experience, as each of the viewpoints have been specifically located where the sensitivity of the receptor and / or the views of the proposed development would be greatest. In this sense they are not always typical or representative.

1.2.11 As a precaution, the visual assessment in **Chapter 6** has considered all of those receptors within 15km of the proposed development and national level receptors within 45km.

Interpretation of Viewpoint Analysis Summary Tables

1.2.12 The information set out in **Table 6.2.1** provides a summary of the viewpoint analysis of the effects of the proposed development on a 'solus' or primary basis. This part of the assessment helps to define the contribution the proposed development would make to any subsequent cumulative assessments. It is also relevant to the latter half of the operational period for the proposed development, when the consented periods of operation for some of the other wind farms would expire and they would be decommissioned, assuming no extensions to the operating periods or re-powering schemes are granted.

1.2.13 **Table 6.2.1** also provides a summary of viewpoint analysis of the cumulative the effects of the proposed development. The cumulative analysis sets out the effects of proposed development '*in addition*' to and '*in combination*' with other existing and consented wind energy developments and applications, assessing two scenarios in accordance with the methodology in **Technical Appendix 6.2** as follows:

- **Proposed development:** Assessed on an individual basis (the LVIA)

  This part of the assessment takes account of other existing forms of wind farm development that may be present in the landscape, whilst recognising that their influence on landscape character is likely to be time limited. It does not consider the additional or combined cumulative effects and only reports on the effect of the proposed development alone.

- **Scenario 1:** Existing + Consented + the proposed development

  The additional and combined cumulative effects of the baseline, including the existing and consented wind energy developments with the proposed development are reported.

- **Scenario 2:** Existing + Consented + Applications + the proposed development

  The additional and combined cumulative effects of the baseline, including existing and consented wind energy developments and applications (and one at scoping – Fairburn Extension) with the proposed development are reported.

1.2.14 The summary tables list the names of the viewpoints and include the following information:

- Viewpoint Analysis:
  - Distance: Distance of the viewpoint location from the nearest turbine within the proposed development;
  - Sensitivity: The sensitivity of the viewer at the viewpoint location is recorded (ranging from High, Medium, Low, and Very Low) in accordance with the methodology in **Technical Appendix 6.1;**
  - Magnitude: The magnitude of change, taking account of the proposed development only is recorded (ranging from High, High – Medium, Medium, Medium – Low, Low, Low – Very Low, Very Low, and Zero) in accordance with the methodology;
  - Level of Effect: The level of visual effect for the proposed development only is recorded and takes account of the sensitivity and magnitude in accordance with the methodology. Those levels of effect shown in **bold** relate to significant effects in accordance with the relevant EIA Regulations.
- Cumulative Viewpoint Analysis:
  - Magnitude (Existing and Consented wind farms): The magnitude of change, taking account of other existing and consented / under construction wind farms that may be visible is recorded (ranging from High, High – Medium, Medium, Medium – Low, Low, Low – Very Low, Very Low, and Zero) in accordance with the methodology;
  - Additional Level of Effect: The additional effect of adding the proposed development to the existing and consented baseline in Cumulative Scenario 1 is provided;
  - Cumulative Scenario 1: The level of visual effect, taking account of the other existing, consented / under construction wind farms and the proposed development, is recorded (taking account of the sensitivity and magnitude in accordance with the methodology). Those levels of effect shown in bold relate to significant effects in accordance with the relevant EIA Regulations and the developments contributing most to the cumulative effects are recorded in brackets;
  - Magnitude (Other Wind Farm Applications): The magnitude of change, taking account of other wind farm applications (and one at scoping) that may be visible on the wireline is recorded (ranging from High, High – Medium, Medium, Medium – Low, Low, Low – Very Low, Very Low, and Zero) in accordance with the methodology;
  - Additional Level of Effect: The additional effect of adding the proposed development to the existing and consented baseline and other wind farm applications (and one pre-planning application) in Cumulative Scenario 2 is provided; and
  - Cumulative Scenario 2: The level of visual effect, taking account of the other existing, consented / under construction, application wind farms (and one at scoping) and the proposed development, is recorded (taking account of the sensitivity and magnitude in accordance with the methodology). Those levels of effect shown in **bold** relate to significant effects in accordance with the relevant EIA Regulations and the developments contributing most to the cumulative effects are recorded in brackets.

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1.3 Sunlight and Weather Conditions

1.3.1 Changing weather patterns and local climatic conditions would influence the visibility of the proposed development which would vary from periods of low visibility (fog, low cloud, and bright sunny conditions that are accompanied by haze generated by temperature inversions) as well as periods of high visibility in clear weather. In some instances, the proposed development may appear 'back-lit' (e.g., appearing darker in colour during sunset/sunrise and periods of pale or white blanket cloud) and in other circumstances may appear to be 'up-lit' (e.g., during stormy periods that combine dark clouds and bright sunshine).

1.3.2 All of the viewpoint analysis and assessment has assumed conditions of good weather and clear visibility.

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Table 6.2.1 Summary of Viewpoint Analysis

Viewpoint No. and Title	HFoV	Distance to nearest turbine (m)	Viewpoint Analysis: proposed development (PD)			Cumulative Viewpoint Analysis: proposed development (PD) and other wind farms					
						Cumulative Scenario 1:			Cumulative Scenario 2:		
			Sensitivity	Magnitude	Level of Effect:	Magnitude (Existing and Consented)	Additional Level of Effect (PD)	Combined Level of Effect	Magnitude (Applications)	Additional Level of Effect (PD)	Combined Level of Effect
1. Core Path RC30.01 to Orrian Dam	59°	3,624	High	Medium	**Major**	Medium	**Major**	**Major** (Fairburn, PD)	High	**Major**	**Substantial** (Fairburn Ext, Fairburn, PD)
2. Torgormack / Drumindorsair	23°	3,729	High	Low reducing to Very Low	Moderate reducing to Minor	Very Low	Moderate reducing to Minor	Moderate (PD) reducing to Minor	Very Low	Moderate reducing to Minor	Moderate (PD) reducing to Minor
3. Fairburn Estate	12°	5,233	High	Low	**Moderate**	Low-Very Low	**Moderate**	**Moderate** (PD)	Zero	No cumulative effect	
4. Beinn a'Bhathaich Ard (Corbett)	28°	5,967	High	High-Medium	**Substantial to Major**	Low-Very Low	**Substantial to Major**	**Substantial to Major** (PD)	Medium	**Substantial to Major**	**Substantial to Major** (Fairburn Ext, PD)
5. Struy (A831)	13°	7,027	High / High-Medium	Medium	**Major / Major to Moderate**	Very Low	**Major / Major to Moderate**	**Major / Major to Moderate** (PD)	Zero	No cumulative effect	
6. Beauly	9°	7,411	High	Very Low to Zero	Negligible to No View	Very Low to Zero	Negligible to No View	Negligible to No View	Very Low to Zero	Negligible to No View	Negligible to No View
7. Muir of Ord (A832)	<1°	8,307	High	Very Low to Zero	Negligible to No View	Very Low	Negligible to No View	Negligible	Very Low	Negligible to No View	Negligible
8. Kiltarlity	17°	8,325	High	Medium	**Major**	Very Low	**Major**	**Major** (PD)	Medium	**Major**	**Major** (PD, Fanellan substation)
9. Contin (A835)	11°	8,439	High / Medium	Low-Very Low	Moderate to Minor / Minor	Low-Very Low	Moderate to Minor / Minor	Moderate to Minor / Minor	Low-Very Low	Moderate to Minor / Minor	Moderate to Minor / Minor
10. Jamestown	24°	9,352	High	Low	Moderate	Low-Very Low	Moderate	Moderate	Medium-Low	Moderate	**Major to Moderate** (Fairburn Ext, PD)
11. Barlvaird / Newmore	13°	10,409	High	Medium-Low	**Major to Moderate**	Low	**Major to Moderate**	**Major to Moderate** (PD)	Medium-Low	**Major to Moderate**	**Major to Moderate** (Fairburn Ext, PD)

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Viewpoint No. and Title	HFoV	Distance to nearest turbine (m)	Viewpoint Analysis: proposed development (PD)			Cumulative Viewpoint Analysis: proposed development (PD) and other wind farms					
						Cumulative Scenario 1:			Cumulative Scenario 2:		
			Sensitivity	Magnitude	Level of Effect:	Magnitude (Existing and Consented)	Additional Level of Effect (PD)	Combined Level of Effect	Magnitude (Applications)	Additional Level of Effect (PD)	Combined Level of Effect
12. A835 / B9169	12°	12,773	Medium	Medium	**Moderate**	Low-Very Low	**Moderate**	**Moderate** (PD)	Medium	**Moderate**	**Moderate** (Fairburn Ext, PD)
13. Great Glen Way near Ladycairn	10°	13,633	High	Medium	**Major**	Low-Very Low	**Major**	**Major** (PD)	Low	**Major**	**Major** (PD)
14. A832 west of Tore	9°	13,710	Medium	Medium-Low	Moderate to Minor	Low-Very Low	Moderate to Minor	Moderate to Minor	Low	Moderate to Minor	Moderate to Minor
15. Meall a'Mhadaibh	8°	14,529	High	Low	**Moderate**	Low-Very Low	**Moderate**	**Moderate** (PD)	Low	**Moderate**	**Moderate** (PD)
16. Sgurr a'Choire Ghlais (Munro)	7°	15,200	High	Low - Very Low	Moderate to Minor	Low	Moderate to Minor	Moderate to Minor	Medium-Low	Minor	**Major to Moderate** (Fairburn Ext)
17. Heights of Brae	15°	15,204	High	Low	**Moderate**	Low-Very Low	**Moderate**	**Moderate** (PD)	Low	**Moderate**	**Moderate** (Fairburn Ext, PD)
18. Knockbain - Torgorm	7°	18,769	High	Low	Moderate	Very Low	Moderate	Moderate	Low-Very Low	Moderate	Moderate
19. A862, Clachnaharry	7°	19,089	High / Medium	Low	Moderate / Minor	Very Low	Moderate / Minor	Moderate / Minor	Low-Very Low	Moderate / Minor	Moderate / Minor
20. A9 Cromarty Firth	10°	19,390	High / Medium	Low	Moderate / Minor	Low	Moderate / Minor	Moderate / Minor	Low-Very Low	Moderate / Minor	Moderate / Minor
21. Ben Wyvis	13°	20,607	High	Low-Very Low	Moderate to Minor	High-Medium	Moderate to Minor	**Substantial to Major** (Kirkan, Lochluichart, Corriemollie, Lochluichart Ext, Novar, Ext)	Low-Very Low	Moderate to Minor	**Substantial to Major** (Kirkan, Lochluichart, Corriemollie, Lochluichart Ext, Novar, Ext)
22. A9 Kessock Bridge	6°	21,612	High / Medium	Low-Very Low	Moderate to Minor / Minor	Very Low	Moderate to Minor / Minor	Moderate to Minor / Minor	Very Low	Moderate to Minor / Minor	Moderate to Minor / Minor
23. A96, Alturlie Junction	5°	26,546	Medium	Very Low	Minor	Very Low	Minor	Minor	Very Low	Minor	Minor
24. Cnoc Fyrish	9°	27,281	High	Very Low	Minor	Medium	Minor	**Major** (Strathrory)	Medium	Minor	**Major** (Strathrory, Abhainn Dubh)

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Viewpoint No. and Title	HFoV	Distance to nearest turbine (m)	Viewpoint Analysis: proposed development (PD)			Cumulative Viewpoint Analysis: proposed development (PD) and other wind farms					
						Cumulative Scenario 1:			Cumulative Scenario 2:		
			Sensitivity	Magnitude	Level of Effect:	Magnitude (Existing and Consented)	Additional Level of Effect (PD)	Combined Level of Effect	Magnitude (Applications)	Additional Level of Effect (PD)	Combined Level of Effect
25. B817, Alness	8°	29,147	High / Medium	Very Low	Minor / Negligible	Very Low	Minor / Negligible	Minor / Negligible	Very Low	Minor / Negligible	Minor / Negligible
26. Chanonry Point	4°	31,015	High	Very Low	Minor to Negligible	Very Low	Minor to Negligible	Minor to Negligible	Very Low	Minor to Negligible	Minor to Negligible
27. Invergordon	6°	32,858	High	Very Low	Negligible	Very Low	Negligible	Negligible	Low	Negligible	Moderate (Abhain Dubh)

Note: Significant effects resulting from the proposed development are indicated in bold text and shaded dark grey.

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Table 6.2.2 Viewpoint Analysis

Figure 6.18a-h	**Viewpoint 1: Core Path RC30.01 to Orrin Dam** (The assessment takes account of a 180° FoV from this location as illustrated).	
Description	This viewpoint is located on Core Path RC30.01 which runs from Fairburn Estate to Orrin Dam at the eastern edge of Orrin Reservoir. The route follows the River Orrin on a slightly elevated path traversing undulating landform to the north of the river. The view towards the proposed development is orientated south / southwest and views across and along the River Orrin valley towards a ridgeline of low hills. The hills immediately facing include Airigh na Lite hill to the south and Carn Doire Mhurchaidh hill to the southeast, although the main view is along the valley to higher, distant peaks at Sgurr a' Phollain to the southwest (westbound). The view to the west is short range due to the hill of Beinn an Rubha Riabhaich extending across with the existing Fairburn Wind Farm visible in this direction (one hub and two blade tips). Land cover in the view consists of heather, rough grassland and moorland scrub on elevated and upper slopes, and riparian trees along the lower River Orrin valley, and coniferous forestry in the wider view. Human development in the view includes a surfaced track, telegraph poles, existing wind farms (Fairburn) and coniferous forestry.	
Sensitivity	The viewpoint is not located within a designated landscape but is located on a Core Path indicating a High-Medium value. The view would be experienced by recreational walkers whose attention or interest is likely to be focused on the surrounding views and landscape features and susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to 17 turbines would be visible on the skyline affecting approximately 59° of the horizontal Field of View (FoV) at 3,624m distance. The turbines would be partly screened by landform such that mostly hubs and blades or blade tips would be visible. The upper tower of T10 would be visible as the landform dips between Airigh na Lite hill and Carn Doire Mhurchaidh hill whilst T20 would be partially backclothed by landform. The proposed development would be visible on the skyline appearing against the sky and appearing within a simple moorland landscape. None of the other infrastructure components of the proposed development would be visible due to intervening landform. Due to the wide views, large-scale simple landscape and presence of other wind farms in the wider view (Fairburn), the proposed turbines although prominent, would appear reasonably well accommodated in this view, although the magnitude of change would be *Medium.* *Aviation warning lights on T3, T14 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to High-Medium*.	
Assessment	**Sensitivity**	High
	Magnitude	Medium
	Level of Effect	**Major** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Medium* Fairburn would be visible to the north / northwest above landform as a hub and two blade tips at ~0.9km distance (Medium magnitude). **Consented Wind Farms:** *Zero* There would be no consented wind farms visible. **Other Wind Farm Applications:** *High* Fairburn Extension (scoping) would be visible to the fore of the proposed turbines (High magnitude). The overall cumulative magnitude of change for other wind farms would be *High.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Major** and Significant (due to the proposed development and Fairburn) Fairburn would be decommissioned approximately 30 years prior to the end of the operational period of the proposed development, thereby reducing the cumulative effect.	
Additional effect:	**Major** and Significant **Additional Magnitude:** Medium **Combined Magnitude:** Medium	

Figure 6.18a-h	**Viewpoint 1: Core Path RC30.01 to Orrin Dam** (The assessment takes account of a 180° FoV from this location as illustrated).
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)	
Combined effect	**Substantial** and Significant (due to Fairburn Extension and to a lesser degree, Fairburn and the proposed development) Fairburn would be decommissioned approximately 30 years prior to the end of the operational period of the proposed development, thereby reducing the cumulative effect.
Additional effect	**Major** and Significant **Additional Magnitude:** Medium **Combined Magnitude:** High
Type of Effect	Long term (reversible), direct, cumulative and negative.

Figure 6.19a-e	**Viewpoint 2: Torgormack / Drumindorsair** (The assessment takes account of a 90° FoV from this location as illustrated).	
Description	This viewpoint is located along a minor road between the scattered communities of Drumindorsair and Torgormack and is indicative of views from residents. The view is on a steep road adjacent to a residential property and is orientated west / northwest along the upper contours and summit of Cnoc na Moine. Views towards the proposed development from further up the road are further restricted due to screening from intervening vegetation and landform. The main view from this location is to the south where there are long range views across the undulating landscape. Land cover consists of improved grassland fields bounded by gorse in the near distance, with mixed woodlands and forestry interspersed with glimpsed improved grassland fields in the mid to far distance. There are longer range views towards the Corbett of Beinn a'Bhathaich Ard in the west. Human development in the view includes the paved road, post and wire fencing, road signage, residential buildings, field patterns and coniferous forestry.	
Sensitivity	The viewpoint is not located within a nationally or locally designated landscape area indicating a Medium value. The view would be experienced by residents whose attention or interest is likely to be focused on the surrounding views and landscape features from their home and susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to five turbines would appear on the skyline affecting approximately 23° of the horizontal FoV at 3,729m distance. The proposed turbines would be partly screened by landform, trees and forestry such that three hubs and three blades / tips would be theoretically visible behind Cnoc na Moine. Two of the blades / tips would be screened by intervening vegetation and the hubs would be partially filtered by intervening trees and gorse scrub. None of the other infrastructure components of the proposed development would be visible due to intervening landform. Due to the partial landform and vegetation screening, the proposed turbines would appear reasonably well accommodated in the view. The magnitude of change would be Low resulting in a **Moderate** level of effect that would be Not Significant. This is due to the partial landform and vegetation screening resulting in limited extent of visibility of the turbines, and the turbines appearing in a gap in the hedgerow along this minor road. The foreground hedgerow along the road would gradually mature over the operational period of the proposed development screening further turbine hubs and blades reducing the level of effect further. *Aviation warning lights on T7 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage would be visible during the construction / decommissioning periods. The magnitude of change would range from Zero to Low.	
Assessment	**Sensitivity**	High
	Magnitude	Low reducing to Very Low as foreground hedgerow gradually matures
	Level of Effect	**Moderate** and Not Significant reducing to **Minor** and Not Significant as foreground hedgerow gradually matures
	Type of Effect	Long term (reversible), direct and negative reducing to neutral.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low to Zero* There would be several existing wind farms theoretically visible, or partially visible in clear conditions as blades to the south and southeast including Dunmaglass at ~30km distance (Very Low to Zero magnitude).	

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Figure 6.19a-e	**Viewpoint 2: Torgormack / Drumindorsair** (The assessment takes account of a 90° FoV from this location as illustrated).			
	Consented Wind Farms: *Very Low to Zero* Aberarder would be theoretically visible in clear conditions to the southeast at ~30km (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Very Low* The hubs and blades of Loch Liath would be theoretically visible to the southwest at ~20km but mostly screened by intervening woodland (Very Low magnitude). The application Fanellan substation would be theoretically visible to the south at approximately 2.1km but would be mostly screened by forestry (Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Very Low.*			
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)				
Combined effect:	**Moderate** and Not Significant reducing to **Minor** and Not Significant as foreground hedgerow gradually matures			
Additional effect:	**Moderate** and Not Significant reducing to **Minor** and Not Significant as foreground hedgerow gradually matures			
	Additional Magnitude:	Low reducing to Very Low	**Combined Magnitude:**	Low reducing to Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)				
Combined effect	**Moderate** and Not Significant reducing to **Minor** and Not Significant as foreground hedgerow gradually matures			
Additional effect	**Moderate** and Not Significant reducing to **Minor** and Not Significant as foreground hedgerow gradually matures			
	Additional Magnitude:	Low reducing to Very Low	**Combined Magnitude:**	Low reducing to Very Low
Type of Effect	Long term (reversible), direct, cumulative and negative reducing to neutral.			

Figure 6.20a-e	**Viewpoint 3: Fairburn Estate** (The assessment takes account of a 90° FoV from this location as illustrated).			
Description	This viewpoint is located on a minor road between the A832 at Marybank and the Falls of Orrin as the road corves around the southeast edge of the Fairburn GDL near Orrinside. The view is orientated south / southwest and views across the River Orrin valley towards the undulating skyline where long sweeping arcs form the skyline between low rounded summits of Cnoc Udais and Cnoc Beinn na Lice to the south / southeast, and the craggy summits of Cul Beag and Cul Mor to the southwest. Land cover consists of roadside scrub, deciduous woodland and improved grassland fields in the lower valley, forestry, and distant moorland on upper slopes and upland areas. Human development in the view comprises the paved road, fencing, fields, scattered residential properties, existing turbines (Auchmore) and pylons to the south.			
Sensitivity	The viewpoint is not located within a nationally or locally designated landscape area although it is representative of views within the GDL indicating a High-Medium value. The view would be experienced by visitors to the GDL / Falls of Orrin (and local residents in the area) whose attention or interest is likely to be focused on the surrounding views and landscape features and susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.			
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to five turbines would be theoretically visible on the skyline as a hub, a partial hub, and three partial blades / tips affecting approximately 12° of the horizontal FoV at 5,233m distance. The lower turbine towers and remaining turbines would be screened by landform. None of the other infrastructure components of the proposed development would be visible due to intervening landform. Due to the partial landform screening and presence of other wind farms (Auchmore) in the view, the proposed turbines, although noticeable, would appear reasonably well accommodated in the view. The magnitude of change would be *Low* and the effect would be **Moderate** and Significant due to the extent of visibility of the turbines on the skyline and higher sensitivity of the receptor. *Aviation warning lights on T3 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low*.			
Assessment	**Sensitivity**	High-Medium		

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Figure 6.20a-e	**Viewpoint 3: Fairburn Estate** (The assessment takes account of a 90° FoV from this location as illustrated).	
	Magnitude	Low
	Level of Effect	**Moderate** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low* Fairburn would be partially visible to the west at ~4.8km (Low-Very Low magnitude). Auchmore is visible to the south (Low-Very Low magnitude). **Consented Wind Farms:** *Zero* No consented wind farms would be visible from this location **Other Wind Farm Applications:** *Zero* No other application wind farms would be visible from this location. The overall cumulative magnitude of change for other wind farms would be *Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Moderate** and Significant (due to the proposed development)	
Additional effect	**Moderate** and Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	No cumulative effect	
Additional effect	No cumulative effect	
	Additional Magnitude: Zero	**Combined Magnitude:** Zero
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.21a-h	**Viewpoint 4: Beinn a'Bhathaich Ard (Corbett)** (The assessment takes account of a 360° FoV from this location as illustrated).
Description	This viewpoint is located at the summit of Beinn a'Bhathaich Ard, a Corbett between Glen Strathfarrar and Orrin Reservoir. Views from the summit are panoramic with the views across the expanse of low-lying landscape features between Beauly Firth to the east and the mountainous skyline to the southwest. The view towards the proposed development is orientated to the northeast and views across an undulating foreground ridgeline formed from Sgurr a'Phollain and Carn na Gabhalach towards Cromarty Firth and Beauly Firth beyond. Landcover consists mainly of upland moorland in the near to middle distance and a patchwork of agricultural fields and coniferous forestry in the far distance. Settlements, scattered residential properties, geometric fields, coniferous forestry are visible features in distant views. Other human development in the view includes telegraph poles, pylons, wind turbines, and the Kessock Bridge in clear conditions.
Sensitivity	The viewpoint is located near the eastern edge of the locally designated *Strathconon, Monar and Mullardoch* SLA, and within the *Central Highlands* WLA denoting a High-Medium to High value. The view would be experienced by recreational walkers whose attention or interest is likely to be focused on the landscape. Susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.
Magnitude of Change (proposed development only)	**Whilst in Operation**: All 16 turbines would be visible in the mid distance of the view beyond the Sgurr a'Phollain and Carn na Gabhalach ridgeline, affecting approximately 28° of the horizontal FoV at 5,967m distance. The turbines would be seen as part of the expansive moorland landscape occupying the middle distance of the view and would be backclothed by the more settled landscape beyond. The turbines would appear slowly rotating against the landform. Parts of the access track and substation would be visible. The design of the wind farm presents as a simple and linear layout with minimal overlapping of turbines. The expansive open landscape helps to mitigate the apparent scale of the turbines, and the proposed development would appear reasonably well accommodated in this panoramic view which already features wind turbines and other human development. The magnitude of change would be *High-Medium.* *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:**

Figure 6.21a-h	**Viewpoint 4: Beinn a'Bhathaich Ard (Corbett)** (The assessment takes account of a 360° FoV from this location as illustrated).	
	Construction activity including a crane and construction vehicles are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to High-Medium*.	
Assessment	**Sensitivity**	High
	Magnitude	High-Medium
	Level of Effect	**Substantial to Major** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* There would be several wind farms visible from the summit. These include distant wind farms in the low-lying areas to the east, southeast and south at distances over 30km distance (Moy, Tom na Clach, Far, Glen Kyllachy, Dunmaglass, Corriegarth, Stronelairg, Beinneun/Extension, and Millenium) (all Very Low magnitude). Corrimony and Bhlaraidh would both be visible to the south at ~18km and 22km respectively (Low-Very Low magnitude). Lochluichart / Extension and Corriemollie would be visible to the north at over 22km (Low-Very Low magnitude). Scattered single turbines would also be visible behind the proposed turbines including Auchmore and Foulis Farm (Very Low magnitude). **Consented Wind Farms:** *Low-Very Low* Lochluichart Extension II and Kirkan would be visible to the north at over 23km distance (Low-Very Low magnitude). Strathrory would be partially visible to the northeast in the same view as the proposed turbines (Very Low magnitude). Bhlaraidh Extension would be visible to the south at over 21km (Low-Very Low magnitude). Other consented wind farms would be visible at greater distances to the southeast, south and southwest, but would not result in Significant effects (no greater than Very Low magnitude). **Other Wind Farm Applications:** *Medium* Loch Liath would be visible to the south at over 18km (Low-Very Low magnitude). The scoping Fairburn Extension would be partially visible beyond the proposed turbines to the northeast at ~7km distance (Medium magnitude). Fanellan substation would be theoretically visible to the east at approximately 11.5km but would be mostly screened by forestry (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Medium*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Substantial to Major** and Significant (due to the proposed development)	
Additional effect	**Substantial to Major** and Significant	
	Additional Magnitude: High-Medium	**Combined Magnitude:** High-Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Substantial to Major** and Significant (due to the proposed development and Fairburn Extension)	
Additional effect	**Substantial to Major** and Significant	
	Additional Magnitude: High-Medium	**Combined Magnitude:** High-Medium
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.22a-e	**Viewpoint 5: Struy (A831)** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located in Strathglass on the A831 to the south of the small hamlet of Struy. The view is orientated northeast along the strath / A831 towards the low hill forms of Coille nan Uaighean, Bad a' Chlamhain, and Creag Ard Bheag which form the skyline. Craeg nam Broc and mature trees frame the view to the right and left. The strath has a wide floor at this location which features a pastoral field in the near to middle distance as well as road infrastructure, and scattered settlement. Mature deciduous trees line the roads within the valley floor and transition to coniferous forestry on the upper slopes and summits. Other human development in the view comprises telegraph poles, bridge infrastructure, fencing and roadside stone walls.
Sensitivity	The viewpoint is not located within a designated landscape, although Glen Strathfarrar NSA is located nearby to the west indicating increased scenic value and High-Medium value. The view

Figure 6.22a-e	**Viewpoint 5: Struy (A831)** (The assessment takes account of a 90° FoV from this location as illustrated).				
	would be experienced by nearby residents whose attention or interest is likely to be focused on the surrounding views and landscape features, and road users whose attention would be on the road ahead and scenic features to the west and susceptibility to change is assessed as High (residents) and High-Medium (road users), and the sensitivity is assessed as *High (residents)* and *High-Medium* (road users).				
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to 10 turbines would be theoretically visible on the skyline affecting approximately 13° of the horizontal FoV at 7,027m distance. The turbines would be partly screened by landform and forestry such that six of the visible turbines would appear at hub height (one screened by intervening vegetation) with the remaining three as blades / tips. The towers / upper towers of four turbines would be visible in the 'dip' between hills. The wind farm composition would appear as a simple design which appears 'nestled' within the surrounding landform and vegetation / forestry. The access track would be screened by intervening forestry and other vegetation. *Aviation warning lights on T2 and T7 would be visible.* The magnitude of change would be *Medium*. **Whilst Under Construction and Decommissioning:** Construction activity including some clearance along the access track and cranes would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Medium*.				
Assessment	**Sensitivity**	High / High-Medium			
	Magnitude	Medium			
	Level of Effect	**Major / Major to Moderate** and Significant			
	Type of Effect	Long term (reversible), direct and negative.			
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).					
Cumulative Magnitude	**Existing Wind Farms:** *Very Low to Zero* Two hubs and two blade tips of Corrimony would be theoretically visible to the south but would be heavily filtered by roadside vegetation (Very Low to Zero magnitude). **Consented Wind Farms:** *Zero* There would be no consented wind farms visible. **Other Wind Farm Applications:** *Zero* There would be no other application wind farms visible. The overall cumulative magnitude of change for other wind farms would be *Very Low to Zero*.				
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)					
Combined effect	**Major / Major to Moderate** and Significant (due to the proposed development)				
Additional effect	**Major / Major to Moderate** and Significant				
	Additional Magnitude:	Medium	**Combined Magnitude:**	Medium	
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)					
Combined effect	No cumulative effect				
Additional effect	No cumulative effect				
	Additional Magnitude:	N/A	**Combined Magnitude:**	N/A	
Type of Effect	Long term (reversible), direct and negative.				

Figure 6.23a-d	**Viewpoint 6: Beauly** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at the southeastern edge of Braeview Park, a popular recreational space and local shinty club location within the settlement of Beauly. The view is orientated west and views across the recreational fields towards low-lying middle-distance hills which form the skyline. In the near to middle distance the recreational fields are bounded by a residential road and single storey housing. Beyond this the low hills contain the settlement and provide a wooded backdrop. Landcover comprises urban elements in the near distance (grass sports field, urban/garden trees and hedgerows), improved grassland on the lower hill slopes interspersed with tree boundaries and deciduous woodlands on the lower and upper slopes with coniferous forest on the distant

Figure 6.23a-d	**Viewpoint 6: Beauly** (The assessment takes account of a 90° FoV from this location as illustrated).	
	summits. Apart from the urban context, other human development in the view includes pylons in the middle distance, geometric filed patterns and forestry.	
Sensitivity	The viewpoint is not located within a designated landscape, indicating a Medium value. The view is representative of local residents who are likely to experience the view from their home and susceptibility to change is assessed as High, and the sensitivity is assessed as *High.*	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to five partial blade tips would be theoretically visible on the horizon between affecting approximately 9° of the horizontal FoV at 7,411m distance. In reality, they would be screened by intervening forestry. The remaining turbines and lower parts of the visible turbines would be screened by intervening landform. None of the other infrastructure components of the proposed development would be visible due to intervening landform. The magnitude of change would be *Very Low to Zero* (*Very Low* if forestry is felled). *No aviation warning lights would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Very Low.*	
Assessment	**Sensitivity**	High
	Magnitude	Very Low to Zero
	Level of Effect	**Negligible to No View** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low to Zero* A cluster of wind farms to the north would be theoretically visible at over 25km including Novar / Extension and Coir na Cloiche but would be mostly screened by intervening buildings and vegetation (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low to Zero* Belladrum Kiltrlity single turbine would be theoretically visible to the south but would be mostly screened by intervening buildings and vegetation (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Very Low to Zero* Abhainn Dubh would be partly theoretically visible to the north but would be mostly screened by intervening buildings and vegetation (Very Low to Zero magnitude). Fanellan substation would be theoretically visible to the south at approximately 5km but would be mostly screened by forestry (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Very Low to Zero*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Negligible to No View** and Not Significant	
Additional effect	**Negligible to No View** and Not Significant	
	Additional Magnitude: Very Low to Zero	**Combined Magnitude:** Very Low to Zero
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Negligible to No View** and Not Significant	
Additional effect	**Negligible to No View** and Not Significant	
	Additional Magnitude: Very Low to Zero	**Combined Magnitude:** Very Low to Zero
Type of Effect	Long term (reversible), direct, cumulative and neutral.	

Figure 6.24a-d	**Viewpoint 7: Muir of Ord (A832)** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located towards the centre of the settlement of Muir of Ord as the A832 rises on embankment to cross the railway line. The view is orientated west / southwest towards Cnoc Udas and Cnoc Croit na Maoile which form part of the skyline. Landcover consists of street trees, ornamental garden trees and shrubs in the near and middle distance, and coniferous forest and moorland on the upper slopes and summits of the distant hills. The view is an urban streetscape comprising roads, street lighting, signage, and residential property. The contrast with the

Figure 6.24a-d	**Viewpoint 7: Muir of Ord (A832)** (The assessment takes account of a 90° FoV from this location as illustrated).	
	background hills is slightly reduced by the presence of a communications mast on Cnoc Udais and a wind turbine at Auchmore.	
Sensitivity	The viewpoint is not in a designated area but is located on the NC 500 Tourist Route and the value of the viewpoint is therefore considered to be High. The viewpoint is representative of the view experienced by residents and tourists, whose attention or interest is likely to be focused on the landscape (High susceptibility). Therefore, the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to one blade tip would appear on the skyline affecting approximately <1° of the horizontal FoV at 8,307m distance, and would be partly screened by intervening coniferous forestry. None of the other infrastructure components of the proposed development would be visible due to intervening landform. The magnitude of change would be *Very Low to Zero*. *No aviation warning lights would be visible.* **Whilst Under Construction and Decommissioning:** The upper part of a crane is likely to be visible from this location during the construction / decommissioning periods. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	High
	Magnitude	Very Low to Zero
	Level of Effect	**Negligible to No View** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* A blade of Auchmore would be visible in the same view as the proposed development (hub if forestry felled), the blades of Fairburn would also be visible to the northwest along the same ridgeline (both Very Low magnitude). **Consented Wind Farms:** *Zero* No consented wind farms would be visible. **Other Wind Farm Applications:** *Very Low* A hub of the scoping Fairburn Extension would be filtered by intervening vegetation but would be visible in winter views and from other parts of the settlement (Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Very Low*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Negligible** and Not Significant	
Additional effect	**Negligible to No View** and Not Significant	
	Additional Magnitude: Very Low to Zero	**Combined Magnitude:** Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Negligible** and Not Significant	
Additional effect	**Negligible to No View** and Not Significant	
	Additional Magnitude: Very Low to Zero	**Combined Magnitude:** Very Low
Type of Effect	Long term (reversible), direct, cumulative and neutral.	

Figure 6.25a-e	**Viewpoint 8: Kiltarlity** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at Kiltarlity Church to the southeast extent of the settlement of Kiltarlity. The view is orientated northwest and views across open fields (partially allocated for housing in the Highland Local Development Plan) towards residential properties and distant hills which form the horizon. Landcover consists of improved grassland in near and middle distance, mixed trees within the settlement in the middle distance and a combination of moorland and coniferous forestry in upland areas on the hills beyond. A line of mature trees denotes a minor road and adjacent Core Path providing access to the church and primary school. Human development in the view is evident in the linear fields, residential and farm buildings, fencing, field patterns, and coniferous forestry. Pylons in the middle to far distance break the skyline of the view.

Figure 6.25a-e	**Viewpoint 8: Kiltarlity** (The assessment takes account of a 90° FoV from this location as illustrated).	
Sensitivity	The viewpoint is not located within any designated landscape indicating a Medium value. The view would be experienced by visitors to the church and is representative of residents whose attention or interest is likely to be focused on the surrounding views and landscape features from the settlement and susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines (16 hubs and four blades / blade tips) would be theoretically visible on the skyline affecting approximately 17° of the horizontal FoV at 8,325m distance. The turbines would appear slowly rotating against the sky and would appear on the distant hills with the towers and /or upper towers visible beyond pylons, although several of the turbines would be screened or partially screened by intervening landform. Intervening middle distance forestry would also screen some of the turbine bases. The design of the wind farm presents as a relatively simple row of well-spaced turbines with minimal overlapping, although there would be two larger gaps between the turbines. Parts of the access track would also be visible. Due to the intervening distance, wide views, partial landform screening, large-scale of the landscape and presence of other human development in the view, the proposed turbines, although noticeable, would appear reasonably well accommodated in the view. The magnitude of change would be *Medium*. *Aviation warning lights on T2, T3, T7 and T14 would be visible.* **Whilst Under Construction and Decommissioning:** Parts of the access track, vehicle movements and cranage would be visible during construction and decommissioning. The magnitude of change would range from *Zero to Medium.*	
Assessment	**Sensitivity**	High
	Magnitude	Medium
	Level of Effect	**Major** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Novar, Novar Extension, and Coire na Cloiche would be theoretically visible to the north at distances over 30km subject to screening from vegetation (all Very Low to Zero magnitude). **Consented Wind Farms:** *Zero* There would be no consented wind farms visible from this location. **Other Wind Farm Applications:** *Medium* The blades of the scoping Fairburn Extension would be theoretically visible behind the proposed development (Very Low magnitude). Abhainn Dubh would be partially visible to the north subject to screening from intervening vegetation (Very Low to Zero magnitude). Fanellan substation would be theoretically visible in an elevated location to the northwest at approximately 3km and would appear in the same view as the proposed development (Medium magnitude). The overall cumulative magnitude of change for other wind farms would be *Low (Medium* due to Fanellan substation).	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Major** and Significant (due to the proposed development)	
Additional effect	**Major** and Significant	
	Additional Magnitude: Medium	**Combined Magnitude:** Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Major** and Significant (due to the proposed development and Fanellan substation)	
Additional effect	**Major** and Significant	
	Additional Magnitude: Medium	**Combined Magnitude:** Medium
Type of Effect	Long term (reversible), direct, cumulative and negative.	

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Figure 6.26a-e	**Viewpoint 9: Contin Village Shop (A835)** (The assessment takes account of a 90° FoV from this location as illustrated).	
Description	This viewpoint is located on the A835, opposite a bus stop and village shop within the settlement of Contin. The view is orientated south / southwest and views across the A835 towards a dip in the undulating skyline between Cul Mor and Tor Atchitty. Landcover consists of urban and garden planting in the foreground transitioning to forested slopes and moorland in the mid to far distance. Human development in the view is evidenced by the foreground urban streetscape including road, residential property, signage, street lighting, telegraph poles, benches and hedgerows. The upper parts of the existing Auchmore Wind Farm is visible to the left of the view.	
Sensitivity	The viewpoint is not in a designated area, however it is located along the North Coast 500 Tourist Route and the value of the viewpoint is therefore considered to be High. The viewpoint is representative of the view experienced by residents, whose attention or interest is likely to be focused on the landscape (High susceptibility). Therefore, the sensitivity is assessed as *High*. The viewpoint is also considered representative of other road users travelling on the A835, whose attention or interest is likely to be focused on the road ahead reflecting a Medium susceptibility to change. The sensitivity of road users on the A835 is assessed as *Medium*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to eight turbines would appear on the skyline in the dip between Cul Mor and Tor Atchitty as two hubs and six partial blades / tips affecting approximately 11° of the horizontal FoV at 8,439m distance. However, the blade tips of T5 and T11 would not be discernible, thus reducing the visible elements to 8° of the horizontal FoV. The lower parts of the turbines would be screened by intervening landform. Intervening forestry would further screen some of the turbines on the skyline, subject to felling. Visibility would be largely limited to one hub and two blades subject to forestry felling which would be seen beyond other human development in the foreground. None of the other infrastructure components of the proposed development would be visible due to intervening landform. The magnitude of change would be *Low-Very Low.* *Aviation warning lights on T14 would be visible, subject to forestry felling.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low-Very Low.*	
Assessment	**Sensitivity**	High / Medium
	Magnitude	Low-Very Low
	Level of Effect	**Moderate to Minor / Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* Blade tips of Fairburn are not discernible in the view (Zero magnitude). Auchmore is visible to the south (Low-Very Low magnitude). **Consented Wind Farms:** *Zero* There are no consented wind farms visible from this location. **Other Wind Farm Applications:** *Low-Very Low* A hub and blade of the scoping Fairburn Extension would be visible to the fore of the proposed development (Low-Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Low-Very Low*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Moderate to Minor / Minor** and Not Significant	
Additional effect	**Moderate to Minor / Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** Low-Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Moderate to Minor / Minor** and Not Significant	
Additional effect	**Moderate to Minor / Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** Low-Very Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.27a-e	**Viewpoint 10: Jamestown** (The assessment takes account of a 90° FoV from this location as illustrated).	
Description	This viewpoint is located in the settlement of Jamestown along Ballachnecore Road to the east of the settlement. The view is orientated south / southwest and views across Strathconon basin towards Cul Mor and Cul Beag to the left of the River Orrin valley. In the near and middle distance, the landform falls towards mixed trees and the main area of the settlement (not visible beyond the trees). Landcover includes a patchwork of arable and semi-improved grassland fields interspersed with lines of trees and woodland clumps which transition to coniferous forestry and moorland on slopes and summits. Human development in the view includes scattered residential buildings and farms, settlement, telegraph poles, coniferous forestry, and geometric fields. The existing Auchmore and Fairburn wind farms are visible on the skyline.	
Sensitivity	The viewpoint is not located within any designated landscape indicating a Medium value. The view is representative of residents whose attention or interest is likely to be focused on the surrounding views and landscape features. Susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** The proposed development would be partially screened by Cul Mor and Cul Beag such that eight hubs and six blades / blade tips would be visible, affecting approximately 24° of the horizontal FoV at 9,352m distance. The turbines would appear slowly rotating against the sky, as a simple cohesive group, located beyond the containing Strathconon hills. None of the other infrastructure components of the proposed development would be visible due to intervening landform. Due to the partial landform screening, large scale of the receiving landscape, wide views, intervening distance and presence of other wind farms and human development in the view, the proposed development would appear reasonably well accommodated in the view. The magnitude of change would be *Low* resulting in a **Moderate** effect that would not be significant due to the presence of human development in the foreground, wide views, and the limited extent of visibility of the turbines visible in combination with intervening distance. *Aviation warning lights on T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low.*	
Assessment	**Sensitivity**	High
	Magnitude	Low
	Level of Effect	**Moderate** and Not Significant
	Type of Effect	Long term (reversible), direct and negative
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low to Very Low* Blades and tips of Fairburn are visible above the ridgeline and on the horizon to the right of the view the view (Very Low magnitude). Auchmore would be visible in the same view as the proposed development on the ridgeline to the left (Low-Very Low magnitude). **Consented Wind Farms:** *Zero* There are no consented wind farms visible from this location. **Other Wind Farm Applications:** *Medium-Low* The scoping Fairburn Extension would be visible overlapping with the proposed development (Medium-Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Medium-Low*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Moderate** and Not Significant	
Additional effect	**Moderate** and Not Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Major to Moderate** and Significant (due to Fairburn Extension and to a lesser degree, the proposed development)	
Additional effect	**Moderate** and Not Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Medium-Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

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Figure 6.28a-e	**Viewpoint 11: Barlvaird / Newmore** (The assessment takes account of a 90° FoV from this location as illustrated).	
Description	This viewpoint is located in an elevated area within the scattered settlements of Barlvaird and Newmore. The view is orientated southwest and views across gently falling landform and Strathconon basin to the undulating hills forming the ridgeline to the south of Strathconon and distant hill summits beyond. Landcover is mostly improved grassland and arable fields interspersed with woodlands and coniferous forest in the near and middle distance. Coniferous forestry also clads the lower slopes and summits of hills with upper slopes and higher summits characterised by open moorland. Human development in the view comprises paved road, post and wire fencing, field patterns, scattered residential and farm buildings and distant plantation forestry. The existing wind farms at Auchmore and Fairburn are also visible on the skyline.	
Sensitivity	The viewpoint is not located within any designated landscape indicating a Medium value. The view is representative of residents whose attention or interest is likely to be focused on the surrounding views and landscape features. Susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to 19 turbines would appear on the skyline mostly as hubs and upper towers visible (15 hubs and four blades / blade tips) affecting approximately 13° of the horizontal FoV at 10,408m distance. The lower parts of the turbines and several of the hubs would be screened by intervening landform. As such the turbines would appear to be set back from the facing hills. Half of the turbines would be seen rotating slowly against the sky whilst the other half would be backclothed by landform. None of the other infrastructure components of the proposed development would be visible due to intervening landform. Due to the partial landform screening, intervening distance, large-scale of the receiving landscape, wide views, and presence of other wind farms in the view, the proposed development would appear reasonably well accommodated in the view. The magnitude of change would be *Medium-Low*. *Aviation warning lights on T2, T3, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Medium-Low.*	
Assessment	**Sensitivity**	High
	Magnitude	Medium-Low
	Level of Effect	**Major to Moderate** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low* Fairburn would be visible on the skyline as upper towers and hubs (Low magnitude). Auchmore would be visible overlapping the proposed development (Low magnitude). Other existing wind farms would be theoretically visible at greater distances but would be screened or heavily filtered by intervening vegetation (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low to Zero* Two hubs and blades of Bhlaraidh Extension would be visible in clear conditions to the southwest (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Medium-Low* The scoping Fairburn Extension would be visible adjacent to the proposed development (Medium-Low magnitude). Abhainn Dubh would be theoretically visible to the north in heavily filtered views (Very Low magnitude). The blades and one hub of Loch Liath would be filtered in views to the southwest (Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Medium-Low*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Major to Moderate** and Significant (due to proposed development).	
Additional effect	**Major to Moderate** and Significant	
	Additional Magnitude: Medium-Low	**Combined Magnitude:** Medium-Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Major to Moderate** and Significant (due to Fairburn Extension and the proposed development).	
Additional effect	**Major to Moderate** and Significant	

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	Additional Magnitude:	Medium-Low	**Combined Magnitude:**	Medium-Low
Type of Effect	Long term (reversible), direct, cumulative and negative.			

Figure 6.29a-e	**Viewpoint 12: A835 / B9169** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at the junction of the A835 and B9169 between Tore and Conon Bridge and is representative of road users. The view is orientated southwest across the expansive Strathconon basin towards the undulating hills forming the ridgeline to the south of Strathconon and distant hill summits beyond. Landcover consists of expansive arable fields across the Strathconon basin in the near, mid, and far distance interspersed with occasional hedgerows and tree clumps, transitioning to coniferous woodland on rising landform and lower hill slopes and moorland on distant hill summits. Improved grassland is visible to the left of the view. Human development in the view comprises scattered residential properties in the near to middle distance, field patterns, post and wire fencing, telegraph poles, arable fields, pylons, wind farms and coniferous forestry.
Sensitivity	The viewpoint is not located within a designated landscape indicating a Medium value. The view would be experienced by road users whose attention or interest is likely to be focused on the road ahead and susceptibility to change is assessed as Medium. The sensitivity is assessed as *Medium*.
Magnitude of Change (proposed development only)	**Whilst in Operation:** All 20 turbines (19 hubs and one blade) would appear on the skyline, affecting approximately 12° of the horizontal FoV at 12,773m distance. The turbines would appear as a simple and linear group with minimal overlapping. Half of the turbines would be seen rotating slowly against the sky whilst the other half would be backclothed by landform. There would be limited visibility of the access track visible associated around T18 with the remainder of other infrastructure components of the proposed development screened by intervening landform. Due to the intervening distance, some partial screening, transient and wide view, large-scale of the receiving landscape and presence of other wind farms in the view, the proposed development would appear reasonably well accommodated in the view. The magnitude of change would be *Medium* resulting in a **Moderate** effect that would be significant due to the extent of visibility of the turbines visible on the skyline and against landform. *Aviation warning lights on T2, T3, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes would be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Medium*.
Assessment	**Sensitivity** Medium **Magnitude** Medium **Level of Effect** **Moderate** and Significant **Type of Effect** Long term (reversible), direct and negative
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).	
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* Fairburn would be visible on the skyline as hubs (Low-Very Low magnitude). Auchmore would be visible overlapping the proposed development (Very Low magnitude). Novar, Novar Extension and Coire na Cloiche would be visible in clear conditions to the north (Very Low to Zero magnitude). **Consented Wind Farms:** *Zero* There are no consented wind farms visible from this location. **Other Wind Farm Applications:** *Medium* The scoping Fairburn Extension would be visible adjacent to the proposed development (Medium magnitude). Abhainn Dubh would be partially visible to the north in clear conditions (Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Medium*.
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)	
Combined effect	**Moderate** and Significant (due to the proposed development)
Additional effect	**Moderate** and Significant **Additional Magnitude:** Medium **Combined Magnitude:** Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)	

Figure 6.29a-e	**Viewpoint 12: A835 / B9169** (The assessment takes account of a 90° FoV from this location as illustrated).
Combined effect Additional effect	**Moderate** and Significant (due to Fairburn Extension and the proposed development) **Moderate** and Significant **Additional Magnitude:** Medium **Combined Magnitude:** Medium
Type of Effect	Long term (reversible), direct, cumulative and negative.

Figure 6.30a-f	**Viewpoint 13: Great Glen Way near Ladycairn** (The assessment takes account of a 180° FoV from this location as illustrated).
Description	This viewpoint is located on an elevated section of the Great Glen Way as the route emerges from coniferous forestry to the north of Ladycairn. The view towards the proposed development is orientated northwest where there are extensive views across The Aird and Strathglass towards the low hills of the Erchless Forest, flanked by taller summits of Sgurr a'Phollain and adjacent hills to the left, and more distant hills including Ben Wyvis to the right. Landcover mostly comprises improved and semi-improved grasslands interspersed with coniferous forest, some arable fields are visible in the lower straths and moorland is present on the uplands and distant summits. Human development in the view comprises telegraph poles, scattered residential properties, coniferous forestry, field patterns, fencing, pylons, and occasional wind farms.
Sensitivity	The viewpoint is not located within a nationally or locally designated landscape, however, it is located on the route of the Great Glen Way, one of Scotland's Great Trails. The value of the viewpoint is therefore considered to be High. The view would be experienced by walkers whose attention is likely to be focused on surrounding landscape features, indicating a High susceptibility to change. Consequently, the sensitivity is assessed as *High*.
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of proposed turbines including hubs would appear partly on the skyline and some partly backclothed by landform, affecting approximately 10° of the horizontal FoV at 13,633m distance. The proposed development would appear as a linear and cohesive group forming a distinct cluster that affords respite space between groups, within a field of view influenced by existing wind energy development. The turbines would appear slowly rotating against the sky, partially appearing above the landform on the horizon to the northwest. There would be limited visibility of the access track visible with the remainder of other infrastructure components of the proposed development screened by intervening landform. Due to the expansive views, intervening distance, presence of other wind farms and the large scale of the receiving landscape, the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Medium.* *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage may be visible in clear conditions during the construction / decommissioning periods. The magnitude of change would range from *Zero* to *Low*.
Assessment	**Sensitivity** High **Magnitude** Medium **Level of Effect** **Major** and Significant **Type of Effect** Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).	
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* Fairburn would be visible on the skyline in the same view as the proposed development as hubs and upper towers (Low-Very Low magnitude). Auchmore would be visible further to the right (Very Low magnitude). Lochluichart and Lochluichart Extension would be partially visible in clear conditions (Very Low magnitude). To the north Novar, Novar Extension and Coire na Cloiche would be theoretically visible in clear conditions (Very Low magnitude). Bhlaraidh would be partially visible to the southwest in clear conditions (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low* Lochluichart Extension II would be partially visible in clear conditions to the northwest (Very Low magnitude). Bhlaraidh Extension would be partially visible to the southwest in clear conditions (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Low*

Figure 6.30a-f	**Viewpoint 13: Great Glen Way near Ladycairn** (The assessment takes account of a 180° FoV from this location as illustrated).
	The scoping Fairburn Extension would be visible behind to the proposed development (Low magnitude). Loch Liath would be partially visible to the southwest, and Abhainn Dubh would be visible to the north in clear conditions (both Very Low to Zero magnitude). Carn Coire na Muic would be barely perceptible in the view (Very Low to Zero magnitude). Fanellan substation would be theoretically visible to the northwest at approximately 7km but would be partially screened by intervening vegetation (Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Low.*
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)	
Combined effect:	**Major** and Significant (due to the proposed development)
Additional effect:	**Major** and Significant
	Additional Magnitude: Medium **Combined Magnitude:** Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented windfarms + applications)	
Combined effect	**Major** and Significant (due to the proposed development)
Additional effect	**Major** and Significant
	Additional Magnitude: Medium **Combined Magnitude:** Medium
Type of Effect	Long term (reversible), direct, cumulative and negative.

Figure 6.31a-d	**Viewpoint 14: A832 west of Tore** (The assessment takes account of a 90° FoV from this location as illustrated).	
Description	This viewpoint is located on the A832 to the southwest of Tore as the route passes Fettes and begins to descend towards Muir of Ord. The view is orientated west / southwest and views across the western end of the Beauly Firth towards the hills forming the skyline beyond. Cnoc Dubh, Cnoc Croit and adjacent hills form an elevated ridgeline and noticeable feature in the middle distance to the fore of more distant summits. Landcover consists of roadside grasses and arable fields bound by coniferous forestry in the near to middle distance. Geometric pasture fields are visible on lower slopes in the middle to far distance and transition to coniferous forestry and moorland on the upper slopes and distant summits. Human development in the view is evidenced in the road surface, post and wire fencing, field patterns, scattered residential, farm and agricultural buildings, pylons, wind turbines, and coniferous forestry.	
Sensitivity	The viewpoint is not located within a nationally or locally designated landscape or on a designated tourist route, indicating a Medium value. There is no footpath or cycle provision at this location. The view would be experienced by road users whose attention or interest is likely to be focused on the road ahead resulting in a Medium susceptibility to change. The sensitivity is assessed as *Medium*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines including 12 hubs and eight blades would appear above Cnoc Dubh, and to the fore of more distant summits affecting approximately 9° of the horizontal FoV at 13,710m distance in this transient view. Many of the turbines would be partially screened by Cnoc Dubh and adjacent hills such that mostly hubs and blades would be visible with some upper towers visible as Cnoc Dubh gently slopes to the north. Although the majority of the turbines would be backclothed by distant summits, blades and some hubs would be visible on the skyline as the summits lose elevation. None of the infrastructure components of the proposed development would be visible due to intervening landform. Due to the wide views, intervening distance, presence of other wind farms and the large scale of the receiving landscape, the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Medium-Low*. *Aviation warning lights on T2, T3 and T14 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage may be visible in clear conditions during the construction / decommissioning periods. The magnitude of change would range from *Zero to Medium-Low*.	
Assessment	**Sensitivity**	Medium
	Magnitude	Medium-Low
	Level of Effect	**Moderate to Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and negative
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development		

Figure 6.31a-d	**Viewpoint 14: A832 west of Tore** (The assessment takes account of a 90° FoV from this location as illustrated).
(The assessment takes account of a 360° FoV from this location).	
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* Fairburn would be visible on the skyline in the same view as the proposed development as hubs and upper towers (Low-Very Low magnitude). Auchmore would be visible further to the right of the proposed development (Low-Very Low magnitude). Other existing wind farms visible would be of very Low magnitude due to the intervening distance. **Consented Wind Farms:** *Zero* Blade tips of Bhlaraidh Extension to the southwest are unlikely to be discernible (Zero magnitude). **Other Wind Farm Applications:** *Low* The scoping Fairburn Extension would be visible adjacent to the proposed development (Low-Very Low magnitude). Loch Liath would be partially visible to the southeast subject to screening from roadside vegetation (Very Low to Zero magnitude). Fanellan substation would be theoretically visible to the southwest at approximately 11km but would be mostly screened by forestry (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Low-Very Low.*
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)	
Combined effect: Additional effect:	**Moderate to Minor** and Not Significant **Moderate to Minor** and Not Significant
	Additional Magnitude: Medium-Low **Combined Magnitude:** Medium-Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)	
Combined effect Additional effect	**Moderate to Minor** and Not Significant **Moderate to Minor** and Not Significant
	Additional Magnitude: Medium-Low **Combined Magnitude:** Medium-Low
Type of Effect	Long term (reversible), direct, cumulative and negative.

Figure 6.32a-h	**Viewpoint 15: Meall a'Mhadaibh** (The assessment takes account of a 360° FoV from this location as illustrated).
Description	This viewpoint is located at the summit of Meall a'Mhadaibh, to the south of Loch Beannacharan and Glen Strathfarrar. Views from the summit are panoramic and the view towards the proposed development is orientated to the northeast across Glen Strathfarrar towards Beinn a'Bhathaich Ard and the River Beauly valley. Distant views of Beauly Firth and Kessock Bridge are visible in clear conditions. In other directions, the view mostly looks across adjoining hills and mountain ranges, although to the south there are long range views across the southern end of Strathglass. Landcover consists mainly of moorland on the surrounding uplands and mountains and distant agricultural fields in the valley floor interspersed with forestry on lower slopes and summits. Scattered residential properties, geometric fields, and coniferous forestry are visible human development in distant views. Other human development in the view includes wind turbines and pylons.
Sensitivity	The viewpoint is located within the nationally designated *Glen Strathfarrar* NSA and is also within the *Central Highlands* WLA denoting a High value. The view would be experienced by recreational walkers whose attention or interest is likely to be focused on the landscape. Susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.
Magnitude of Change (proposed development only)	**Whilst in Operation:** Up to 16 turbines would be theoretically visible on the horizon in the middle distance affecting approximately 8° of the horizontal FoV at 14,529m distance. The proposed turbines would be partially screened by intervening landform such that 14 hubs including some towers, and two partial blades / tips would be visible. The majority of the turbines would be backclothed by distant landform with the upper parts of the turbines breaking the skyline. There would be limited visibility of the access track visible with the remainder of other infrastructure components of the proposed development screened by intervening landform. Due to the panoramic views, intervening distance, presence of other wind farms and the large scale of the receiving landscape, the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Low* and the level of effect would be **Moderate** and significant from this elevated location due to the extent of visibility of the turbines visible in the middle distance and high sensitivity of the receptor. Although there are existing turbines in this part of the view, the proposed turbines would increase the density of visible turbines to the northeast.

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Figure 6.32a-h	**Viewpoint 15: Meall a'Mhadaibh** (The assessment takes account of a 360° FoV from this location as illustrated).	
	Aviation warning lights on T2, T3, T7 and T14 would be visible. **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low.*	
Assessment	**Sensitivity**	High
	Magnitude	Low
	Level of Effect	**Moderate** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* There would be several existing wind farms visible in an arc between the south and northeast. Auchmore would be visible in the same location as the proposed development and would be seen behind the proposed turbines (Very Low magnitude). Others would be more visible to the southeast and include Corrimony (~13km) (Low-Very Low magnitude) and Bhlaraidh (partially screened) (~17km) (Very Low magnitude). Other wind farms would be theoretically visible or partially visible in clear conditions at distances over ~27km (Very Low to Zero magnitude). **Consented Wind Farms:** *Low-Very Low* Several consented wind farms would be theoretically visible. The closest would be Chrathaich and Bhlaraidh Extension (both Low-Very Low magnitude). Other wind farms would be visible or partly visible in clear conditions at distances over ~28km (all Very Low to Zero magnitude). **Other Wind Farm Applications:** *Low-Very Low* Loch Liath would be visible to the south-southeast at over 14km (Low magnitude). Carn Coire na Muic would be barely perceptible in the view (Very Low to Zero magnitude). The blade tips of Tom na Clach Extension would not be discernible in the view (Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Moderate** and Significant (due to the proposed development)	
Additional effect:	**Moderate** and Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Moderate** and Significant (due to the proposed development)	
Additional effect	**Moderate** and Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.33a-h	**Viewpoint 16: Sgurr a'Choire Ghlais (Munro)** (The assessment takes account of a 360° FoV from this location as illustrated).
Description	This viewpoint is located at the summit of Sgurr a'Choire Ghlais, a Munro between Glen Strathfarrar and Glen Orrin. Views from the summit are panoramic. The view towards the proposed development is orientated to the northeast and views across Carn nan Gobhar and Meall na Faire towards Glen Orrin and lowland features beyond. The wider view is characterised by layers of surrounding hills interspersed with glens and occasional lochs. Landcover consists mainly of upland moorland and a patchwork of agricultural fields and coniferous forestry in distant low lying areas. Scattered residential properties, geometric fields, forestry are visible features in distant views. Other human development in the view includes wind turbines and pylons.
Sensitivity	The viewpoint is located within the locally designated *Strathconon, Monar and Mullardoch* SLA and within the *Central Highlands* WLA denoting a High-Medium / High value. The view would be experienced by recreational walkers whose attention or interest is likely to be focused on the landscape. Susceptibility to change is assessed as High, and the sensitivity is assessed as *High*.
Magnitude of Change (proposed	**Whilst in Operation:** Intervening landform in the middle distance would screen the majority of the proposed turbines such that only three hubs and 12 partial blades or blade tips would be visible beyond. The visible turbines would affect approximately 7° of the horizontal FoV at 15,200m distance. The turbines

Figure 6.33a-h	**Viewpoint 16: Sgurr a'Choire Ghlais (Munro)** (The assessment takes account of a 360° FoV from this location as illustrated).	
development only)	would be backclothed by landform and would appear contained within the hill forms. The magnitude of change would be *Low – Very Low*. *Aviation warning lights on T3 and T14 would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low-Very Low.*	
Assessment	**Sensitivity**	High
	Magnitude	Low-Very Low
	Level of Effect	**Moderate to Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and negative to neutral.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low* There would be several existing wind farms visible from the summit. The nearest include Fairburn would be clearly visible in the same view as the proposed development at ~17km (Low magnitude), Lochluichart and Lochluichart Extension at ~24km to the north-northeast (Very Low magnitude), and Corrimony (~20km) and Bhlaraidh (~24km) (both Very Low magnitude). Other wind farms would be theoretically visible between the south and northeast in clear conditions at distances over ~34km (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low* Several consented wind farms would be theoretically visible. The closest would be Kirkan to the north-northeast, and Bhlaraidh Extension to the southeast, both at ~26km distance (both Very Low magnitude). Other wind farms would be partly visible over ~26km, or theoretically visible between the south and northeast in clear conditions at distances over ~35km (all Very Low to Zero magnitude). **Other Wind Farm Applications:** *Medium-Low* The scoping Fairburn Extension would be visible adjacent to the proposed development relatively unscreened by intervening landform at ~13km (Medium-Low magnitude). Loch Liath would be visible to the south-southeast at over 21km, and Abhainn Dubh would be visible to the northeast at over 35km (both Very Low magnitude). The overall cumulative magnitude of change for other wind farms would be *Medium-Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Moderate to Minor** and Not Significant	
Additional effect:	**Moderate to Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented windfarms + applications)		
Combined effect	**Major to Moderate** and Significant (due to Fairburn Extension and <u>not</u> the proposed development).	
Additional effect	**Minor** and Not Significant (reduced due to Fairburn Extension)	
	Additional Magnitude: Very Low	**Combined Magnitude:** Medium-Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.34a-f	**Viewpoint 17: Heights of Brae** (The assessment takes account of a 180° FoV from this location as illustrated).
Description	This viewpoint is located at the Neil Gunn Memorial Viewpoint at the Heights of Brae, northwest of Dingwall. The main orientation of the viewpoint is to the south and southeast across Dingwall and the western edge of Cromarty Firth. The view towards the proposed development is orientated south / southwest and views diagonally across the Heights of Fodderty and Strath Peffer to Cnoc Farrel in the middle distance and Creag Mhor and the Erchless Forest hills in the far distance. Landcover comprises arable fields and improved and rough grassland in the near distance, improved grassland with woodland and coniferous forest in the middle distance and upland moorland in the far distance. Human development in the view includes near distance road, stone walling and roadside fencing, arable fields, residential properties, telecommunications masts, telegraph poles, pylons, coniferous forestry, and wind turbines.

Figure 6.34a-f	**Viewpoint 17: Heights of Brae** (The assessment takes account of a 180° FoV from this location as illustrated).	
Sensitivity	The viewpoint is not located within a designated landscape, although the location is identified as a specific viewpoint on OS maps indicating a High value. The view would be experienced by visitors (and nearby residents) whose attention or interest is likely to be focused on the surrounding views and landscape features and susceptibility to change is assessed as High. The sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines (19 hubs and one blade) would be visible on the horizon beyond Cnoc Farrel affecting approximately 15° of the horizontal FoV at 15,204m distance. The bases and lower parts of some turbines would be screened by intervening landform. Most of the turbines would appear against the sky with a small number of turbines backclothed by landform. The turbines would appear as a simple, linear group in part of the view already influenced by wind farm development. There would be limited visibility of the access track visible with the remainder of other infrastructure components of the proposed development screened by intervening landform. Due to the wide panoramic views, intervening distance, presence of other wind farms and the large scale of the receiving landscape, the turbines would appear reasonably well accommodated within the view. The main view to the southwest across Dingwall and Cromarty Firth would be unaffected by the proposed development. The magnitude of change would be *Low* and the level of effect would be **Moderate** and significant from this elevated location due to the extent of visibility of the turbines visible and high sensitivity of the receptor. Although there are existing turbines in this part of the view, the proposed turbines would increase the density of visible turbines to the southwest. *Aviation warning lights on T2, T3, T7, T14 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage and limited vehicle movements may be visible in clear conditions during the construction / decommissioning periods. The magnitude of change would range from *Zero* to *Low*.	
Assessment	**Sensitivity**	High
	Magnitude	Low
	Level of Effect	**Moderate** and Significant
	Type of Effect	Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Low-Very Low* Fairburn would be visible in the same view as the proposed development (Low-Very Low magnitude). Auchmore would be visible to the left of the proposed development (Very Low magnitude). Other wind farms would be theoretically visible to the south and southwest in clear conditions at distances over ~38km (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low* Several consented wind farms would be theoretically visible in exceptional conditions to the south at over ~40km (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Low* The scoping Fairburn Extension would be visible overlapping with the proposed development (Low magnitude). Other applications would be barely discernible in the view due to screening from landform and distance (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect	**Moderate** and Significant (due to the proposed development)	
Additional effect	**Moderate** and Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Moderate** and Significant (due to Fairburn Extension and the proposed development)	
Additional effect	**Moderate** and Significant	
	Additional Magnitude: Low	**Combined Magnitude:** Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

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Figure 6.35a-e	**Viewpoint 18: Knockbain - Torgorm** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at Knockbain car park and viewing location on the northern shoreline of the Beauly Firth to the west of Charleston and North Kessock. The view is orientated west and views along the shoreline and across the Firth towards the distant shoreline at Beauly and the undulating hills beyond. Human development in the view includes benches and foreground elements, distant, scattered residential and farm buildings, agricultural fields, coniferous forestry and existing turbines. The view south / southeast views across the Beauly Firth towards the City of Inverness.
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape, however, it is identified as a parking area on OS maps where people are encouraged to enjoy the view with the provision of benches indicating a High value. The view would be experienced by visitors to the shoreline whose attention or interest is likely to be focused on the surrounding views and landscape features and susceptibility to change is assessed as High. The sensitivity is assessed as *High*.
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines (20 hubs and four blades) would be visible, partly appearing on the skyline with some backclothed by distant hills. The turbines would be visible at hub height affecting approximately 7° of the horizontal FoV at 18,769m distance. The remaining turbines and lower parts of the turbines would be screened by intervening landform. The turbines would appear as a simple, linear group that is contained by the hills at either side of the firth. All other infrastructure components of the proposed development would be screened by intervening landform. Due to the wide panoramic views, long intervening distance, large scale of the receiving landscape, city views to the south / southeast and presence of other turbines (Auchmore), the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Low* and the level of effect would be **Moderate** and not significant due to the overall limited extent of the turbines visible as a result of intervening landform, the narrow FoV occupied by the turbines, long intervening distance and other human development in the wider view. *Aviation warning lights on T2, T3, T7 and T14 would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low.*
Assessment	**Sensitivity** High **Magnitude** Low **Level of Effect** **Moderate** and Not Significant **Type of Effect** Long term (reversible), direct and negative.
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).	
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Auchmore would be theoretically visible on the skyline at ~17km, but are mostly screened by intervening vegetation (Very Low magnitude). Two Moy turbines are theoretically visible to the southeast but are screened by intervening vegetation (Very Low magnitude). **Consented Wind Farms:** *Zero* There are no consented wind farms visible from this location. **Other Wind Farm Applications:** *Low-Very Low* The scoping Fairburn Extension would be visible adjacent to the proposed development as hubs and blades, partially screened by vegetation (Low-Very Low magnitude). Carn Coire na Muic would be barely perceptible in the view (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Low-Very Low.*
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)	
Combined effect: Additional effect:	**Moderate** and Not Significant **Moderate** and Not Significant
	Additional Magnitude: Low **Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)	
Combined effect Additional effect	**Moderate** and Not Significant **Moderate** and Not Significant

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Figure 6.35a-e	**Viewpoint 18: Knockbain - Torgorm** (The assessment takes account of a 90° FoV from this location as illustrated).			
	Additional Magnitude:	Low	**Combined Magnitude:**	Low
Type of Effect	Long term (reversible), direct, cumulative and negative.			

Figure 6.36a-e	**Viewpoint 19: A862 Clachnaharry** (The assessment takes account of a 90° FoV from this location as illustrated).			
Description	This viewpoint is located at a layby on the busy A862 Clachnaharry Road on the southern shoreline of the Beauly Firth to the west of Inverness. The view is orientated west and views along the southern shoreline towards the western limit of the Firth, flanked by the forested Gallow Hill to the north of the Firth. The shoreline in most directions of the view features deciduous woodland transitioning to coniferous forest with areas agricultural fields between and scattered residential properties. Human development in the view includes the busy road, residential properties, coniferous forestry, existing wind turbines and pylons.			
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape area but is located on the North Coast 500 Tourist Route indicating a High value. The view would be experienced by tourists whose attention or interest is likely to be focused on surrounding landscape features. Susceptibility to change is assessed as High. The sensitivity is assessed as *High*. The viewpoint is also considered representative of other road users travelling on the A862, whose attention or interest is likely to be focused on the road ahead reflecting a Medium susceptibility to change. The sensitivity of road users on the A862 is assessed as *Medium.*			
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines (15 hubs and five blades) would be visible partly on the skyline in clear conditions affecting approximately 7° of the horizontal FoV at 19,089m distance. The majority of the turbines would appear at hub height with two visible at full height and several as partial blades behind intervening landform. The turbines would appear as a simple, linear group on the skyline of the view with two turbines backclothed by landform. All other infrastructure components of the proposed development would be screened by intervening landform and coniferous forestry. Due to the wide panoramic views, long intervening distance, large scale of the receiving landscape and presence of other turbines, the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Low* and the level of effect on tourists would be **Moderate** and not significant due to the limited extent of the turbines visible as a result of intervening landform and forestry, the narrow FoV occupied by the turbines, long intervening distance, transient view and other human development (including wind turbines) in the wider view. *Aviation warning lights on T2, T3, T7 and T14 would be visible.* **Whilst Under Construction and Decommissioning:** Cranage would be visible during the construction / decommissioning periods in clear conditions. The magnitude of change would range from *Zero to Low.*			
Assessment	**Sensitivity**	High / Medium		
	Magnitude	Low		
	Level of Effect	**Moderate / Minor** and Not Significant		
	Type of Effect	Long term (reversible), direct and negative.		
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).				
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Farirburn would be partially visible in the same view as the proposed development as hubs and blades at ~21.5km distance (Very Low magnitude) and Auchmore would also be in the same view at ~ 17km (Very Low magnitude). Novar / Extension are theoretically visible to the northwest but are screened by intervening vegetation (both Zero magnitude). **Consented Wind Farms:** *N/A* There would be no consented wind farms visible from this location. **Other Wind Farm Applications:** *Low-Very Low* The scoping Fairburn Extension would be visible adjacent to the proposed development as hubs and blades, partially screened by vegetation (Low-Very Low magnitude). The cumulative magnitude of change for other wind farms would be *Low-Very Low.*			
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)				

Figure 6.36a-e	**Viewpoint 19: A862 Clachnaharry** (The assessment takes account of a 90° FoV from this location as illustrated).			
Combined effect: Additional effect:	**Moderate / Minor** and Not Significant **Moderate / Minor** and Not Significant			
	Additional Magnitude:	Low	**Combined Magnitude:**	Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)				
Combined effect Additional effect	**Moderate / Minor** and Not Significant **Moderate / Minor** and Not Significant			
	Additional Magnitude:	Low	**Combined Magnitude:**	Low
Type of Effect	Long term (reversible), direct, cumulative and negative.			

Figure 6.38a-c	**Viewpoint 20: A9 Cromarty Firth** (The assessment takes account of a 90° FoV from this location as illustrated).			
Description	This viewpoint is located at a northbound layby on the A9 to the south of Cromarty Bridge. The view is orientated southwest across the western shoreline of the Cromarty Firth towards Dingwall and the low hills to the southwest of Dingwall, framed by the sweeping sides of the Firth and backdropped by distant peaks and summits. Although distant, scattered residential and farm buildings are visible at Dingwall and along the containing edges of the Firth. Coniferous forestry is also visible on slopes and summits beyond the deciduous coastal woodland, interspersed with agricultural fields. Scattered turbines are also visible in clear conditions at Fairburn and Auchmore in the distance.			
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape but is located along the North Coast 500 Tourist Route. The value of the view is therefore judged to be High. The view would be experienced by tourists whose attention is likely to be on the surrounding landscape features. The sensitivity is therefore assessed as *High*. The viewpoint is also considered representative of other road users travelling on the A9, whose attention or interest is likely to be focused on the road ahead reflecting a Medium susceptibility to change. The sensitivity of road users on the A9 is assessed as *Medium.*			
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible (18 hubs and two blades), partly appearing on the skyline with some backclothed by distant hills, affecting approximately 10° of the horizontal FoV at 19,390m distance. Whilst the towers of some of the turbines would be visible, there would be a mixture of hubs, partial towers, and blades visible in very clear conditions. The lower parts of some turbines would be screened by intervening landform. The turbines would appear as a simple, linear group on the skyline of the view with up to six turbines backclothed by landform. Other infrastructure components of the proposed development would be barely discernible at this distance. Due to the wide panoramic views, long intervening distance, large scale of the receiving landscape, partial landform screening and presence of other turbines, the turbines would appear reasonably well accommodated within the view. The magnitude of change would be *Low* and the level of effect for tourists would be **Moderate** and not significant due to the manner in which this viewpoint would be experienced, travelling at speed, viewing a wide panorama (both sides of the bridge), narrow FoV occupied by the turbines, long intervening distance, and other human development (including wind turbines and vehicle movements along the A9) in the wider view. *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** The upper parts of cranes are likely to be visible during the construction / decommissioning periods. The magnitude of change would range from *Zero to Low.*			
Assessment	**Sensitivity**	High / Medium		
	Magnitude	Low		
	Level of Effect	**Moderate / Minor** and Not Significant		
	Type of Effect	Long term (reversible), direct and negative.		
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).				
Cumulative Magnitude	**Existing Wind Farms:** *Low* Auchmore would be theoretically visible on the skyline adjacent to the proposed turbines at ~16km (Very Low magnitude). Fairburn is partially visible as hubs in the same view (Very Low			

Figure 6.38a-c	**Viewpoint 20: A9 Cromarty Firth** (The assessment takes account of a 90° FoV from this location as illustrated).
	magnitude). Four single turbines are visible to the hill above Dingwall (Low-Very Low magnitude). Foulis Farm turbine is visible in the direction of travel to the northwest at ~3.8km (Low magnitude), and Novar is partially visible to the north but mostly screened by vegetation at ~12km (Very Low magnitude). Bhlaraidh would be barely discernible in the same view as the proposed development (Very Low to Zero magnitude). **Consented Wind Farms:** *Very Low to Zero* The blade tips of Chrathaich would be barely discernible in the same view as the proposed development (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Low-Very Low* The scoping Fairburn Extension would be visible adjacent to the proposed development as hubs and blades, partially screened by vegetation (Low-Very Low magnitude). Loch Liath would be screened by intervening landform and vegetation (Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Low.*
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)	
Combined effect:	**Moderate / Minor** and Not Significant
Additional effect:	**Moderate / Minor** and Not Significant
	Additional Magnitude: Low **Combined Magnitude:** Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)	
Combined effect	**Moderate / Minor** and Not Significant
Additional effect	**Moderate / Minor** and Not Significant
	Additional Magnitude: Low **Combined Magnitude:** Low
Type of Effect	Long term (reversible), direct, cumulative and negative

Figure 6.38a-e	**Viewpoint 21: Ben Wyvis** (The assessment takes account of a 270° FoV from this location as illustrated).
Description	This viewpoint is located at the summit of Ben Wyvis (1,046m) which offers 360° panoramic views of the surrounding landscape. The view towards the proposed development is orientated south across Strathconon to the southeast and layers of undulating hills to the south and southwest. In the wider view, there are several focal points including Cromarty Firth to the east and southeast, Loch Luichart to the southwest, Loch Glascarnoch and Loch Vaich to the west and northwest and successive layers of mountains to the north. Human development in the view is most apparent to the east and southeast where scattered settlement and field patterns are visible. Wind farm development is visible in views to the east, south, southwest and northwest.
Sensitivity	The viewpoint is located in the locally designated Ben Wyvis SLA and within the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and the value of the viewpoint is therefore considered to be High. The viewpoint is representative of the view experienced by recreational walkers, whose attention or interest is likely to be focused on the landscape (High susceptibility). Therefore, the sensitivity is assessed as *High*.
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible backclothed by landform on low lying hills affecting approximately 13° of the horizontal FoV at 20,607m distance. The turbines would be visible in very clear conditions adjacent to the existing Fairburn turbines and in a view affected by numerous wind farm development in three directions. This viewpoint is within a WLA and there are strong perceptions of 'ruggedness' and 'openness', particularly in other directions, but the presence of other existing wind farms and other human development associated with the Cromarty Firth reduces the perception of 'wildness' viewed to the south. Due to the limited magnitude, long intervening distance, the presence of other wind farms, the wide 360° views and large scale of the receiving landscape, the proposed development would be reasonably well accommodated in this view. The magnitude of change would be *Low-Very Low*. *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** The cranes are likely to be visible during the construction / decommissioning periods in very clear conditions. The magnitude of change would range from *Zero to Low-Very Low.*
Assessment	**Sensitivity** High
	Magnitude Low-Very Low

Figure 6.38a-e	**Viewpoint 21: Ben Wyvis** (The assessment takes account of a 270° FoV from this location as illustrated).	
	Level of Effect	**Moderate to Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and negative
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Medium* There are many clusters of existing wind farms partially visible to the southeast to the southwest. The nearest of these are Farirburn which would slightly overlap with the proposed development at ~16.1km distance (Very Low magnitude) and Auchmore to the south at ~ 19km (Very Low magnitude). Others in this direction would be visible in clear or exceptional conditions at over 42km (Very Low to Zero magnitude). In the wider view to the west, Lochluichart, Corriemollie, and Lochluichart Extension form a cluster at between 11km and 14km distance (Medium to Low magnitude). Novar and Novar Extension are partly visible to the northeast at between ~8km and 11km distance – although mostly screened by landform (Medium magnitude), and Coire na Cloiche is also visible in this direction at ~17km (Low magnitude). **Consented Wind Farms:** *High-Medium* Several consented wind farms would be visible to the south and southwest at over 44km in clear or exceptional conditions (Very Low to Zero magnitude). Kirkan would be visible to the fore of the Lochluichart cluster at 9km (High-Medium magnitude), and Lochluichart Extension II would also add to the cluster at ~12km (Low magnitude). Meall Buidhe would be visible on the skyline to the north at ~26km (Very Low magnitude). Strathrory would be visible to the southeast in the middle distance (Low-Very Low magnitude). **Other Wind Farm Applications:** *Medium* The scoping Fairburn Extension would be visible slightly overlapping the proposed development (Low-Very Low magnitude). Other application wind farms would be partially visible in clear or exceptional conditions to the southwest and southeast at over ~42km (Very Low to Zero magnitude). The cumulative magnitude of change for other wind farms would be *High-Medium.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Substantial to Major** and Significant (due to Kirkan, Lochluichart, Corriemollie, Lochluichart Extension and Novar / Novar Extension, and not the proposed development)	
Additional effect:	**Moderate to Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** High-Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Substantial to Major** and Significant (due to Kirkan, Lochluichart, Corriemollie, Lochluichart Extension and Novar / Novar Extension, and not the proposed development)	
Additional effect	**Moderate to Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** High-Medium
Type of Effect	Long term (reversible), direct, cumulative and negative	

Figure 6.39a-e	**Viewpoint 22: A9 Kessock Bridge** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located on the A9 at the Kessock Bridge crossing of the Moray and Beauly Firths, north of Inverness. The view is orientated west and views along the Beauly Firth towards the distant shoreline and low-lying hills, with taller hill ranges forming the skyline beyond. The settlement of Inverness is a main focal point in the view (and further to the south) with the harbour, pier and marina, the most noticeable features. Scattered settlement is visible around the Firth in low-lying areas between a band of shoreline deciduous woodland and elevated coniferous forests. Agricultural fields form visible 'bands' of open space adjacent to the scattered settlement. Human development is extensive as visible in the view and also includes the existing Fairburn and Auchmore wind farms in the far distance to the west.
Sensitivity	The viewpoint is not located within a nationally or locally designated landscape, however, this location is on a traffic-free section of Sustrans National Cycle Route 1 and the John o'Groats Trail; a promoted long distance walking route from Inverness to John o'Groats. The value of the viewpoint is therefore considered to be High. The view would be experienced by recreational users (walkers and cyclists) on a traffic-free route whose attention is likely to be focused on

Figure 6.39a-e	**Viewpoint 22: A9 Kessock Bridge** (The assessment takes account of a 90° FoV from this location as illustrated).	
	surrounding landscape features, indicating a High susceptibility to change. Consequently, the sensitivity of recreational users is assessed as *High*. The viewpoint is also considered representative of road users travelling on the A9, whose attention or interest is likely to be focused on the road ahead reflecting a Medium susceptibility to change. The sensitivity of road users on the A9 is assessed as *Medium.*	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible in clear conditions on distant hills to the west along the expansive Beauly Firth affecting approximately 6° of the horizontal FoV at 21,612m distance. The turbines would be visible in oblique views from the road between structural elements of the bridge and typically at speed in views for northbound travellers in vehicles. The turbines would be partly backclothed by hills, although most of the turbines would be visible against the sky. Due to the panoramic views, intervening distance, narrow FoV, human development in the view and the large scale of the receiving landscape, the turbines would appear well accommodated within the view. Ground-based infrastructure would not be visible in this location. The magnitude of change would be *Low-Very Low*. *Aviation warning lights on T2, T3, T7, T14 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in clear conditions. The magnitude of change would range from *Zero to Low-Very Low*.	
Assessment	**Sensitivity**	High / Medium
	Magnitude	Low-Very Low
	Level of Effect	**Moderate to Minor / Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and negative
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Farirburn would be partially visible in the same view as the proposed development as hubs and blades at ~24km distance (Very Low magnitude) and Auchmore would also be in the same view at ~ 19km (Very Low magnitude). Dunmaglass and Aberarder are also visible to the south in good conditions at ~ 26km distance (both Very Low magnitude), and Farr, Glen Kyllachy and Moy are also partially visible to the southeast at ~18km (Very Low magnitude). **Consented Wind Farms:** *Zero* Blade tips from Corriegarth II would not be discernible in the view (Zero magnitude) **Other Wind Farm Applications:** *Very Low* The scoping Fairburn Extension would be visible adjacent to the proposed development as hubs and blades, partially screened by vegetation (Very Low magnitude). Carn Coire na Muic would be barely perceptible in the view (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Very Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Moderate to Minor / Minor** and Not Significant	
Additional effect:	**Moderate to Minor / Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** Low-Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Moderate to Minor / Minor** and Not Significant	
Additional effect	**Moderate to Minor / Minor** and Not Significant	
	Additional Magnitude: Low-Very Low	**Combined Magnitude:** Low-Very Low
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.40a-c	**Viewpoint 23: A96, Alturlie Junction** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at the Alturlie junction along the A96 westbound. The view is orientated west and views along and across the Moray Firth towards the distant shoreline and low-lying hills. Kessock Bridge is a main focal point in the view and is visible in glimpsed views in this section of

Figure 6.40a-c	**Viewpoint 23: A96, Alturlie Junction** (The assessment takes account of a 90° FoV from this location as illustrated).	
	the A96 alongside roadside scrub, signage and telegraph poles. The Moray Firth and wooded shorelines with forested slopes of Ord Hill are also focal features in the view.	
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape indicating a Medium value. The view would be experienced by road users whose attention or interest is likely to be focused on the road ahead and susceptibility to change is assessed as Medium. The sensitivity is assessed as *Medium.*	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible on the distant skyline beyond the Kessock Bridge affecting approximately 5° of the horizontal FoV at 26,546m distance. Half of the turbines would be visible against the sky and half backclothed by landform and would be visible only in very clear conditions. The view would be fleeting as vehicles travel westbound along the A96 or turn at the junction. Ground-based infrastructure would not be visible from this location due to intervening distance. The magnitude of change would *Very Low*. *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in clear conditions. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	Medium
	Magnitude	Very Low
	Level of Effect	**Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Auchmore would be in the same view as the proposed turbines at ~ 24km (Very Low magnitude). Other existing wind farms would be theoretically visible in clear conditions to the northwest at over 28km subject to intermittent screening (Very Low to zero magnitude). **Consented Wind Farms:** *Zero* Blade tips from Strathrory would not be discernible in the view (Zero magnitude). **Other Wind Farm Applications:** *Very Low* The scoping Fairburn Extension would be visible adjacent to the proposed development as hubs and blades, partially screened by vegetation (Very Low magnitude). Carn Coire na Muic would be barely perceptible in the view (Very Low to Zero magnitude). The overall cumulative magnitude of change for other wind farms would be *Very Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect: Additional effect:	**Minor** and Not Significant **Minor** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect Additional effect	**Minor** and Not Significant **Minor** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Type of Effect	Long term (reversible), direct, cumulative and neutral	

Figure 6.41a-d	**Viewpoint 24: Cnoc Fyrish** (The assessment takes account of a 180° FoV from this location as illustrated).
Description	This viewpoint is located at Cnoc Fyrish, next to the Fyrish monument, at an altitude of 451m AOD. The primary views from this location are south / southeast towards the Cromarty Firth, Black Isle and Moray Firth beyond which is a recognised viewpoint. The view towards the proposed development is orientated southwest towards the western shoreline of Cromarty Firth and the low-lying agricultural fields interspersed with coniferous forest plantations. The view in this direction is backdropped by distant summits and peaks. Scattered settlement is visible around the

Figure 6.41a-d	**Viewpoint 24: Cnoc Fyrish** (The assessment takes account of a 180° FoV from this location as illustrated).	
	Firth and rigs and piers are visible focal points. Other human development includes scattered farm buildings, pylons and overhead lines, post and wire fencing and wind turbines.	
Sensitivity	The viewpoint is promoted as a recognised viewpoint on OS maps. As a tourist destination, the value of the viewpoint is assessed as High. The view would be experienced by walkers whose attention or interest is likely to be focused on the landscape. Therefore, susceptibility to change is considered to be High and the overall sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible partly on the skyline affecting approximately 9° of the horizontal FoV at 27,281m distance. The turbines would appear on the distant hills in very clear conditions, beyond the forestry in the middle distance. The turbines would be partially backclothed by hills such that mainly blades and a small number of hubs break the skyline. The wind farm would be experienced as part of a 360° view from the hill summit. The proposed development would not appear incongruous in this contemporary rural view and would be reasonably well accommodated in the large-scale landscape of this view. Ground based infrastructure would be discernible at this distance. The magnitude of change would *Very Low*. *Aviation warning lights on T2, T3, T7, T14, T17 and T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in very clear conditions. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	High
	Magnitude	Very Low
	Level of Effect	**Minor** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* There are many clusters of existing wind farms partially visible to the southeast to the southwest. Farirburn which would be visible adjacent to the proposed development at ~25km distance (Very Low magnitude) and Auchmore to the south at ~ 24km (Very Low magnitude). Others would be visible in clear or exceptional conditions at over 38km (Very Low to Zero magnitude). **Consented Wind Farms:** *Medium* Strathrory would be visible to the northeast (Medium magnitude). Several other consented wind farms would be visible to the south and southwest at over 44km in clear or exceptional conditions (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Medium* Abhainn Dubh would be visible to the west at ~6.5km distance (Medium magnitude). The scoping Fairburn Extension would be visible slightly overlapping the proposed development (Very Low magnitude). Other application wind farms would be partially visible in clear or exceptional conditions to the southwest and southeast at over ~45km (Very Low to Zero magnitude). The cumulative magnitude of change for other wind farms would be *Medium.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect: Additional effect:	**Major** and Significant (due to Strathrory and not the proposed development) **Minor** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Medium
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect Additional effect	**Major** and Significant (due to Strathrory and Abhainn Dubh and not the proposed development) **Minor** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Medium
Type of Effect	Long term (reversible), direct, cumulative and negative.	

Figure 6.42a-c	**Viewpoint 25: B817, Alness** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at on the B817 to the southwestern edge of Alness. The view is orientated southwest and looks along the B817 and across near and middle-distance agricultural

Figure 6.42a-c	**Viewpoint 25: B817, Alness** (The assessment takes account of a 90° FoV from this location as illustrated).	
	fields towards Cromarty Firth and the low-lying hills on the Black Isle beyond. The western shoreline of Alness Bay forms a noticeable feature in the middle to far distance. Roadside furniture, telegraph poles and road surfaces, give way to agricultural fields interspersed with trees, woodland and distant coniferous forest.	
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape area, although the Sustrans Cycle Route 1 and John o'Groats Trail follow the road indicating a High value. The view would be experienced by road users whose attention or interest is likely to be focused on the road ahead and recreational cyclists whose attention or interest is likely to be focused on the landscape features around them and susceptibility to change is assessed as High. The sensitivity is assessed as *High* (recreational cyclists) to *Medium* (other road users).	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be theoretically visible on the skyline on the distant hills affecting approximately 8° of the horizontal FoV at 29,147m distance. The turbines would mostly appear against the sky with a small number of turbines backclothed by landform and visible in very clear conditions. The view would be fleeting as vehicles travel westbound along the B817. Ground-based infrastructure would not be visible from this location due to intervening distance. The magnitude of change would *Very Low*. *Aviation warning lights on T2, T3, T7, T14 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in very clear conditions. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	High / Medium
	Magnitude	Very Low
	Level of Effect	**Minor / Negligible** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Auchmore would be visible in clear conditions at ~ 26km (Very Low magnitude). Other existing windfarms theoretically visible would not be discernible in the view due to distance and/or partial blade or tip visibility (Zero magnitude). **Consented Wind Farms:** *Very Low to Zero* Bhlaraidh Extension and Chrathaich would be partially at over 47km in clear or exceptional conditions (Very Low to Zero magnitude). **Other Wind Farm Applications:** *Very Low* Abhainn Dubh would be theoretically visible in heavily filtered views to the west (Zero magnitude). Loch Liath would be partly visible to the southwest in clear or exceptional conditions at over 44km (Very Low to Zero magnitude). The scoping Fairburn Extension would be partially visible slightly overlapping the proposed development (Very Low magnitude). The cumulative magnitude of change for other wind farms would be *Very Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect: Additional effect:	**Minor / Negligible** and Not Significant **Minor / Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect Additional effect	**Minor / Negligible** and Not Significant **Minor / Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Type of Effect	Long term (reversible), direct, cumulative and neutral	

Figure 6.43a-c	**Viewpoint 26: Chanonry Point** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located on the western side of a signposted parking area with interpretation boards at Chanonry Point, southeast of Fortrose, in the Cromarty Sutors, Rosemarkie and Fort

Figure 6.43a-c	**Viewpoint 26: Chanonry Point** (The assessment takes account of a 90° FoV from this location as illustrated).	
	George SLA. The view in the direction of the proposed development is orientated west / southwest and looks along the Moray Firth shoreline towards Avoch Bay and forested hills of Craigiehowe in the middle to far distance, and in very clear conditions, Kessock Bridge and the northeastern edge of Inverness. The distant skyline is formed from hills flanking the Moray and Beauly Firths including hills at Drummoss Muir and The Aird to the southwest and distant hills around Gen Orrin beyond Graigiehowe to the west. The settlement of Avoch and other scattered settlement are visible along the coastline alongside other near distance human development features. The existing Fairburn Wind Farm is visible in very clear conditions.	
Sensitivity	The viewpoint is located within the locally designated Cromarty Sutors, Rosemarkie and Fort George SLA at a promoted parking area with interpretation boards. The value of the viewpoint is therefore assessed as High. The view would be experienced by tourists and visitors to Chanonry Point whose main attention or interest is likely to be on landscape features and surroundings, indicating a High susceptibility to change. Consequently, the sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be visible in very clear or exceptional conditions at hub height, mostly backclothed by distant hills affecting approximately 4° of the horizontal FoV at 31,015m distance. Ground-based infrastructure would not be visible in this location. The magnitude of change would *Very Low*. *Aviation warning lights on T2, T3, T7, T14 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in very clear conditions. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	High
	Magnitude	Very Low
	Level of Effect	**Minor to Negligible** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Fairburn would be visible in the same view as the proposed turbines at ~32km to the west (Very Low magnitude), and Aberarder, Dunmaglass, Farr, Glen Kyllachy and Corriegarth would be visible to the south at over 35km (all Very Low magnitude). **Consented Wind Farms:** *Zero* Blades and tips of Corrigarth II and Dell are unlikely to be discernible in the view (Zero magnitude). **Other Wind Farm Applications:** *Very Low* Blade and tips would be visible of the scoping Fairburn Extension (Very Low magnitude). The cumulative magnitude of change for other wind farms would be *Very Low*.	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect: Additional effect:	**Minor to Negligible** and Not Significant **Minor to Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect Additional effect	**Minor to Negligible** and Not Significant **Minor to Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Type of Effect	Long term (reversible), direct, cumulative and neutral	

Figure 6.44a-c	**Viewpoint 27: Invergordon** (The assessment takes account of a 90° FoV from this location as illustrated).
Description	This viewpoint is located at a car park and viewing location on the northern shoreline of the Cromarty Firth to the southwest of the settlement of Invergordon. The view is orientated southwest and views along the sweeping northern shoreline towards Cromarty Bridge and across the Firth

Figure 6.44a-c	**Viewpoint 27: Invergordon** (The assessment takes account of a 90° FoV from this location as illustrated).	
	towards the Black Isle shoreline. Human development in the view includes scattered settlement, agricultural fields and coniferous forestry. Invergordon Harbour is visible to the left of the view.	
Sensitivity	The viewpoint is not located within a locally or nationally designated landscape, however, it is a location where people are encouraged to enjoy the view with the provision of benches indicating a High value. The view would be experienced by visitors or residents to the shoreline whose attention or interest is likely to be focused on the surrounding views and landscape features and susceptibility to change is assessed as High. The sensitivity is assessed as *High*.	
Magnitude of Change (proposed development only)	**Whilst in Operation:** All of the proposed turbines would be visible in very clear conditions mostly at hub height, and partly on the skyline affecting approximately 6° of the horizontal FoV at 32,858m distance. Ground-based infrastructure would not be visible in this location. The magnitude of change would *Very Low*. *Aviation warning lights on T3, T14, T17, T20 would be visible.* **Whilst Under Construction and Decommissioning:** Cranes would be visible during the construction / decommissioning periods in very clear conditions. The magnitude of change would range from *Zero to Very Low*.	
Assessment	**Sensitivity**	High
	Magnitude	Very Low
	Level of Effect	**Negligible** and Not Significant
	Type of Effect	Long term (reversible), direct and neutral
Cumulative Assessment: Existing + Consented + Application wind farms and the proposed development (The assessment takes account of a 360° FoV from this location).		
Cumulative Magnitude	**Existing Wind Farms:** *Very Low* Fairburn would be partially visible in the same view as the proposed turbines at ~31km to the southwest (Very Low magnitude). Novar would be partly visible to the northwest as hubs or blades at over 34km (Very Low to Zero magnitude). **Consented Wind Farms:** *Zero* There would be no consented wind farms visible from this location. **Other Wind Farm Applications:** *Low* Abhainn Dubh would be visible to the west at ~15km (Low magnitude), Fairburn Extension (scoping) would slightly overlap with the proposed turbines (Very Low magnitude). The cumulative magnitude of change for other wind farms would be *Low.*	
Scenario 1: (Cumulative effect of proposed development + other existing + consented wind farms)		
Combined effect:	**Negligible** and Not Significant	
Additional effect:	**Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Very Low
Scenario 2: (Cumulative effect of proposed development + existing and consented wind farms + applications)		
Combined effect	**Moderate** and Not Significant (due to Abhainn Dubh)	
Additional effect	**Negligible** and Not Significant	
	Additional Magnitude: Very Low	**Combined Magnitude:** Low
Type of Effect	Long term (reversible), direct, cumulative and neutral	

Key

- Lines indicating the distance from the proposed turbines
- Access Tracks
- Substation
- Battery Storage
- Construction Compound

Lighting Strategy

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Air Navigation Order (ANO) visible red lighting

Note: All proposed turbines would have MOD Infra-Red Lighting which would be visible to aircraft, and not visible to the general public.

0 250 500 750 1,000 1,250 1,500 1,750 m

Scale at A3: 1:30,000

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Figure 6.3.A
Lighting Strategy Plan

June 2025

wsp

Figure 6.3.A Strategy UK0037662.3719-WSPE-FG-SA-00063_R1.mxd Originator: UKCGW775

Figure 6.3.A Strategy UK0037662.3719-WSPE-FG-SA-00063_R1

220000 225000 230000 235000 240000 245000 250000 255000 260000 265000

865000 860000 855000 850000 845000 840000 835000 830000

N

ALNESS
Evanton
Garve
DINGWALL
Culbokie
Strathpeffer
Mount Eagle
Contin
Maryburgh
CONON BRIDGE
Tore
Marybank
MUIR OF ORD
North Kessock
BEAULY
Kirkhill
INVERNESS
Kiltarlity
5km
10km
Dores
Cannich
15km
Drumnadrochit
20km

Key

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Night-time Landscape and Visual Study Area (20km)
- Lines indicating the distance from the proposed turbines
- Visible Light

Source: The Applicant acknowledges the use of imagery provided by services from NASA's Global Imagery Browse Services (GIBS), part of NASA's Earth Observing System Data and Information System (EOSDIS).

0 1 2 3 4 5 6 7 8 9 10 km

Scale at A3: 1:160,000

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Figure 6.3.B
Baseline Satellite Image

June 2025

Figure 6.3.B Satellite UK0037662.3719-WSPE-FG-SA-00064_R1.mxd Originator: UKCGW775

220000 225000 230000 235000 240000 245000 250000 255000 260000 265000

865000 860000 855000 850000 845000 840000 835000 830000

N

N9

N8

N15

5km

10km

15km

20km

Key

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Night-time Landscape and Visual Study Area (20km)
- Lines indicating the distance from the proposed turbines
- Night-time Viewpoint Locations

N8) Kiltarlity
N9) A835, Contin
N15) Meall a 'Mhadaibh

- 1-2 nacelles may be theoretically visible
- 3-4 nacelles may be theoretically visible
- 5-6 nacelles may be theoretically visible

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 9 10 km

Scale at A3: 1:160,000

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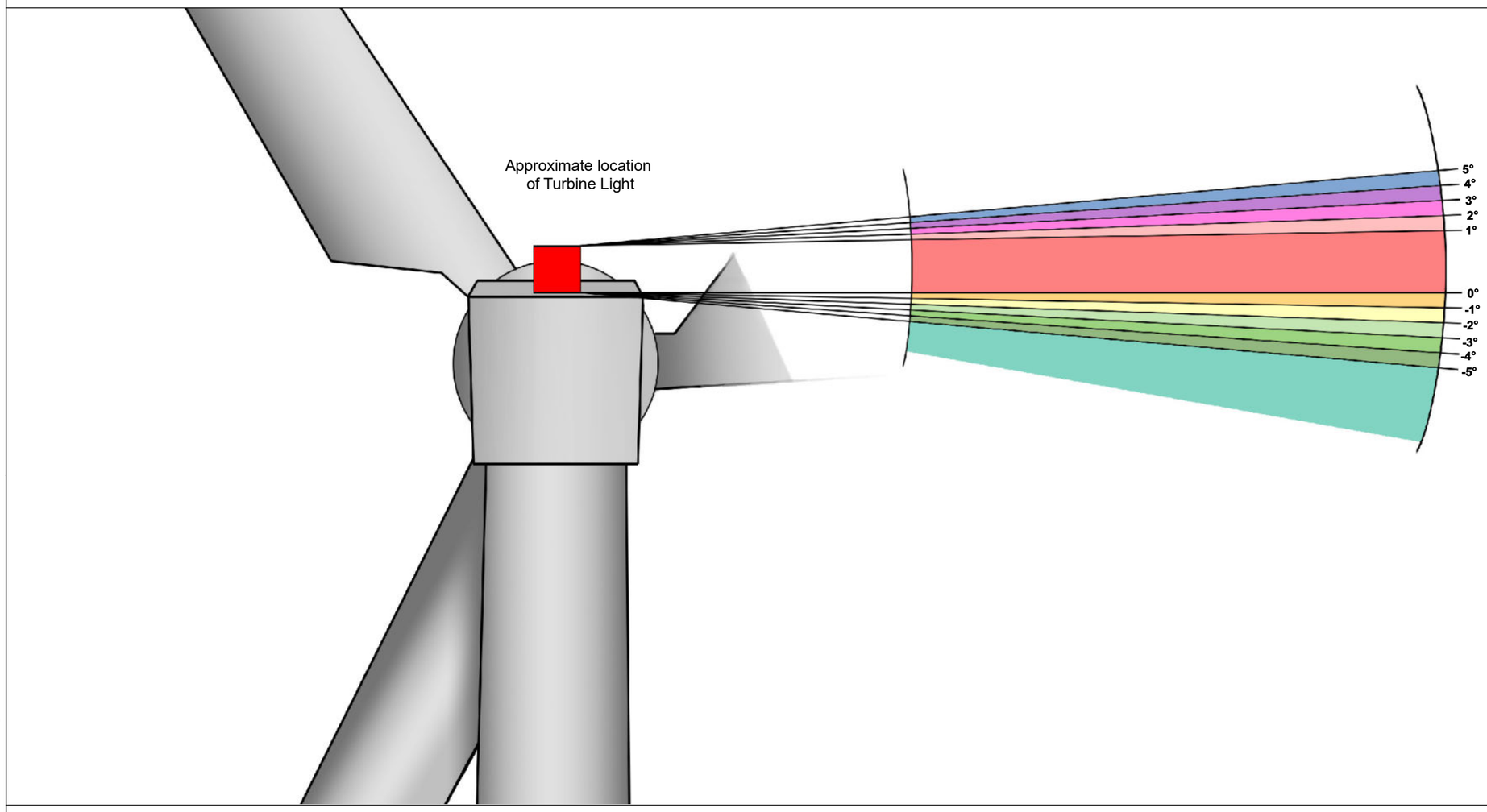
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Ballach Wind Farm
EIA Report

Figure 6.3.C
Nacelle Lights Zone of Theoretical Visibility with Night-time Viewpoints

June 2025

Figure 6.3.C ZTV UK0037662.3719-WSPE-FG-SA-00065_R1.mxd Originator: UKCGW775



Key

Intensity of Turbine Light shown in Candelas (cd)

Vertical Angle of Lighting from Nacelle	Maximum and Minimum Luminous Intensity (Candela / cd.)	10% of Maximum and Minimum Luminous Intensity (Candela / cd.)
Above 5°	147 to 34	15 to 3
4° to 5°	247 to 134	25 to 13
3° to 4°	481 to 237	48 to 24
2° to 3°	1160 to 481	116 to 48
1° to 2°	2119 to 1170	212 to 117
0° to 1°	2206 to 1968	221 to 197
-1° to 0°	2036 to 987	204 to 99
-2° to -1°	996 to 383	100 to 38
-3° to -2°	394 to 197	39 to 20
-4° to -3°	199 to 131	20 to 13
-5° to -4°	131 to 92	13 to 9
Below -5°	94 to 38	9 to 4

Source: CEL-WT-MIC Light Specification as noted in Aviation Lighting and Mitigation Report for Ballach Wind Farm V1.1 - https://www.contarnex.com/led-obstruction-lighting/datasheets/CEL-WT-MIC%20-%20rev1.pdf

Notes:
1. Reduced intensity turbine lighting (200cd) based on 'Air Navigation Order 2016 (CAP393) Article 223 (8)' which allows the 2000cd turbine light to be 'reduced to not less than 10% of the minimum peak intensity specified' i.e. 200cd 'if visibility in all directions from every wind turbine generator in a group is more than 5km'.

2. The lighting intensity for each of the vertical angles shown is based on information provided by an aviation warning light bulb manufacturer.

3. Perception of theoretical candela intensity does not take account of distance.

4. ZTV calculations do not take into account surface features such as forestry or buildings.

5. ZTV calculations for turbine lighting intensity based on visible aviation lighting mounted on the turbine hub.

6. The ZTV calculates the degree of vertical angle from the study area shown to each of the Proposed Development turbines.

7. ZTV calculations represent a worst case situation where predicted lighting intensity may be as a result of only one turbine in the layout.

8. No landform within the study area is above 5 degrees from the height of the turbine lighting.

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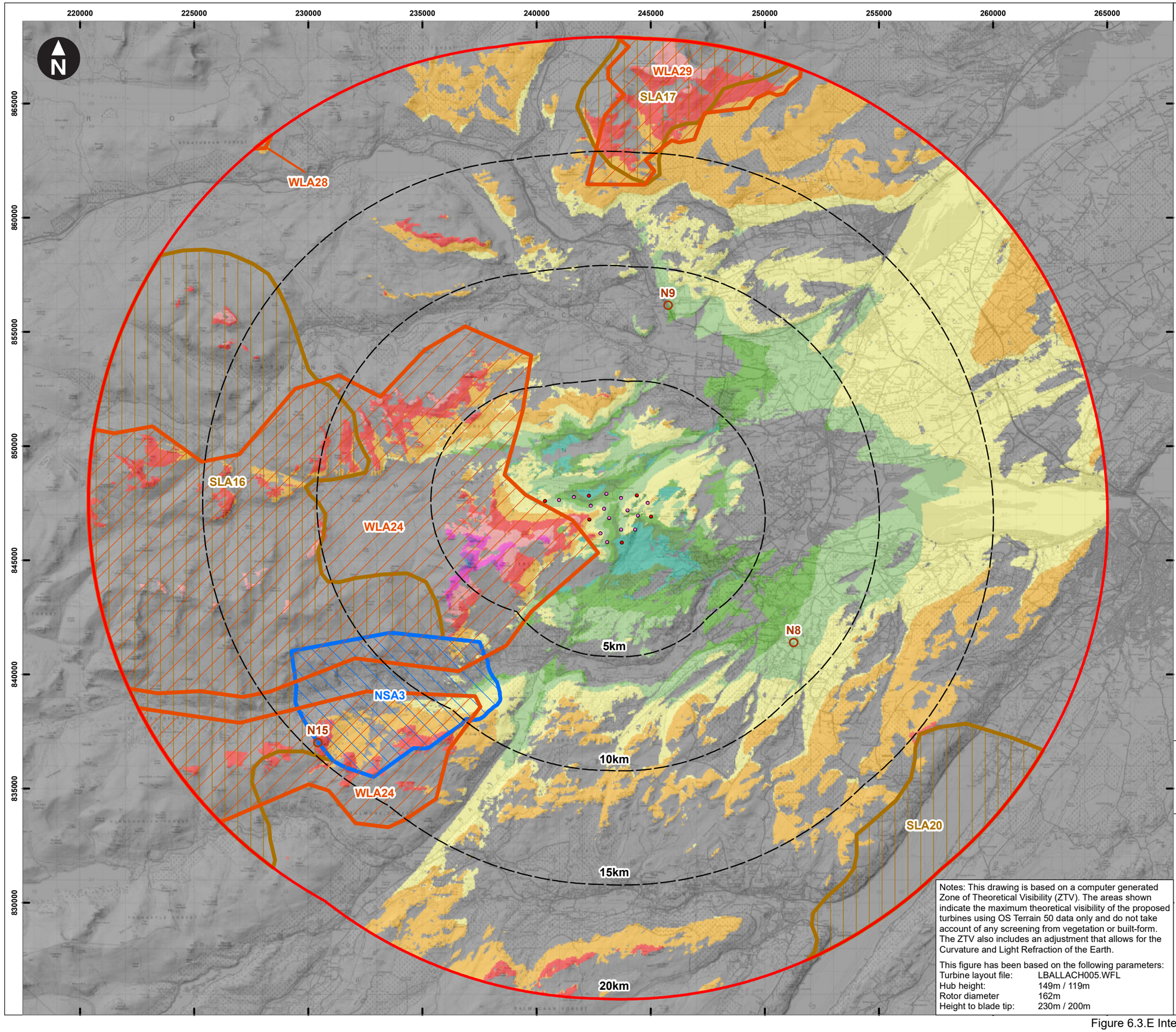
Ballach Wind Farm
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Figure 6.3.D
Turbine Lighting Intensity

wsp

June 2025

Figure 6.3.D Turbine UK0037662.3719-WSPE-FG-SA-00066_R1.mxd Originator: UKCGW775



Key

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Night-time Landscape and Visual Study Area (20km)
- Lines indicating the distance from the proposed turbines
- Night-time Viewpoint Locations

N8) Kiltarlity
N9) A835, Contin
N15) Meall a 'Mhadaibh

Intensity of Turbine Light shown in Candelas (cd)

Vertical Angle of Lighting from Nacelle	Maximum and Minimum Luminous Intensity (Candela / cd.)	10% of Maximum and Minimum Luminous Intensity (Candela / cd.)
The luminous intensity above 5° of the vertical angle would decrease as noted in Figure 6.3.D.		
4° to 5°	247 to 134	25 to 13
3° to 4°	481 to 237	48 to 24
2° to 3°	1160 to 481	116 to 48
1° to 2°	2119 to 1170	212 to 117
0° to 1°	2206 to 1968	221 to 197
-1° to 0°	2036 to 987	204 to 99
-2° to -1°	996 to 383	100 to 38
-3° to -2°	394 to 197	39 to 20
-4° to -3°	199 to 131	20 to 13
-5° to -4°	131 to 92	13 to 9
Below -5°	94 to 38	9 to 4

Source: CEL-WT-MIC Light Specification as noted in Aviation Lighting and Mitigation Report for Ballach Wind Farm V1.1 - https://www.contarnex.com/led-obstruction-lighting/datasheets/CEL-WT-MIC%20-%20rev1.pdf

Wild Land Areas

WLA24) Central Highlands
WLA28) Fisherfield - Letterewe - Fannichs
WLA29) Rhiddoroch - Beinn Dearg - Ben Wyvis

National Scenic Areas

NSA3) Glen Strathfarrar

Special Landscape Areas

SLA16) Strathconon, Monar and Mullardoch
SLA17) Ben Wyvis
SLA20) Loch Ness and Duntelchaig

0 1 2 3 4 5 6 7 8 9 10 km

Scale at A3: 1:160,000

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Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

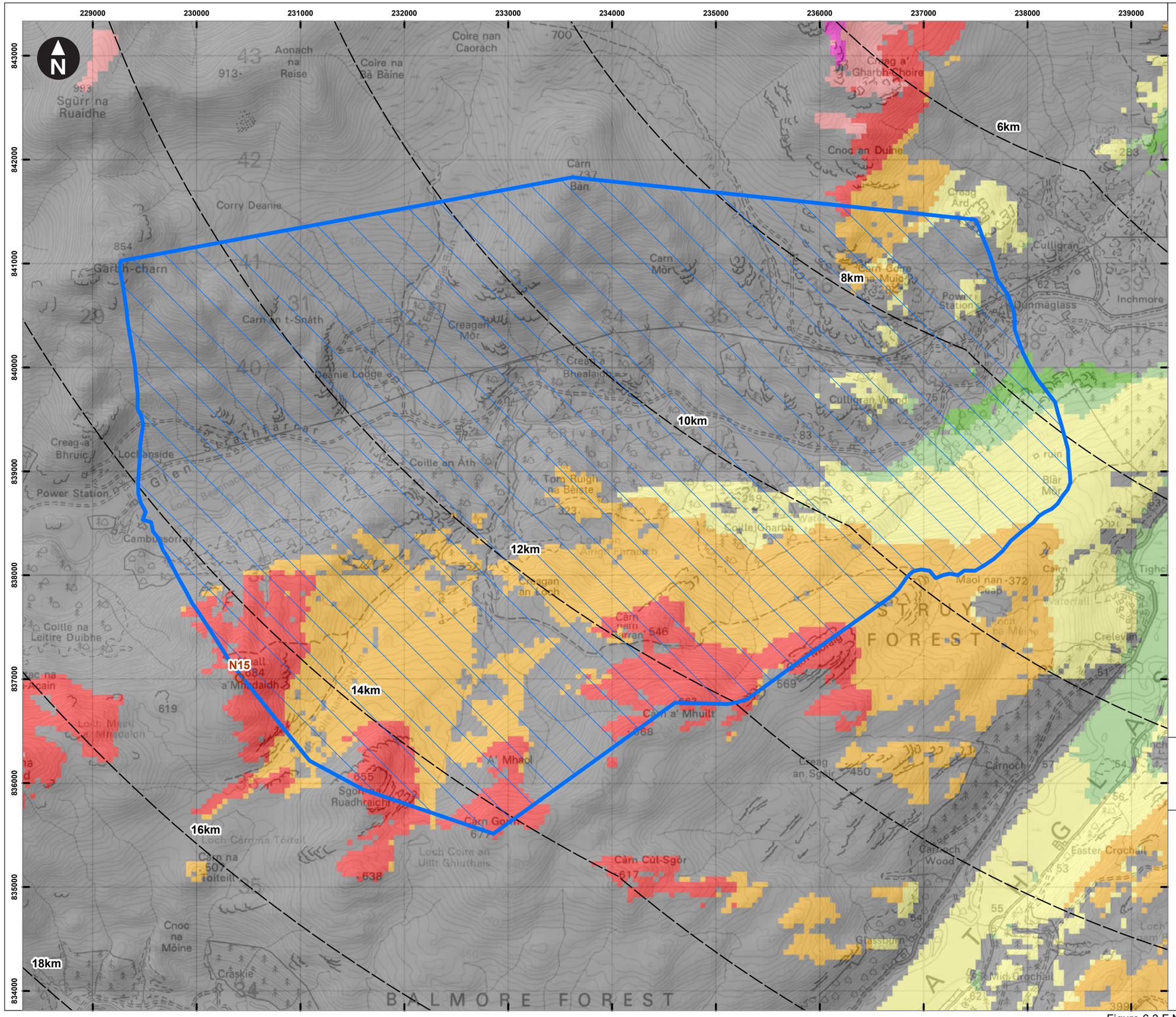
Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

Figure 6.3.E
Lighting Intensity Zone of Theoretical Visibility with Landscape Designations

wsp

June 2025

Figure 6.3.E Intensity UK0037662.3719-WSPE-FG-SA-00067_R3.mxd Originator: UKCGW775



Key

Lines indicating the distance from the proposed turbines

Night-time Viewpoint N15: Meall a 'Mhadaibh

National Scenic Area 3: Glen Strathfarrar

Intensity of Turbine Light shown in Candelas (cd)

Vertical Angle of Lighting from Nacelle	Maximum and Minimum Luminous Intensity (Candela / cd.)	10% of Maximum and Minimum Luminous Intensity (Candela / cd.)
The luminous intensity between 5° and 90° of the vertical angle would decrease as noted in Figure 6.3.D.		
4° to 5°	247 to 134	25 to 13
3° to 4°	481 to 237	48 to 24
2° to 3°	1160 to 481	116 to 48
1° to 2°	2119 to 1170	212 to 117
0° to 1°	2206 to 1968	221 to 197
-1° to 0°	2036 to 987	204 to 99
-2° to -1°	996 to 383	100 to 38
-3° to -2°	394 to 197	39 to 20
-4° to -3°	199 to 131	20 to 13
-5° to -4°	131 to 92	13 to 9
Below -5°	94 to 38	9 to 4

Source: CEL-WT-MIC Light Specification as noted in Aviation Lighting and Mitigation Report for Ballach Wind Farm V1.1 - https://www.contarnex.com/led-obstruction-lighting/datasheets/CEL-WT-MIC%20-%20rev1.pdf

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 0.25 0.5 0.75 1 1.25 1.5 1.75 2 km

Scale at A3: 1:35,000

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Client

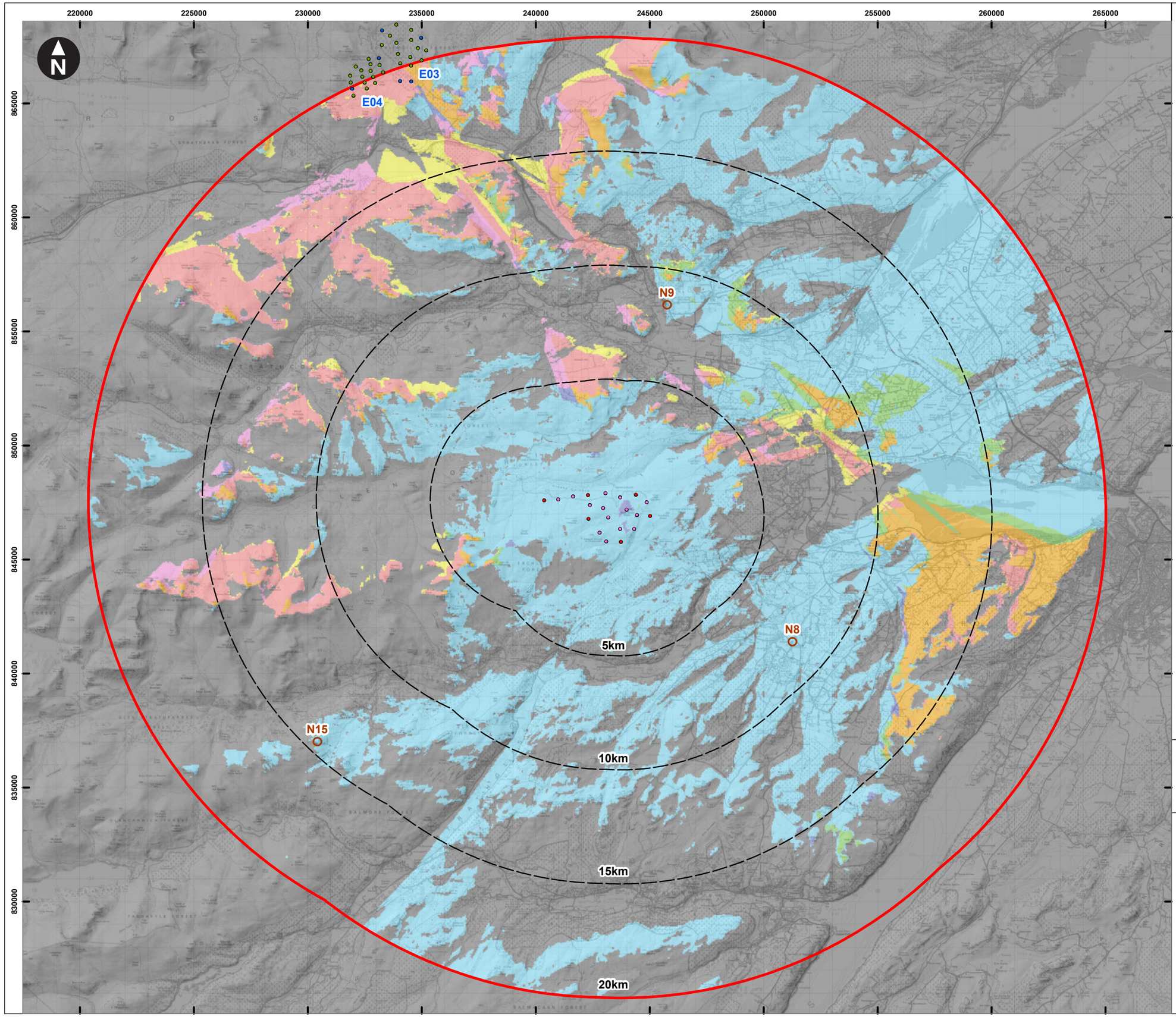
EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.F
Glen Strathfarrar NSA with Lighting Intensity Zone of Theoretical Visibility

June 2025

Figure 6.3.F NSA UK0037662.3719-WSPE-FG-SA-00068_R1.mxd Originator: UKCGW775



Key

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Night-time Landscape and Visual Study Area (20km)
- Lines indicating the distance from the proposed turbines
- Night-time Viewpoint Locations

N8) Kiltarlity N9) A835, Contin N15) Meall a 'Mhadaibh

- Lit Existing Wind Farms

E03) Corriemoillie (four turbines lit)
E04) Lochluichart (two turbines lit)

- Unlit turbines in above wind farms
- Ballach Wind Farm may be theoretically visible
- Corriemoillie Wind Farm may be theoretically visible
- Lochluichart Wind Farm may be theoretically visible
- Ballach and Corriemoillie wind farms may be theoretically visible
- Ballach and Lochluichart wind farms may be theoretically visible
- Corriemoillie and Lochluichart wind farms may be theoretically visible
- Ballach, Corriemoillie and Lochluichart wind farms may be theoretically visible

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 9 10 km

Scale at A3: 1:160,000

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Client

EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.G
Cumulative Night-time Zone of Theoretical Visibility - Ballach with Existing Wind Farms

June 2025

Figure 6.3.G CZTV1 UK0037662.3719-WSPE-FG-SA-00069_R1.mxd Originator: UKCGW775

220000 225000 230000 235000 240000 245000 250000 255000 260000 265000

865000 860000 855000 850000 845000 840000 835000 830000

N

C01

N9

N8

N15

5km

10km

15km

20km

Key

- Proposed lit turbine locations
- Proposed unlit turbine locations
- Night-time Landscape and Visual Study Area (20km)
- Lines indicating the distance from the proposed turbines
- Night-time Viewpoint Locations

N8) Kiltarlity
N9) A835, Contin
N15) Meall a 'Mhadaibh

- Lit Consented Wind Farms

C01) Kirkan (six turbines proposed to be lit)

- Unlit turbines in above wind farm
- Ballach Wind Farm may be theoretically visible
- Kirkan Wind Farm may be theoretically visible
- Ballach and Kirkan wind farms may be theoretically visible

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 9 10 km

Scale at A3: 1:160,000

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Client

EnergieKontor

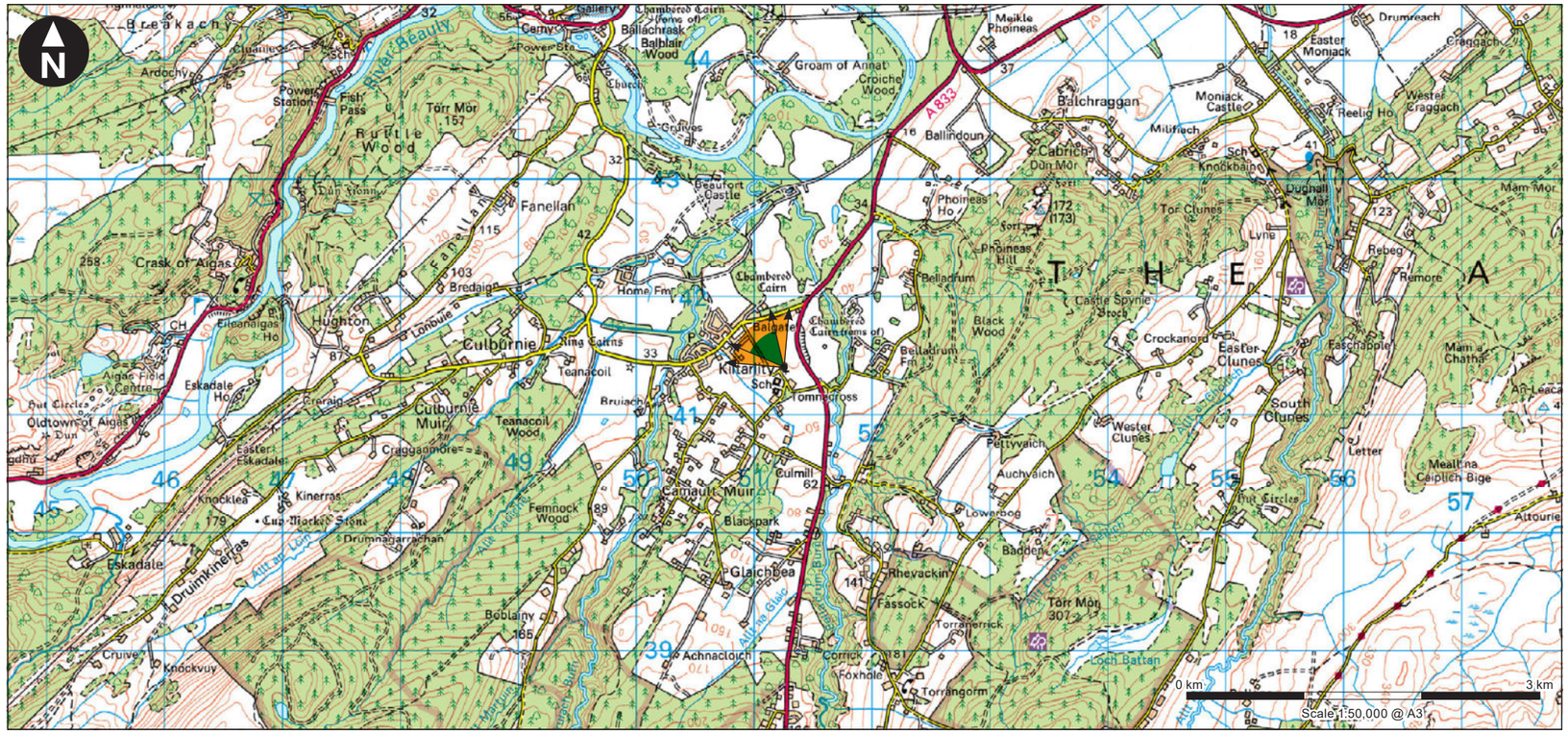
Ballach Wind Farm
EIA Report

Figure 6.3.H
Cumulative Night-time Zone of Theoretical Visibility - Ballach with Consented Wind Farms

wsp

June 2025

Figure 6.3.H CZTV2 UK0037662.3719-WSPE-FG-SA-00070_R1.mxd Originator: UKCGW775


N
Breakach
Ardochy
Power Station
Fish Pass
River Reauly
Torr Mor 157
Rutile Wood
Fanellan
Crask of Aigas
Beaufort Castle
Groam of Annat
Croichel Wood
Balchraggan
Ballindoun
Cabrich
Dun Mor
Moniack Castle
Millfiach
Easter Moniack
Wester Craggach
Knockbain
Duighall Mor
Mam Mor
Tor Clunes
Lyne
Rebeg
Remore
Phoineas Ho
Phoineas Hill
Bellacrum
Home Fm
Chambered Cairn
Balgate
Culburnie
Ring Cairns
Teanacoil
Kilarrity Sch
Tomnagross
Bruiach
Hughton
Lonbuie
Bredaigh
Eskadale Ho
Aigas Field Centre
Oldtown of Aigas
Culburnie Muirs
Teanacoil Wood
Craggaanmore
Easter Eskadale
Knocklea
Kinerras
Cup-Marked Stone
Drumnagarrachan
Eskadale
Druimkinerras
Allt an Eas Mor
Allt an Eas Beag
Femnock Wood
Camault Muir
Culmill
Blackpark
Glaichbea
Rhevackin
Fassock
Torr Mor 307
Torranerrick
Boblainy
Achnacloich
Cruive
Knockvuy
Foxhole
Corrick
Torrangorm
Loch Battan
Allt Glac Bhuidhe
Allt Coire Mhargaidh
Allt Coire Dhuibh
Allt Coire Fhionnaraich
Allt Coire Ghaidheil
Allt Coire Mhuilinn
Allt Coire Ghuilbinn
Allt Coire Ghuilbinn
Allt Coire Ghuilb



Baseline photograph

This image provides landscape and visual context only

Extent of central 50mm frame used to construct panorama

Extent of 53.5° planar panorama

12 13 20 7 14 19 8 18 11 16 10 6 17 15 5 4 9 2 3 1

Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Lit Ballach Wind Farm | Unlit Ballach Wind Farm

OS reference:	E251 254, N841 406	Horizontal field of view:	90° (cylindrical projection)	Camera:	Sony ILCE-7RM3A
Eye level:	41.5m AOD	Principal distance:	522mm	Lens:	50mm (Sony FE 50mm f/1.2 GM)
Direction of view:	320°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	8,326m	Correct printed image size:	820 x 130mm	Date and time:	19/09/2024 @ 20:10

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Ib
Viewpoint N8:
Kiltarlity

June 2025

Figure 6.3.Ia-d VPN8 Kitarlity UN032768 3719-WSPE-FG-SA-00071_R2 Originator: UKCGW775



Photomontage (200cd)

View flat at a comfortable arm's length

Note: The photomontage provides an impression of the proposed lighting intensity at 200cd and assumes clear visibility from the viewpoint location.
Assuming Angle Intensity Mitigation, the brightest visible nacelle lights (T7) would be no greater than 24cd as per the Lighting Strategy.
Meteorological observations suggest that this is likely to occur for 93% of the time.

OS reference:	E251 254, N841 406	Horizontal field of view:	53.5° (planar projection)	Camera:	Sony ILCE-7RM3A
Eye level:	41.5m AOD	Principal distance:	812.5mm	Lens:	50mm (Sony FE 50mm f/1.2 GM)
Direction of view:	320°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	8,326m	Correct printed image size:	820 x 260mm	Date and time:	19/09/2024 @ 20:10

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.1c
Viewpoint N8:
Kiltarlity

June 2025

wsp

Figure 6.3.1a-VPN8 Kiltarlity UN032766\2.3719-WSPE-FG-SA-00071_R2 Originator: UKCGW775



Photomontage (200cd)

View flat at a comfortable arm's length

Note: The photomontage provides an impression of the proposed lighting intensity at 200cd and assumes clear visibility from the viewpoint location.
Assuming Angle Intensity Mitigation, the brightest visible nacelle lights (T7) would be no greater than 24cd as per the Lighting Strategy.
Meteorological observations suggest that this is likely to occur for 93% of the time.
This 90 degree FoV photomontage is produced in addition to the NatureScot 'Visual Representation of Wind Farms' guidance and illustrates the Proposed Development in its landscape setting.

OS reference:	E251 254, N841 406	Horizontal field of view:	90º (cylindrical projection)	Camera:	Sony ILCE-7RM3A
Eye level:	41.5m AOD	Principal distance:	522mm	Lens:	50mm (Sony FE 50mm f/1.2 GM)
Direction of view:	320º	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	8,326m	Correct printed image size:	820 x 260mm	Date and time:	19/09/2024 @ 20:10

Client: EnergieKontor

Ballach Wind Farm
EIA Report

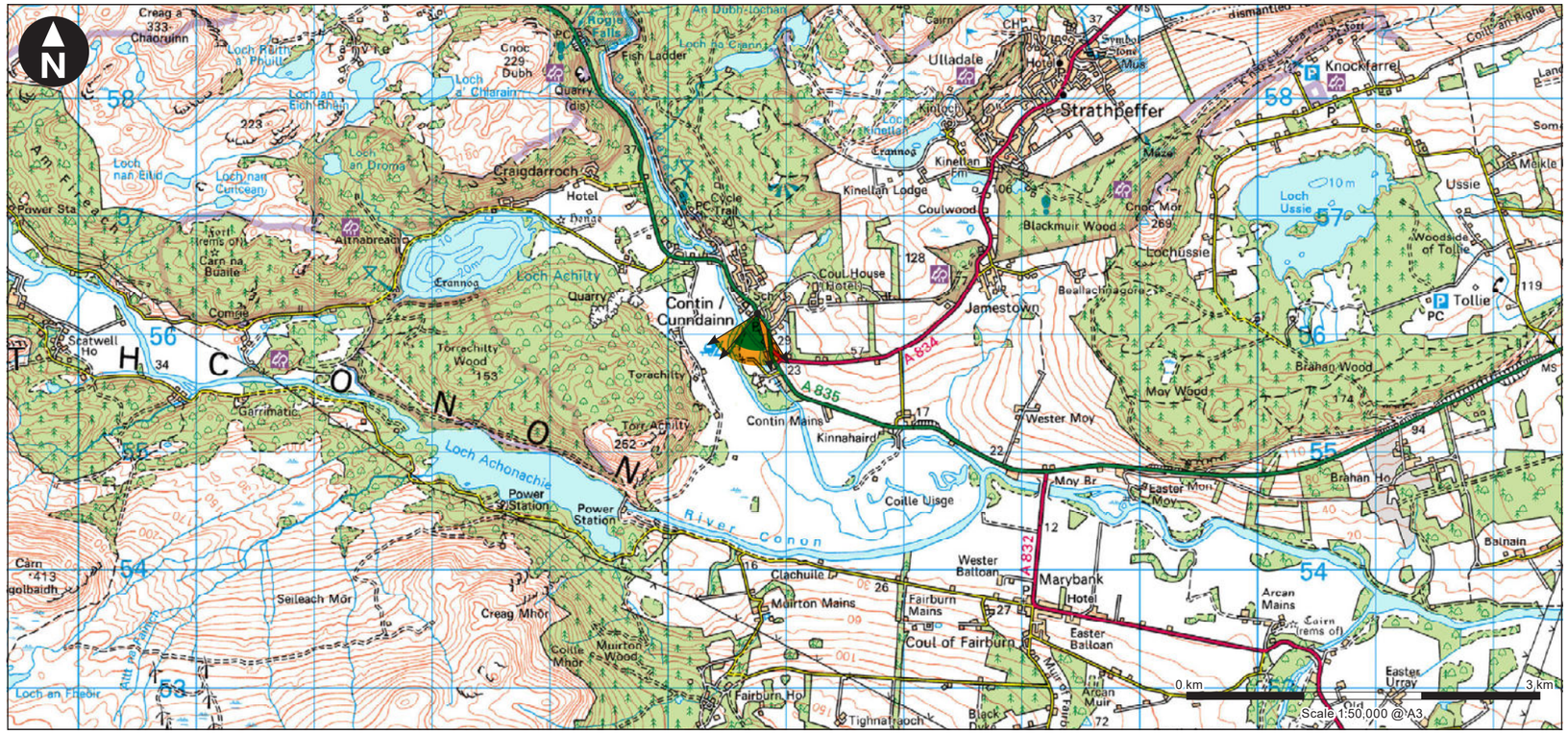
Figure 6.3.Id
Viewpoint N8:
Kiltarlity

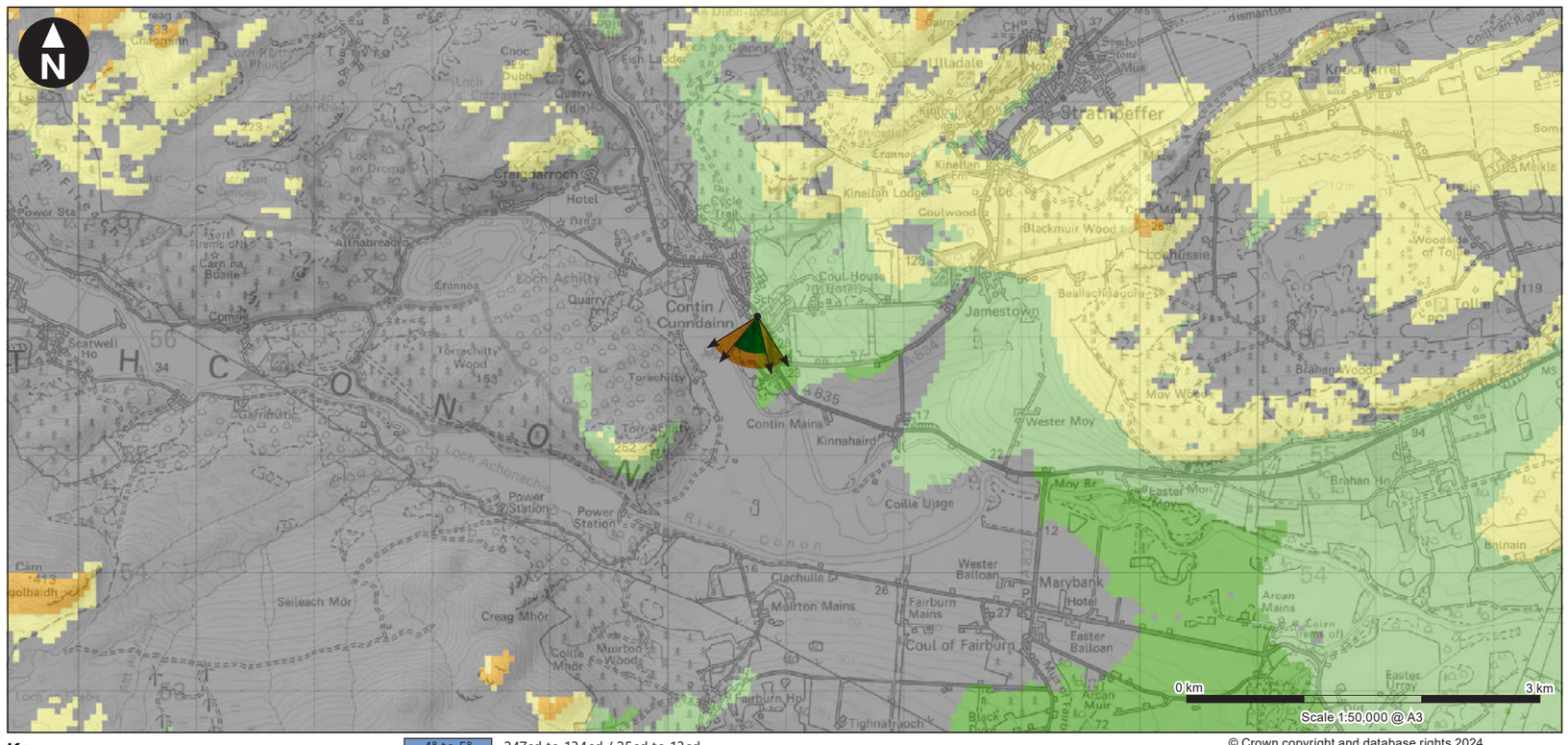
June 2025

wsp

Originator: UKCGW775

Figure 6.3.Ia-VPN8 Kitarlity UN032766E 3719-WSPE-FG-SA-00071_R2





Key

90° horizontal field of view

53.5° horizontal field of view

4° to 5°	247cd to 134cd / 25cd to 13cd
3° to 4°	481cd to 237cd / 48cd to 24cd
2° to 3°	1160cd to 481cd / 116cd to 48cd
1° to 2°	2119cd to 1170cd / 212cd to 117cd
0° to 1°	2206cd to 1968cd / 221cd to 197cd
-1° to 0°	2036cd to 987cd / 204cd to 99cd
-2° to -1°	996cd to 383cd / 100cd to 38cd
-3° to -2°	394cd to 197cd / 39cd to 20cd
-4° to -3°	199cd to 131cd / 20cd to 13cd
-5° to -4°	131cd to 92cd / 13cd to 9cd
Below -5°	94cd to 38cd / 9cd to 4cd

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Ordnance Survey 0100031673

Lit Turbine

Un-Lit Turbine

Viewpoint Parameters

OS reference:	E245 756, N856 178
Ground Level Elevation:	26m AOD
Camera Height:	1.5m AGL
Direction of view to site centre[3]:	196°
Distance to nearest turbine:	8,441m
Number of nacelle lighting units theoretically visible[4]:	1
Date and time of viewpoint photography:	17/09/2024 @ 22:05
Camera:	Sony ILCE-7RM3A
Lens:	50mm (Sony FE 50mm f/1.2 GM)

Information on the limitations of visualisations:

Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:

- A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate;
- A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- To form the best impression of the impacts of the wind farm proposal these images are best viewed at the viewpoint location shown;
- The images must be printed at the right size to be viewed properly (260mm by 820mm);
- You should hold the images flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, you should stand at arm's length from the image presented.
- The ZTV presented here takes no account of the screening effects of vegetation or buildings.

Additional notes:

1. This figure has been based on the following parameters:
Turbine layout file: LBALLACH005.WFL
• Hub height: 149m / 119m
• Rotor diameter: 162m
• Height to blade tip: 230m / 200m

2. Turbine positions could be subject to micro-siting (typically up to 50m).

3. Direction given as bearing relative to Grid North (BNG).

4. The number of turbine blades and hubs theoretically visible is counted from the wireframe in sets of 3 and ignores the screening effects of any intervening objects and forestry.

5. This figure is produced in accordance with SNH Visual Representation of Wind Farms 2017 guidance and also broadly accords with the Landscape Institute's Technical Guidance Note 6/19 (Type 4 Visualisation).

Client

EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Ja
Viewpoint N9:
A835, Contin

June 2025

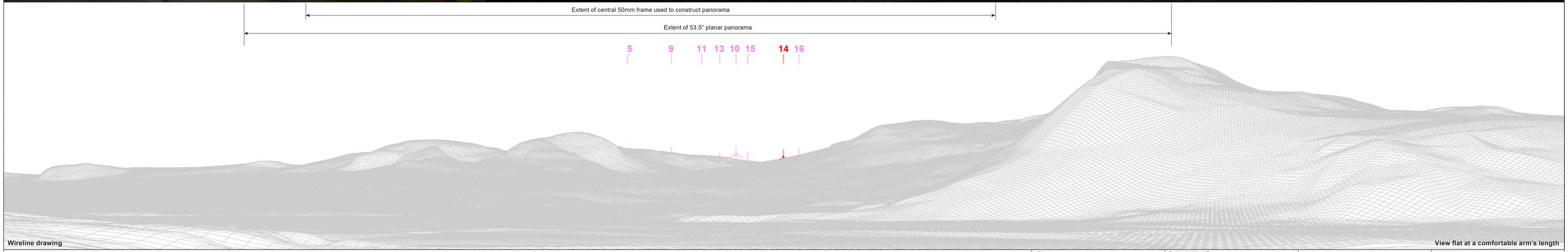
wsp

Figure 6.3.Ja-c VPN9 Contin UK0037662.3719-WSPE-FG-SA-00072_R2 Originator: UKCGW775



Baseline photograph

This image provides landscape and visual context only



Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Lit Ballach Wind Farm | Unlit Ballach Wind Farm

OS reference:	E245 756, N856 178	Horizontal field of view:	90° (cylindrical projection)	Camera:	Sony ILCE-7RM3A
Eye level:	27.5m AOD	Principal distance:	522mm	Lens:	50mm (Sony FE 50mm f/1.2 GM)
Direction of view:	193°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	8,441m	Correct printed image size:	820 x 130mm	Date and time:	17/09/2024 @ 22:05

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Jb
Viewpoint N9:
A835, Contin

June 2025

wsp

Figure 6.3.Jb-c VPN9 Contin UK0037682.3719.WSPE.FIG-SA-0072_R2 Originator: UKCGW775



Photomontage (200cd)

View flat at a comfortable arm's length

Note: No aviation warning lights would be visible due to screening from intervening forestry.
The photomontage provides an impression of the proposed lighting intensity at 200cd and assumes clear visibility from the viewpoint location.
Assuming Angle Intensity Mitigation, the brightest visible nacelle lights (T14) would be no greater than 21cd as per the Lighting Strategy.
Meteorological observations suggest that this is likely to occur for 93% of the time.

OS reference:	E245 756, N856 178	Horizontal field of view:	53.5° (planar projection)	Camera:	Sony ILCE-7RM3A
Eye level:	27.5m AOD	Principal distance:	812.5mm	Lens:	50mm (Sony FE 50mm f/1.2 GM)
Direction of view:	193°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	8,441m	Correct printed image size:	820 x 260mm	Date and time:	17/09/2024 @ 22:05

Client: EnergieKontor

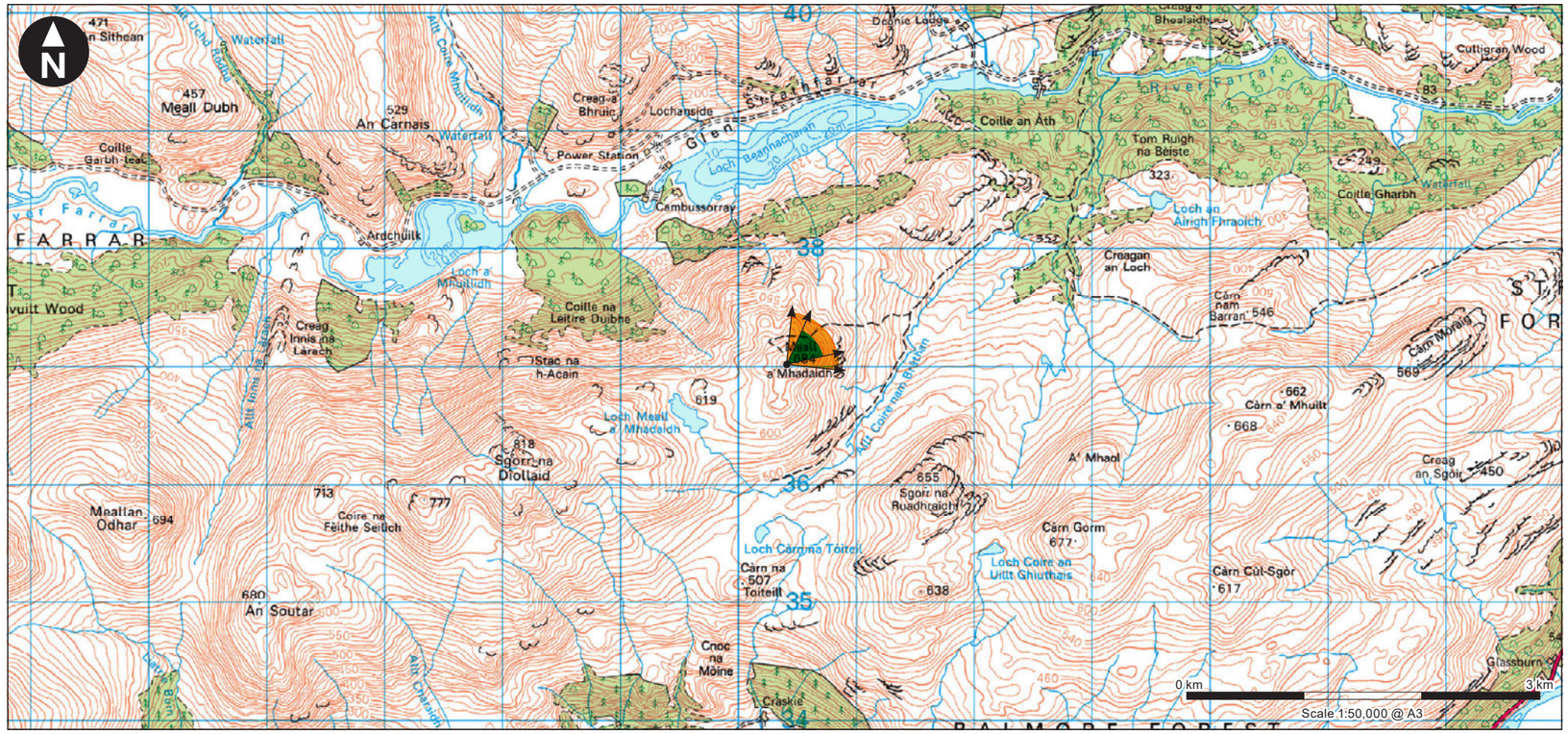
Ballach Wind Farm
EIA Report

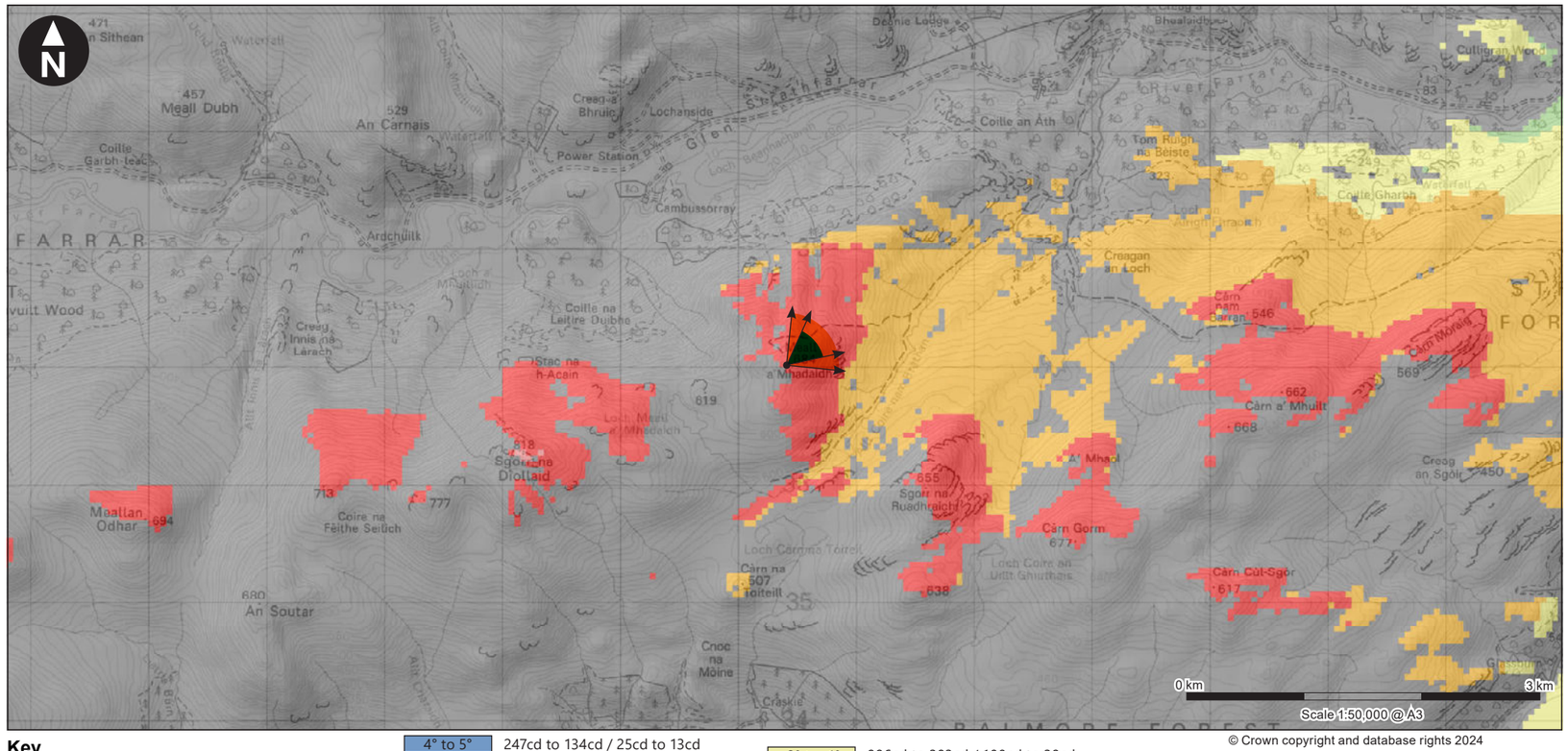
Figure 6.3.Jc
Viewpoint N9:
A835, Contin

June 2025

wsp

Figure 6.3.Jc-VPN9 Contin UK0037682.3719.WSPE.FIG-SA-0072_R2 Originator: UKCGW775





Key

90° horizontal field of view

53.5° horizontal field of view

4° to 5°	247cd to 134cd / 25cd to 13cd
3° to 4°	481cd to 237cd / 48cd to 24cd
2° to 3°	1160cd to 481cd / 116cd to 48cd
1° to 2°	2119cd to 1170cd / 212cd to 117cd
0° to 1°	2206cd to 1968cd / 221cd to 197cd
-1° to 0°	2036cd to 987cd / 204cd to 99cd
-2° to -1°	996cd to 383cd / 100cd to 38cd
-3° to -2°	394cd to 197cd / 39cd to 20cd
-4° to -3°	199cd to 131cd / 20cd to 13cd
-5° to -4°	131cd to 92cd / 13cd to 9cd
Below -5°	94cd to 38cd / 9cd to 4cd

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Ordnance Survey 0100031673

Lit Turbine

Un-Lit Turbine

Viewpoint Parameters

OS reference:	E230 413, N837 020
Ground Level Elevation:	684m AOD
Camera Height:	1.5m AGL
Direction of view to site centre[3]:	52º
Distance to nearest turbine:	14,529m
Number of nacelle lighting units theoretically visible[4]:	4
Date and time of viewpoint photography:	17/09/2024 @ 20:20
Camera:	Sony ILCE-9
Lens:	50mm (Canon 50mm f/1.2)

Information on the limitations of visualisations:

Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:

- A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate;
- A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- To form the best impression of the impacts of the wind farm proposal these images are best viewed at the viewpoint location shown;
- The images must be printed at the right size to be viewed properly (260mm by 820mm);
- You should hold the images flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, you should stand at arm's length from the image presented.
- The ZTV presented here takes no account of the screening effects of vegetation or buildings.

Additional notes:

1. This figure has been based on the following parameters:
Turbine layout file: LBALLACH005.WFL
• Hub height: 149m / 119m
• Rotor diameter: 162m
• Height to blade tip: 230m / 200m

2. Turbine positions could be subject to micro-siting (typically up to 50m).

3. Direction given as bearing relative to Grid North (BNG).

4. The number of turbine blades and hubs theoretically visible is counted from the wireframe in sets of 3 and ignores the screening effects of any intervening objects and forestry.

5. This figure is produced in accordance with SNH Visual Representation of Wind Farms 2017 guidance and also broadly accords with the Landscape Institute's Technical Guidance Note 6/19 (Type 4 Visualisation).

Client

EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Ka
Viewpoint N15:
Meall a 'Mhadaibh

June 2025

wsp

Figure 6.3.Ka-d VP15 Meall a 'Mhadaibh UK0037662.3719-WSPE-FG-SA-00073_R1 Originator: UKCGW775



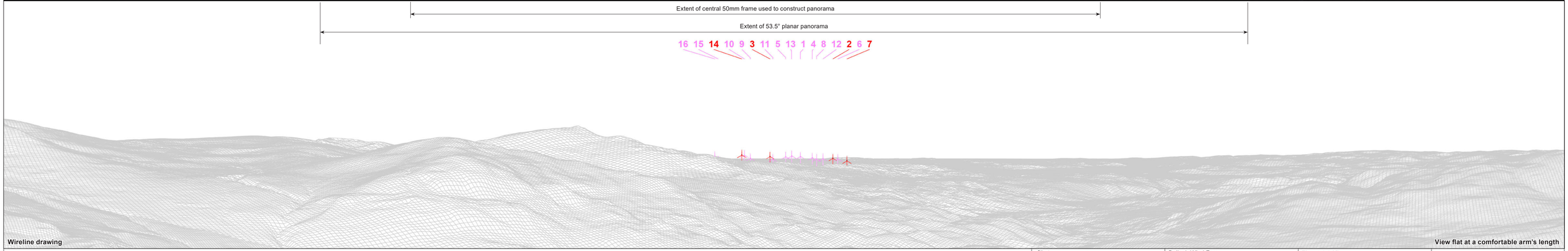
Baseline photograph

This image provides landscape and visual context only

Extent of central 50mm frame used to construct panorama

Extent of 53.5° planar panorama

16 15 14 10 9 3 11 5 13 1 4 8 12 2 6 7



Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Lit Ballach Wind Farm Unlit Ballach Wind Farm

OS reference:	E230 413, N837 020	Horizontal field of view:	90° (cylindrical projection)	Camera:	Sony ILCE-9
Eye level:	685.5m AOD	Principal distance:	522mm	Lens:	50mm (Canon 50mm f/1.2)
Direction of view:	51°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	14,529m	Correct printed image size:	820 x 130mm	Date and time:	17/09/2024 @ 20:20

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Kb
Viewpoint N15:
Meall a 'Mhadaibh

June 2025

Originator: UKCGW775

Figure 6.3.Kb v3 VP15 Meall a 'Mhadaibh UK0037602.3719.VKPE-FG-SA-00073_R1



Photomontage (200cd)

View flat at a comfortable arm's length

Note: The photomontage provides an impression of the proposed lighting intensity at 200cd and assumes clear visibility from the viewpoint location.
Assuming Angle Intensity Mitigation, the brightest visible nacelle lights (T2 & T3) would be no greater than 214cd as per the Lighting Strategy.
Meteorological observations suggest that this is likely to occur for 93% of the time.

OS reference:	E230 413, N837 020	Horizontal field of view:	53.5° (planar projection)	Camera:	Sony ILCE-9
Eye level:	685.5m AOD	Principal distance:	812.5mm	Lens:	50mm (Canon 50mm f1.2)
Direction of view:	51°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	14,529m	Correct printed image size:	820 x 260mm	Date and time:	17/09/2024 @ 20:20

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure 6.3.Kc
Viewpoint N15:
Meall a 'Mhadaibh

June 2025

wsp

Figure 6.3.Kc-vP15 Meall a 'Mhadaibh UK0037652.3719-XKSPE-FG-SA-00073_R1 Originator: UKCGW775



Photomontage (200cd)

View flat at a comfortable arm's length

Note: The photomontage provides an impression of the proposed lighting intensity at 200cd and assumes clear visibility from the viewpoint location.
Assuming Angle Intensity Mitigation, the brightest visible nacelle lights (T2 & T3) would be no greater than 214cd as per the Lighting Strategy.
Meteorological observations suggest that this is likely to occur for 93% of the time.
This 90 degree FoV photomontage is produced in addition to the NatureScot 'Visual Representation of Wind Farms' guidance and illustrates the Proposed Development in its landscape setting.

OS reference:	E230 413, N837 020	Horizontal field of view:	90° (cylindrical projection)	Camera:	Sony ILCE-9
Eye level:	685.5m AOD	Principal distance:	522mm	Lens:	50mm (Canon 50mm f/1.2)
Direction of view:	51°	Paper size:	841mm x 297mm (half A1)	Camera height:	1.5m AGL
Nearest turbine:	14,529m	Correct printed image size:	820 x 260mm	Date and time:	17/09/2024 @ 20:20

Client: EnergieKontor

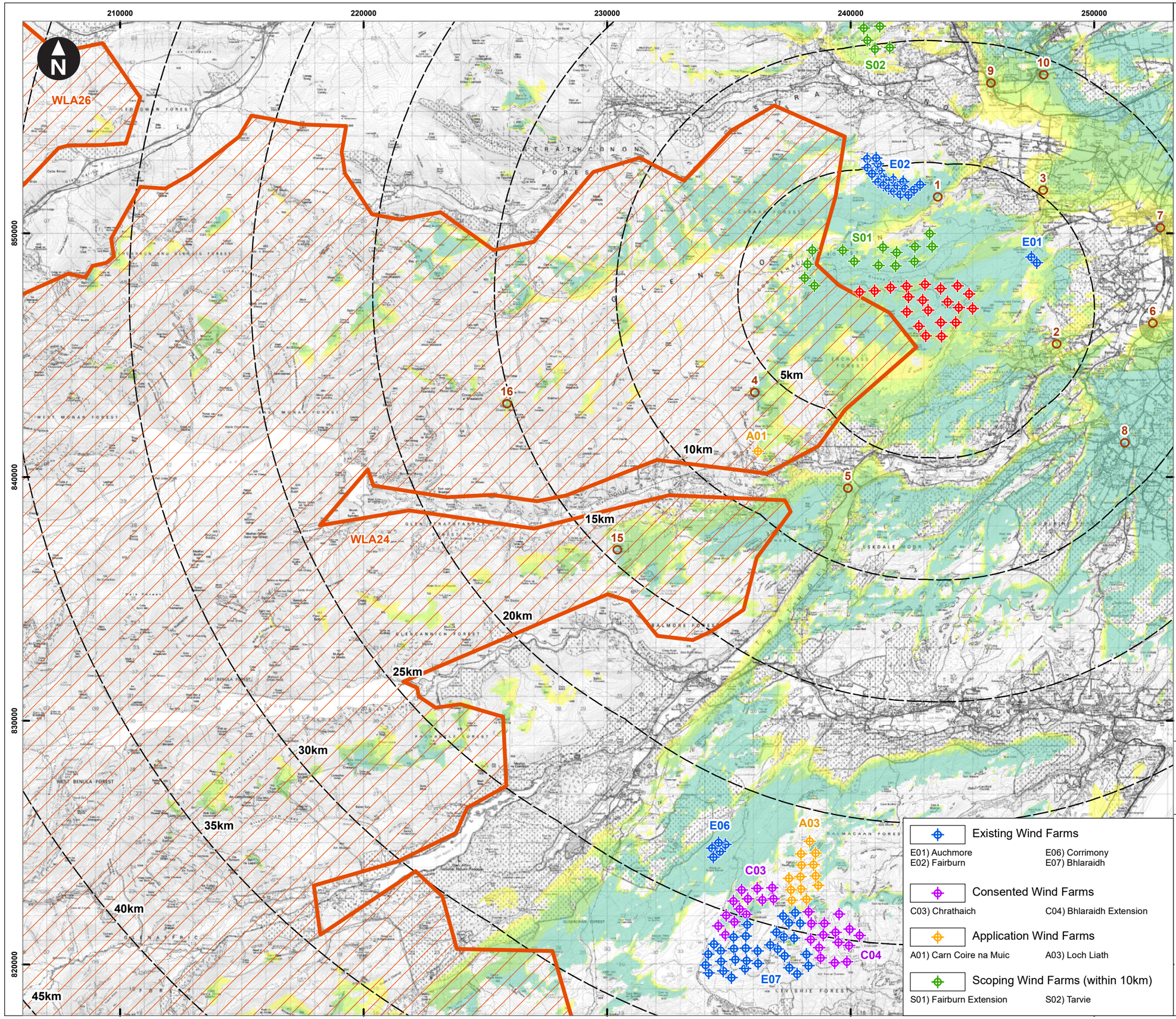
Ballach Wind Farm
EIA Report

Figure 6.3.Kd
Viewpoint N15:
Meall a 'Mhadaibh

June 2025

wsp

Figure 6.3.Kd-v1-P15 Meall a 'Mhadaibh UK0037652.3719-KR/PE-FG-SA-00073_R1 Originator: UKCGW775



Key

- Proposed turbine locations
- Lines indicating the distance from the proposed turbines
- LVIA Viewpoint Locations

1) Core Path RC30.01 to Orrin Dam
2) Torgormack - Drumindorsair
3) Fairburn Estate
4) Beinn a' Bha'ach Àrd
5) A831, Struy
6) Beauly
7) A832, Muir of Ord
8) Kiltarlity
9) A835, Contin
10) Jamestown
15) Meall a 'Mhadaibh
16) Sgùrr a' Choire Ghlais

- Wild Land Areas

WLA24) Central Highlands
WLA26) Coulin & Ledgowan Forest

- 1-5 turbines may be theoretically visible
- 6-10 turbines may be theoretically visible
- 11-15 turbines may be theoretically visible
- 16-20 turbines may be theoretically visible

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 km

Scale at A3: 1:150,000

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- Existing Wind Farms
  - E01) Auchmore
  - E02) Fairburn
  - E06) Corrimony
  - E07) Bhlaraidh
- Consented Wind Farms
  - C03) Chrathaich
  - C04) Bhlaraidh Extension
- Application Wind Farms
  - A01) Carn Coire na Muic
  - A03) Loch Liath
- Scoping Wind Farms (within 10km)
  - S01) Fairburn Extension
  - S02) Tarvie

Client

EnergieKontor

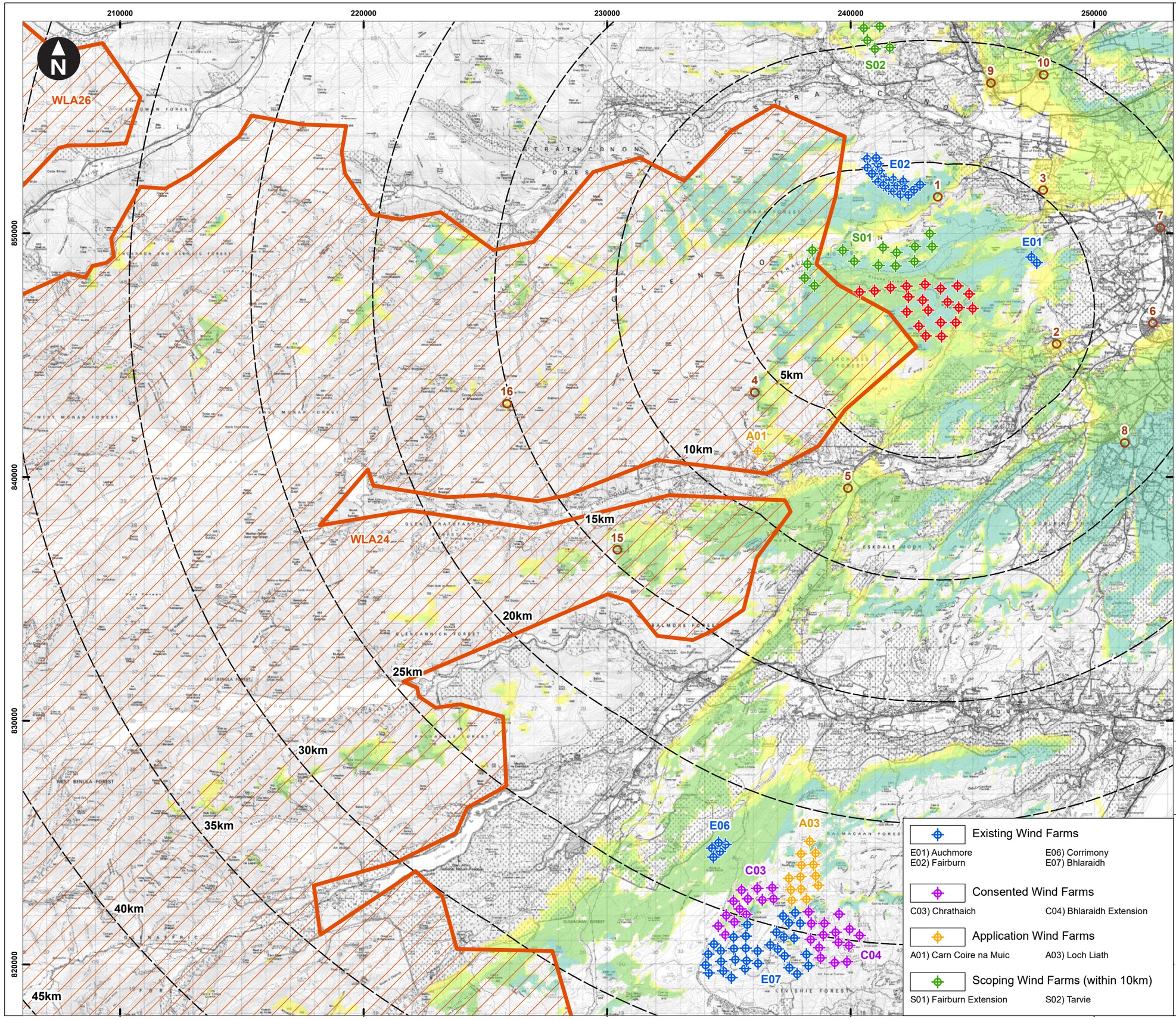
Ballach Wind Farm
EIA Report

Figure 6.4.A
Central Highlands WLA with Zone of Theoretical Visibility to Blade Tip

June 2025

wsp

Figure 6.4.A BT ZTV UK0037662.3719-WSPE-FG-SA-00074_R1.mxd Originator: UKCGW775



Key

- Proposed turbine locations
- Lines indicating the distance from the proposed turbines
- LVIA Viewpoint Locations

1) Core Path RC30.01 to Orrin Dam
2) Torgormack - Drumindorsair
3) Fairburn Estate
4) Beinn a' Bha'ach Àrd
5) A831, Struy
6) Beauly
7) A832, Muir of Ord
8) Kiltarlity
9) A835, Contin
10) Jamestown
15) Meall a 'Mhadaibh
16) Sgùrr a' Choire Ghlais

- Wild Land Areas

WLA24) Central Highlands
WLA26) Coulin & Ledgowan Forest

- 1-5 turbines may be theoretically visible
- 6-10 turbines may be theoretically visible
- 11-15 turbines may be theoretically visible
- 16-20 turbines may be theoretically visible

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 km

Scale at A3: 1:150,000

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- Existing Wind Farms
  - E01) Auchmore
  - E02) Fairburn
  - E06) Corrimony
  - E07) Bhlaraidh
- Consented Wind Farms
  - C03) Chrathaich
  - C04) Bhlaraidh Extension
- Application Wind Farms
  - A01) Carn Coire na Muic
  - A03) Loch Liath
- Scoping Wind Farms (within 10km)
  - S01) Fairburn Extension
  - S02) Tarvie

Client

EnergieKontor

Ballach Wind Farm
EIA Report

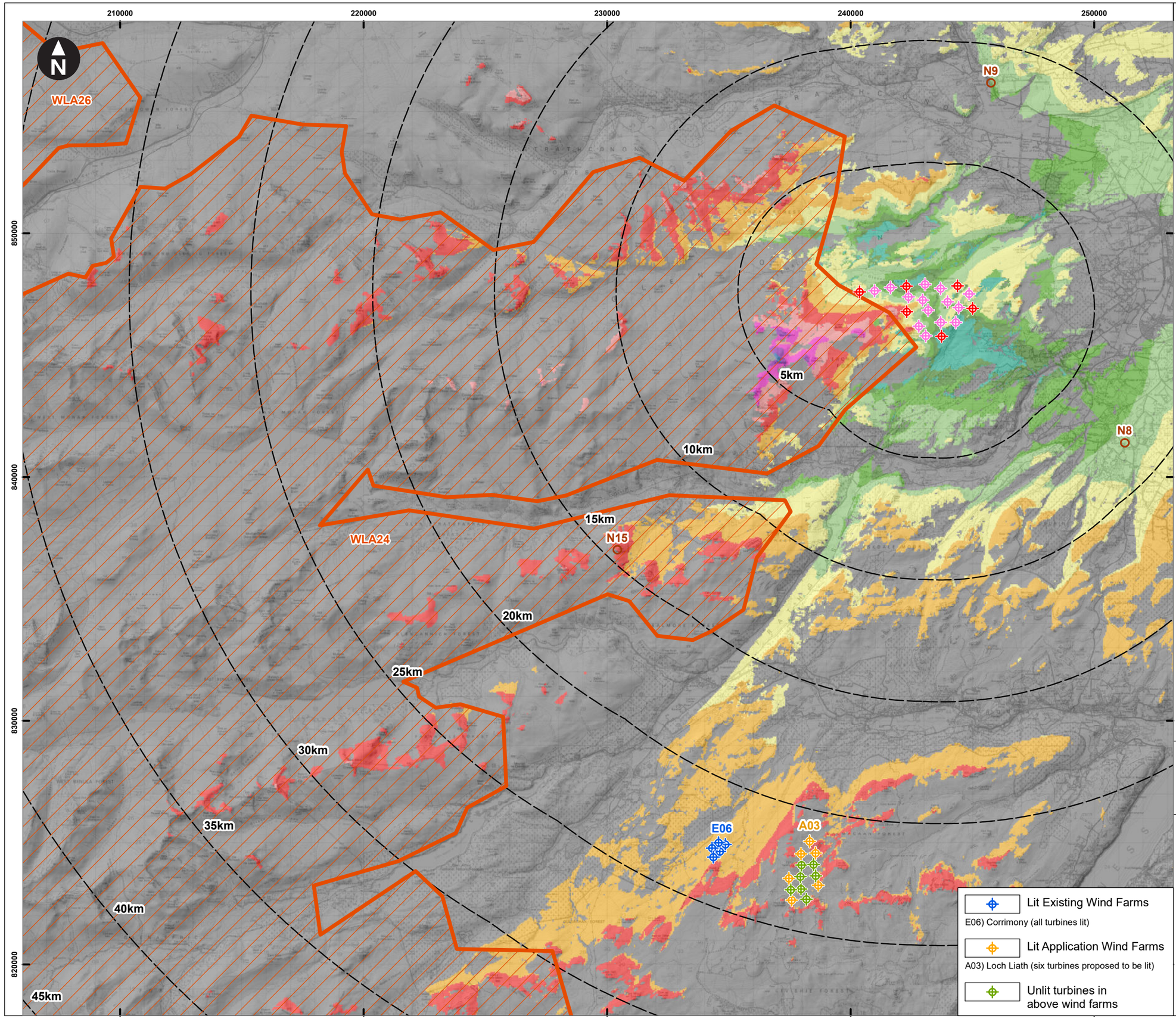
Figure 6.4.B
Central Highlands WLA with Zone of Theoretical Visibility to Hub Height

June 2025

wsp

Figure 6.4.B HH ZTV UK0037662.3719-WSPE-FG-SA-00075_R1.mxd Originator: UKCGW775

Figure 6.4.B HH ZTV UK0037662.3719-WSPE-FG-SA-00075_R1



Key

Proposed lit turbine locations

Proposed unlit turbine locations

Lines indicating the distance from the proposed turbines

Night-time Viewpoint Locations

N8) Kiltarlity
N9) A835, Contin
N15) Meall a 'Mhadaibh

Wild Land Areas

WLA24) Central Highlands
WLA26) Coulin & Ledgowan Forest

Intensity of Turbine Light shown in Candelas (cd)

Vertical Angle of Lighting from Nacelle	Maximum and Minimum Luminous Intensity (Candela / cd.)	10% of Maximum and Minimum Luminous Intensity (Candela / cd.)
The luminous intensity between 5° and 90° of the vertical angle would decrease as noted in Figure 6.3.D.		
4° to 5°	247 to 134	25 to 13
3° to 4°	481 to 237	48 to 24
2° to 3°	1160 to 481	116 to 48
1° to 2°	2119 to 1170	212 to 117
0° to 1°	2206 to 1968	221 to 197
-1° to 0°	2036 to 987	204 to 99
-2° to -1°	996 to 383	100 to 38
-3° to -2°	394 to 197	39 to 20
-4° to -3°	199 to 131	20 to 13
-5° to -4°	131 to 92	13 to 9
Below -5°	94 to 38	9 to 4

Source: CEL-WT-MIC Light Specification as noted in Aviation Lighting and Mitigation Report for Ballach Wind Farm V1.1 - https://www.contarnex.com/led-obstruction-lighting/datasheets/CEL-WT-MIC%20-%20rev1.pdf

Notes: This drawing is based on a computer generated Zone of Theoretical Visibility (ZTV). The areas shown indicate the maximum theoretical visibility of the proposed turbines using OS Terrain 50 data only and do not take account of any screening from vegetation or built-form. The ZTV also includes an adjustment that allows for the Curvature and Light Refraction of the Earth.

This figure has been based on the following parameters:

Turbine layout file:	LBALLACH005.WFL
Hub height:	149m / 119m
Rotor diameter	162m
Height to blade tip:	230m / 200m

0 1 2 3 4 5 6 7 8 km

Scale at A3: 1:150,000

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Ballach Wind Farm
EIA Report

Figure 6.4.C
Central Highlands WLA with Lighting Intensity Zone of Theoretical Visibility

June 2025

Figure 6.4.C Intensity UK0037662.3719-WSPE-FG-SA-00076_R1.mxd Originator: UKCGW775

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Technical Appendix 6.4
Wild Land Assessment

1.1 Introduction

1.1.1 This appendix reports on the wild land assessment which assesses the effects of the proposed development on the Central Highlands Wild Land Area (WLA) and its associated wild land qualities (WLQs).

1.1.2 None of the turbines or infrastructure component of the proposed development are located within the WLA. Consequently, there would be no direct effects on the Central Highlands WLA and its physical attributes.

1.1.3 NPF4 Policy 4 g) advises that *"effects of development outwith wild land areas will not be a significant consideration*".

1.1.4 The nearest turbine of the proposed development (T20) is located approximately 171m distance from the eastern edge of the WLA boundary and may therefore affect the views and perceptual WLQs experienced from within the WLA. The range of effects could include views of the turbines during the day and views of the aviation warning lights during the night. Either of these scenarios could also affect the 'perceptual responses' and WLQs, for example, the 'sense of awe' in response to the steep, rugged hills experienced within the Central Highlands WLA.

1.1.5 The wild land assessment has been divided into two parts, covering the day-time effects (resulting from the overall visibility of the proposed turbines) and the night-time effects (resulting from the visibility of the associated turbines aviation warning lights).

1.1.6 The structure of the wild land assessment has been set out as follows:

- Section 1: Daytime wild land assessment:
  - Wild land assessment Methodology; and
  - Day-time wild land assessment for the Central Highlands WLA.
- Section 2: Night-time wild land assessment:
  - Wild land assessment Methodology; and
  - Night-time wild land assessment for the Central Highlands WLA.

1.1.7 Each of the wild land assessments are supported by a range of ZTV maps and illustrated viewpoints from agreed WLA viewpoint locations.

1.2 Consultation

1.2.1 The EIA scoping exercise and consultation on wild land has principally engaged with NatureScot who advised that a Wild Land Assessment is required for the Central Highlands WLA within the LVIA Study Area. NatureScot, however, did not comment on which WLQs to be included in the Wild Land Assessment as proposed in the scoping report, therefore it is assumed that two of the four qualities to be included in the assessment is agreed.

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Viewpoint Agreement

1.2.2 The following assessment viewpoints (based on the relevant ZTV plots) were also agreed with NatureScot:

- Daytime LVIA and WL viewpoints:
  - Viewpoint 4: Beinn a'Bha'ach Àrd
  - Viewpoint 15: Meall a 'Mhadaibh; and
  - Viewpoint 16: Sgurr a'Choire Ghlais.
- Night-time LVIA and WL (and Glen Strathfarrar NSA) viewpoint:
  - Night-time Viewpoint N15: Meall a 'Mhadaibh.

1.3 Section 1: Day-time Wild Land Assessment

Methodology

1.3.1 The WLA assessment accords with NatureScot's Technical Guidance: *Assessing Impacts on Wild Land Areas*[1]. The method and general approach to the wild land assessment is succinctly described in paragraphs 3-4 and 12 as follows:

"This guidance sets out a methodology and general principles for assessing the impact of development and other proposals on WLAs, as they are experienced from within the WLA, not from outwith."

"The method described employs the general approach and principles set out within the Guidelines for Landscape and Visual Impact Assessment (GLVIA)[2]. The assessment of effects of a proposal on a WLA is an exercise distinct from landscape and visual impact assessment (LVIA) that can draw on but should not duplicate its information. The assessment should consider effects on the physical attributes and perceptual responses that contribute to the WLA qualities identified in the WLA descriptions."

"Each of the WLA descriptions set out their particular wild land qualities, with the physical attributes and perceptual responses contributing to it identified. These descriptions should form the starting point for an assessment of impacts on a WLA."

1.3.2 Table 1 of the Technical Guidance provides a summary of the WLA assessment approach as follows:

- "Step 1 - Define the study area and scope of the assessment:

  Identify a study area appropriate to the scale of the proposal and extent of likely significant effects on the WLA.
- Step 2 – Verify the WLA baseline:

  Confirm the wild land qualities (set out in the WLA description) relevant to the study area, describing any major changes that have occurred since the description was prepared and the nature of their contribution to the WLA.
- Step 3 – Assess the sensitivity of the qualities:

[1] NatureScot, (August 2023). Technical Guidance: *Assessing Impacts on Wild Land Areas*.
[2] Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Landscape Institute and IEMA (May 2013).

Through detailed field assessment within the study area, assess the sensitivity of the wild land qualities scoped in (including their physical attributes and perceptual responses), to the type and scale of change proposed.

- Step 4 – Assess the magnitude of the effects:

  Assess the effects on individual and / or combinations of qualities, drawing out which physical attributes and perceptual responses will be affected, how and to what degree. This should reflect the size or scale of change, its extent and duration.

- Step 5 – Judge the significance of the effects:

  Conclude on the overall significance (taking into account any mitigation), in terms of the study area and where relevant the wider WLA."

1.3.3 In line with the GLVIA 3 and the LVIA methodology set out in **Technical Appendix 6.1**, the general approach entails assessment of the sensitivity of the landscape or visual receptor (in this case the WLQ) to the proposed development (Step 3). This in turn is considered against the magnitude of change (Step 4) likely to result from the proposed development in order to identify a level of effect (Step 5) and subsequently whether this is significant.

1.3.4 Through the consultation process Steps 1 and 2 have been agreed with NatureScot. The WLA assessment will therefore start at Step 3.

Fieldwork

1.3.5 Fieldwork supporting this assessment was undertaken in spring and summer 2025 with landscape architects travelling on foot to the assessment viewpoints and other areas within the WLA.

Sensitivity

1.3.6 The receptor sensitivity is determined by considering the value (which in the case of WLAs is assessed as high, reflecting its national level importance) and the susceptibility of the WLQ to change likely to result from the proposed development. Judgements on value and susceptibility are combined to provide an assessment on the sensitivity of the WLA and associated WLQ to the proposed development. This is evaluated in terms of High, Medium and Low as explained in **Technical Appendix 6.1.**

1.3.7 Both the daytime and night-time assessments are supported by field work examining the WLQs and their associated perceptual responses. The night-time field work is supported by baseline observation of the existing night-time environment or 'darkness survey' of other lights and lit structures that may be perceived from the WLA.

Magnitude of Change

1.3.8 The magnitude of change (evaluated in terms of High, Medium, Low, and Very Low with intermediate levels) considers the scale and geographical extent of the likely effects in a similar manner to **Chapter 6** although the wild land assessment is focused on the WLQ and their perceptual responses.

1.3.9 The duration of the effect is separated from the assessment of magnitude and level of effect and used to describe the nature of the effect (e.g. temporary or permanent). In the case of this development the duration is described as long-term and reversible.

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Cumulative Effects

1.3.10 A list of other wind farm development included in the assessment is provided **Table 6.4 in Chapter 6**.

1.3.11 The cumulative effects are assessed in the same manner as the 'stand-alone' effects of the proposed development and follow the same assessment methodology combining sensitivity and magnitude to determine a level of effect, guided by **Table 6.4.1** below**.**

1.3.12 The cumulative effects of the proposed development are assessed in terms of the 'additional' and the 'combined' cumulative effects taking account of other existing / under construction, consented and submitted wind farm planning applications. Two cumulative scenarios are considered as follows:

- Scenario 1: Existing + Consented + the proposed development:

  The additional and combined cumulative effects of the proposed development and existing and consented wind energy developments are assessed.

- Scenario 2: Existing + Consented + Applications + the proposed development:

  As above, with the inclusion of other, applications (including at planning appeal and one at scoping – Fairburn Extension).

Evaluation of Significance

1.3.13 In accordance with the relevant EIA Regulations, it is important to determine whether the effects, assessed as a result of the proposed development, are likely to be significant. That proposes has been guided by a matrix illustrated in **Table 6.4.1**. Significant landscape and visual effects will be highlighted in bold in the text and in most cases, relate to all those effects that result in a '**Substantial**', '**Substantial to Major**' '**Major**' or '**Major to Moderate**'. 'Moderate' levels of effect can also be assessed as significant, subject to the assessor's opinion, which should be clearly explained as part of the assessment. Un-shaded boxes in **Table 6.4.1** indicate a non-significant effect.

1.3.14 In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None'. The type or nature of effect is also described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse. Project decommissioning ensures that the effects of wind farm development on WLAs would also be reversible.

Table 6.4.1 Evaluation of Landscape and Visual Effects

Magnitude of Change	**Landscape and Visual Sensitivity**			
	High	**Medium**	**Low**	**Very Low**
High	**Substantial**	**Major**	*Moderate*	Not used
High - Medium	**Substantial to Major**	**Major to Moderate**	Moderate to Minor	
Medium	**Major**	*Moderate*	Minor	
Medium - Low	**Major to Moderate**	Moderate to Minor	Minor	
Low	*Moderate*	Minor	Negligible	
Low – Very Low	Moderate to Minor	Negligible	Negligible	

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Magnitude of Change	Landscape and Visual Sensitivity			
	High	**Medium**	**Low**	**Very Low**
Very Low	Minor	Negligible	Negligible	
Zero	None			

1.4 Day-time Assessment - WLA 24: Central Highlands

1.4.1 Drawing from NatureScot's WLA Description of WLA 24: Central Highlands[3], it describes the WLA as a very large area of wild land (1,327m²) and is the second most extensive WLA in Scotland. Part of the WLA 24 is overlapped by three NSA's (NSA 3: Glen Strathfarrar, NSA 6: Glen Affric and NSA 8: Knoydart) and by the locally designated Moidart, Morar and Glen Shiel SLA, and the Strathconon, Monar and Mullardoch SLAs, although the Glen Shiel SLA is located beyond 40km distance with very little visibility of the proposed development. Major routes from Inverness and Fort William flank its southern and north-western edges, but it is otherwise distant from large population centres. In particular the WLA Description notes:

"The WLA 24 "comprises a mix of large mountains, peatland and glens, reflecting the underlying geology of predominantly Moine schists, later carved during glaciation. The area wraps around a series of glens that run west – east, including: Killian; Strath Croe; Strathconon; Orrin; Glen Strathfarrar; Glen Cannich; and Glen Affric. Being so extensive, it also includes the watershed dividing west and east flowing rivers, with views from some mountain tops to both coasts."

"The area is largely uninhabited and used mainly for deer stalking and fishing. The area is popular with visitors - Kintail, Glen Affric and Glen Strathfarrar tending to attract the highest number. It is used for many different recreational activities; for example, short, low-level walks from the ends of the glen roads, mountain bike rides, longer hill treks, ascent of the 36 Munros and 16 Corbetts, and multi-day walks within the interior via a network of paths. The Falls of Glomach is a particular attraction as well as the Alltbeithe Youth Hostel that is used by through-walkers between the west and east, most commonly via Gleann Lichd and Glen Affric."

1.4.2 It may be noted that neither the Falls of Glomach or the Alltbeithe Youth Hostel would be able to view the proposed development and that both are outwith the ZTV. Similarly, Kintail, Glen Affric, Killian, Strath Croe, Strathconon, Glen Cannich and the majority of Glen Strathfarrar are also outwith the ZTV.

Other Relevant Assessment

1.4.3 The LVIA contained within **Chapter 6** is a separate assessment that assesses the likely effects on a range of landscape and visual receptors, some of which are related to WLA 24 and include:

1.4.4 Effects on the main Landscape Character Types (LCT) illustrated in **Figures 6.7-8**, including:

[3] Scottish Natural Heritage (2017). WLA Description of the Central Highlands WLA 24 - Wild land Description Central-Highlands-July-2016-24.pdf

- 220) Rugged Massif – Inverness, 331) Rounded Rocky Hills – Ross and Cromarty, 328) Rugged Mountain Massif – Ross and Cromarty and 226) Wooded Glen – Inverness;
- Effects on the Glen Strathfarrar NSA and locally designated Strathconon, Monar and Mullardoch Special Landscape Area (SLA); and
- Effects on recreational routes and hill walking summits illustrated in **Figures 6.10-11**.

1.5 Step 1 - Study Area and Scope of the Assessment

1.5.1 The blade tip ZTV is illustrated in **Figure 6.4.A** (and hub height in **Figure 6.4.B**) and covers the east facing slopes and summits of the eastern edge of the WLA within 10km. Beyond 10km, visibility is largely limited to some of the upper facing slopes and the highest summits within the remainder of the WLA.

1.5.2 The ZTV coverage indicates that that the vast majority of this area (89.82%) would have No View of the proposed development. Conversely, the blade tip ZTV overlaps with 10.18% of the Central Highlands WLA.

1.5.3 The ZTVs have been calculated using ReSoft © WindFarm computer software to produce an area of theoretical visibility of any part of the proposed turbines, calculated to turbine blade-tip and hub height and based on a digital terrain model. The ZTV does not therefore take account of intervening features such as forestry and can in those circumstances provide an over-estimate of the potential visibility of the proposed turbines.

1.5.4 In terms of the cumulative ZTV (**Figures 6.13-17**) the northern, eastern, northeastern and southeastern parts of the WLA within 10-15km is overlapped by the ZTV pattern for other existing and consented wind farm development. A number of these are simultaneously or successively visible with the proposed development and illustrated in the visualisations.

1.6 Step 2 – Wild Land Qualities included in the Assessment

1.6.1 The WLA Description sets out four WLQs, of which WLQ 1 and 2 are included in the WLA assessment as agreed through consultation at scoping. The four WLQs are described as follows:

- WLQ 1: "*An extensive and awe-inspiring range of large scale, high and rugged mountains*."
- WLQ 2: "*An extensive, remote mountain interior with strong qualities of sanctuary and solitude*."
- WLQ 3: "*Deep glens that have steep, arresting side slopes as well as rivers and waterfalls, with some containing lochs and some revealing human land use*."
- WLQ 4: "*Small and extensive areas of native woodland that contribute to the sense of naturalness and highlight some arresting landscape features*."

1.6.2 The remaining two qualities (3 and 4) relating to "*deep glens with steep, arresting side slopes*" and the "*native woodland*" are excluded from the assessment given neither of these physical features within the WLA descriptions would be directly affected by the proposed development.

1.6.3 The WLA assessment is illustrated by three viewpoints within the WLA, which view the proposed development at distances of between 5.9km and 15.2km from the nearest turbine in the proposed development as follows.

- Viewpoint 4: Beinn a'Bha'ach Àrd
- Viewpoint 15: Meall a 'Mhadaibh; and
- Viewpoint 16: Sgurr a'Choire Ghlais.

1.7 Step 3-5 – Sensitivity and Assessment of Effects

WLQ 1: *An extensive and awe-inspiring range of large scale, high and rugged mountains*.

1.7.1 The WLA Description describes WLQ 1 as follows:

"This WLA includes an extensive area of high, steep-sided mountains. The elevation, jagged forms and rocky faces of these, in combination with natural features such as corries, waterfalls and rugged slopes, contribute to a strong sense of awe. Their vertical dimension is emphasised where seen in contrast to the horizontal surface of adjacent lochs or glen floors, whilst the open space created by these also increase visibility of their distinctive mountain forms.

The large scale, steep slopes and rugged landforms resulting from glaciation, as well as predominant rock cover, contributes to the sense of naturalness and means the ascent of the mountains is physically challenging. Their high elevation is also emphasised by snow cover upon the tops between autumn and spring, particularly on north facing slopes.

Although the mountain range possesses a repetitive pattern of numerous glens and lochs running west to east at fairly equal interval, this regularity is not usually discernible on the ground, even from high elevations. Instead, the hills seem jumbled together as a number of interlocking high ridges of similar prominence, which increases the sense of naturalness. It also means that it can be difficult to orientate and the area appears even more extensive than it is, contributing to the sense of risk.

From the mountain tops and ridges, there are open and exposed panoramic views over an awe-inspiring and extensive range of mountains – some located within the WLA and some beyond in neighbouring wild land areas (as human elements within the intervening glens are screened by the landform). These elevated views indicate a prevailing absence of human artefacts and contemporary land use across the WLA interior and increase the sense of remoteness.

In contrast, some tall and/ or elevated human elements are seen from some of the tops and outward facing slopes around the margins of the WLA, for example wind farms and power lines, which can affect the wild land qualities within the area."

1.7.2 WLQ 1 is mainly focused on the central, northern and western parts (and some southern parts) of the WLA and the awe-inspiring and towering rugged mountains with a high sense of risk are not strongly apparent in the eastern flank of the WLA. These parts in the east are affected by views from human development including wind farms, pylons, hydroelectric schemes and the settled landscape visible to the northeast / east in the distance.

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Step 3 - Sensitivity

1.7.3 The NatureScot Technical Guidance (2023) advises that WLAs are of national importance and a high value is accorded in this assessment.

1.7.4 Central, northern and western (and some southern) parts of WLA: The WLQ is most strongly expressed in the central, northern and western parts (and some southern parts) of this WLA and the susceptibility of their perceptual qualities of *'awe*', '*rugged*' and a '*strong sense of naturalness*' to wind farm development outside its boundary is noted to be High to Medium, due mainly to a lack of development in the baseline in these directions. Views to and from an "*awe-inspiring and extensive range of mountains*" would be possible from Viewpoints 4, 15 and 16 seen mainly to the northwest and southwest. Views towards these mountains would not tend to be affected by wind farm development, which tends to be visible in the opposite or other direction away from the mountains. Existing and consented windfarms would be visible from the mountains, but these appear as smaller and distant features which do not seem to detract from the perceptual qualities which include an inspiring sense of awe, a sense of naturalness as well as the risk and physically challenge of accessing these locations. Overall, the sensitivity of this WLQ (central, northern and western parts of this WLA) is assessed as *High*.

1.7.5 Eastern flank of WLA: This WLQ is much weaker and with the exception of '*sense of naturalness*' it appears to be absent or less well presented in the eastern flank of the WLA. Wind Farm development and evidence of other contemporary land use including pylons, overhead lines, hydroelectric schemes and associated access tracks, coniferous forestry and the settled landscape in the distance to the northeast / east is clearly present, and the susceptibility is consequently medium to low. Viewing from Viewpoint 4, towards the proposed development there are no intervening "*awe-inspiring and extensive range of mountains*". The ridge of hills north of Erchless Forest partially screen the proposed development when viewed from this location. Mountains are however visible further to the southwest and northwest where the core of the WLA and the Munro summit associated with Viewpoint 16: Sgurr a'Choire Ghlais (and other summits) is visible. Overall, the sensitivity of this WLQ (eastern flank of WLA) is assessed as *Medium*.

Step 4 - Assessment of Effects

1.7.6 Having assessed the sensitivity of the wild land qualities which are the subject of this assessment, the assessment now considers the specific effect of the proposed development on the wild land qualities (including the relevant physical attributes and perceptual responses). In this section, the magnitude of change is evaluated and described in terms of the size or scale of change, its extent and duration. Judgements on sensitivity and magnitude are combined to determine the level of effect and its significance in relation to the particular wild land qualities being assessed.

1.7.7 The proposed development is located outwith the WLA boundary and there will be no direct effects on this WLQ.

1.7.8 Central, northern and western (and some southern) parts of WLA: There is very limited ZTV coverage and the intervening distance would ensure that the magnitude of change would be *Very Low to Zero*.

1.7.9 Eastern flank of WLA: The ZTV is more widespread between 2-4km (and intermittently up to approximately 6km) to the southwest / west and up to 8-9km intermittently to the northwest from the proposed development. The proposed development is located within 171m from the edge of the eastern boundary of the WLA boundary. Some of this landscape is influenced by the existing Fairburn and Auchmore wind farms, and other

contemporary land uses beyond its boundary. The magnitude of change would be *High-Medium to Zero*. The nature of the effect would be long term (reversible), indirect and negative.

Step 5 - Judge the significance of the effects

1.7.10 Central, northern and western parts of WLA: Combining the High sensitivity and Very Low to Zero magnitude, the level of effect would be **Minor to None** and Not Significant on WLQ1.

1.7.11 Eastern flank of WLA: Combining the Medium sensitivity and Medium magnitude, the level of effect would be **Major to Moderate** and Significant, to **None** on WLQ1 although it is recognised that this part of the WLA has a weak WLQ in the east.

Cumulative Effects:

Scenario 1: Existing + Consented and the proposed development

1.7.12 The additional effect of the proposed development would remain **Major to Moderate** and Significant. The combined effect would also remain **Major to Moderate** and Significant and whilst it would be the closest wind farm development to the WLA, it would affect the same field of view as the existing and consented development to the east. The existing Fairburn Wind Farm would have a Medium-Low magnitude on the eastern flank of the WLA.

Scenario 2: Existing + Consented + Applications and the proposed development

1.7.13 The additional effect of the proposed development would be reduced to **Moderate** and Significant (reduced due to the scoping Fairburn Extension). Taking account of the scoping Fairburn Extension, partly located within the WLA (High magnitude) the combined cumulative effect would become **Major** and Significant on account of the scoping Fairburn Extension and to a lesser degree, the proposed development. However, it is difficult to justify a significant effect on a weak WLQ in the east. Nevertheless, the scoping Fairburn Extension is partly located within the WLA.

WLQ 2: *An extensive, remote mountain interior with strong qualities of sanctuary and solitude*.

1.7.14 The WLA Description describes WLQ 2 as follows:

"Within the interior of this WLA, there is a strong perception of remoteness, sanctuary, solitude and risk. This is mainly because the interior is very large, few people visit, as access requires a long walk, mountain bike, canoe or boat ride in, and because the great height and range of the mountains limits outward views. The wild land qualities are also influenced by a prevailing lack of human artefacts and contemporary land use as well as human activity or noise.

Within the WLA, the winding and undulating nature of routes can result in perceived distances seeming greater than they actually are, and thus amplifying the sense of remoteness, especially as there are few definite size indicators from which to estimate distance.

Apart from paths, the only other human artefacts within the interior tends to be isolated historic features, such as old enclosures and cottages, for example the Maol-bhuidhe MBA bothy. These create prominent foci and appear obvious as a human artefact, but tend to be isolated, discrete in siting and low-key in design so their effects are localised.

Some of the passes between glens form 'knife edge' bealachs, whilst others form wide elevated shelves that possess neither the enclosure nor linear form of the glens, or the exposure or panoramic views of the mountain tops. Screened from the glens below, but without the altitude and exposure of the peaks, these shelves tend to possess a secluded and hidden quality that contributes to a high degree of perceived remoteness, sanctuary and solitude."

1.7.15 It is questionable if this WLQ really applies to the eastern flank of the WLA. The WLQ description refers to *"long walks*" and "*winding and undulating nature of the routes*" to access this area, yet the land on the eastern edge of the WLA is within 2km of the A831 and other minor roads extending from the dispersed communities to the west. The ZTV in this area overlaps with open and undulating peatland and outer facing slopes and hill summits with clear visibility of human artefacts and contemporary land use in the form of pylons, hydroelectric schemes, forestry and wind farms. There is no evidence of a "*remote interior*" that is screened by surrounding mountain slopes and perceptions of sanctuary and solitude are consequently weaker.

1.7.16 In contrast, in other parts of the WLA particularly the central, northern, western (and some southern) parts, these qualities are strongly expressed.

Step 3 - Sensitivity

1.7.17 The NatureScot Technical Guidance (2023) advises that WLAs are of national importance and a high value is accorded in this assessment.

1.7.18 Central, northern and western (and some southern) parts of WLA: The WLQ are most strongly expressed in the central, northern and western (and some southern) parts of this WLA and the susceptibility of their perceptual qualities noted to be High. Overall, the sensitivity of this WLQ (central, northern and western (and some southern) parts of this WLA) is assessed as *High*.

1.7.19 Eastern flank of WLA: This WLQ is much weaker or absent. Wind Farm development and evidence of other contemporary land use is clearly present, and the susceptibility is consequently Low. Overall, the sensitivity of this WLQ (eastern part of WLA) is assessed as *Medium to Low*.

Step 4 - Assessment of Effects

1.7.20 Central, northern and western (and some southern) parts of WLA: There is very limited ZTV coverage, and the intervening distance would ensure that the magnitude of change would be *Very Low to Zero*.

1.7.21 Eastern flank of WLA: The ZTV is more widespread between 2-4km (and intermittently up to approximately 6km) to the southwest / west and up to 8-9km intermittently to the northwest from the proposed development. The proposed development is located within 171m from the edge of the eastern boundary of the WLA boundary. Some of this landscape is influenced by the existing Fairburn and Auchmore wind farms, and other contemporary land uses beyond its boundary. The magnitude of change would be *Medium-Low to Zero*. The nature of the effect would be long term (reversible), indirect and negative.

Step 5 - Judge the significance of the effects

1.7.22 Central, northern and western parts of WLA: Combining the High sensitivity and Very Low to Zero magnitude, the level of effect would be **Minor to None** and Not Significant on WLQ2.

1.7.23 Eastern flank of WLA: Combining the Medium to Low sensitivity and Medium-Low magnitude, the level of effect would be **Moderate to Minor** and Not Significant, to **None** on WLQ2 and it is recognised that this part of the WLA has a weak WLQ in the east.

Cumulative Effects:

Scenario 1: Existing + Consented and the proposed development

1.7.24 The additional effect of the proposed development would remain **Moderate to Minor, to None** and Significant. The combined effect would also remain **Moderate to Minor, to None** and Not Significant and whilst the proposed development would be the closest wind farm development to the WLA, it would affect the same field of view as the existing and consented development to the east. The Fairburn Wind Farm would have a Low magnitude on this part of the WLA.

Scenario 2: Existing + Consented + Applications and the proposed development

1.7.25 The additional effect of the proposed development would be reduced to **Minor** and Not Significant (reduced due to the scoping Fairburn Extension). Taking account of the scoping Fairburn Extension, partly located within the WLA (High magnitude) the combined cumulative effect would become **Major to Moderate** and Significant on account of the scoping Fairburn Extension and not the proposed development. However, it is difficult to justify a significant effect on a weak WLQ in the east. Nevertheless, the scoping Fairburn Extension is partly located within the WLA.

1.8 Daytime WLA Assessment - Statement of significance

1.8.1 In summary, the proposed development would significantly affect part of WLQ1: *An extensive and awe-inspiring range of large scale, high and rugged mountains* (Major to Moderate) in the eastern flank of the WLA. However, it is recognised that this part of the WLA has a weak or largely absent WLQ in the east. The proposed development would not significantly affect the remaining three WLQs of the Central Highlands WLA (WLA 24).

1.8.2 The proposed development is located outwith the WLAs resulting in no direct effects. Significant cumulative effects are identified which largely relate to other wind farm development, notably some which is within the WLA boundary (the scoping Fairburn Extension).

1.8.3 Whilst there are limited significant effects on one WLQ of WLA 24, the eastern flank of the WLA has weaker or nearly absent WLQs.

Table 6.4.2: Summary of Daytime Wild Land Area Assessment

Wild Land Area / Quality	Sensitivity	Magnitude	Level of Effect	Significance
WLA 24: Central Highlands				
WLQ 1: An extensive and awe-inspiring range of large scale, high and rugged mountains	Other parts: High East: Medium	Other parts: Very Low East: High-Medium	Other parts: Minor to None East: **Major to Moderate**	Other parts: Not Significant East: **Significant**

WLQ 2: An extensive, remote mountain interior with strong qualities of sanctuary and solitude	Other parts: High East: Medium to Low	Other parts: Very Low East: Medium-Low	Other parts: Minor to None East: Moderate to Minor	Other parts: Not Significant East: Not Significant

1.9 Section 2: Night-time Wild Land Assessment

1.9.1 NatureScot confirmed that a night-time wild land assessment should be undertaken as part of the application.

1.9.2 As established for the day-time assessment the proposed development is outwith the wild land and would have no effect on the 'physical' wild land attributes. It can only potentially affect the 'perceptual responses' experienced from within the WLA. The degree to which these could be affected and whether they are significant requires to be established through a night-time wild land assessment.

1.9.3 A night-time landscape and visual assessment to accompany the LVIA is also contained in **Technical Appendix 6.3**.

Methodology

1.9.4 The WLA night-time assessment is not a technical lighting impact assessment based on quantitative measurement of light levels, rather the assessment relies on professional judgement of what the human eye can reasonably perceive. As with the Night-time Assessment for the LVIA the sensitivity of the receptor to the proposed development (aviation warning lights) and the magnitude of change are combined to determine the level of effect likely to result from the aviation warning lights.

1.9.5 The WLA night-time assessment methodology follows NatureScot's *Technical Guidance: Assessing Impacts on Wild Land Areas* (2023) which has been summarised in section 1.3 and adapted to apply to night-time conditions. The assessment has also taken account of NatureScot's *General pre-application and scoping advice for onshore wind farms, Annex 1 - NatureScot advice on the scope of assessment for turbine lighting*, August 2022.

1.9.6 There are two existing wind farms and one consented wind farm within the northern part of the 20km study area with aviation warning lights which are included in the cumulative assessment, as follows:

- Corriemoillie (four aviation warning lights);
- Lochuichart (two aviation warning lights); and
- Consented Kirkan (six aviation warning lights at 2000/200cd).

1.9.7 There are no other application wind farms proposed to be lit within the study area. It is, however, unclear if the scoping pre-application Fairburn Extension Wind Farm would be lit, therefore it is excluded from the assessment.

Health and Safety Precautions

1.9.8 In order to complete the wild land assessment, it was necessary to conduct a site visit between the periods of dusk and dawn to undertake a darkness survey and viewpoint photography. This raised certain health and safety requirements which required additional and unusual health and safety planning and assessment for access / egress

of the viewpoint and possible camping on the summit overnight. Whilst no health and safety issues arose, and the awareness that occasionally some members of the public do camp on the summits overnight, this activity did present an increased risk to the assessors.

1.9.9 The dates of the field work are noted in Section 1.3 and noted on each visualisation figure.

1.9.10 Members of the public are advised that this is not an activity that is recommended, and it should not be undertaken without appropriate health and safety planning, experience and suitable equipment.

Lighting Strategy

1.1.1 The Lighting Strategy is summarised here for ease of reference.

1.9.11 The Lighting Strategy proposes six turbine hub lights and meets the requirements of civilian and military aviation whilst minimising the effects of the aviation warning lights on the surrounding environment. It has been prepared by aviation specialists Wind Power Aviation Consultants Ltd. (WPAC) and approved by the CAA.

1.9.12 The Lighting Strategy is illustrated in **Figure 6.3.A** and is detailed as follows:

- Reduced number of aviation warning lights:

  The number of lights has been reduced from 20 to six (T2, T3, T7, T14, T17 and T20) and the need for mid-tower lights (three on each turbine to provide 360° coverage) has been removed.

- Dimming of aviation warning lights to 10%:

  The proposed lights will dim to 10% of the light intensity (2000cd reducing to 200cd) during periods of clear visibility (>5km from the wind farm), increasing to 2000cd when the visibility sensors detect poor visibility (<5km from the wind farm).

  The lights are designed to accord with CAA SARG Policy Statement (g)[4] "*If the horizontal meteorological visibility in all directions from every wind turbine generator in a group is more than 5km, the intensity for the light positioned as close as practicable to the top of the fixed structure required to be fitted to any generator in the windfarm and displayed may be reduced to not less than 10% of the minimum peak intensity specified for a light of this type.*"

  NS *Guidance on Aviation Lighting Impact Assessment*, Appendix 3, November 2024, advises that the frequency of dimming will typically occur "*90% to 95% of the time*". This observation is supported by the *Ballach Wind Farm Aviation Lighting and Mitigation Technical Appendix V1.1* (2025), prepared by WPAC Ltd. (**Technical Appendix 14.1**) which also notes that:

  "Meteorological observations suggest that the turbine hubs will be obscured on more than eight hundred occasions a month by cloud. (Obstruction lights not visible to the public)

  When not obscured by cloud, the visibility in the area of the turbines can be expected to exceed 5km for up to 94% of the time. (Obstruction lights switched down to 200cd)"

[4] CAA, Safety and Airspace Regulation Group (SARG) dated 1/6/2017, Policy Statement, *Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level*.

- Angle intensity mitigation

  Also described as 'vertical directional intensity mitigation'). The design of aviation warning lights must also comply with the International Civil Aviation Organisation (ICAO) specification as set out in Annex 14 Table 6-3. This limits the 2000 / 200cd light emission to a narrow 'beam spread' with a vertical angle of between 0° to +5° and creating a 'horizontal beam of light' that extends out in all (360°) directions. This form of mitigation can be very effective for those receptors located in valleys or low-lying areas relative to the elevation of the aviation warning lights as illustrated in **Plate 1** and explained further below.

  This reduction in light intensity is illustrated via the ZTV shown in **Figure 6.4.C.**

1.9.13 It is also important to note the periods of day / night when the proposed aviation warning lights would be operating, as set out in **Table 6.3.3** of **Technical Appendix 6.3**. These periods of operation may be compared with the usual day-to day activities of the receptors such as periods when people may be commuting, undertaking recreational activities or the open times for outdoor visitor attractions.

1.9.14 The operation of the aviation warning lights would have no effect on periods of sunrise (when the sun disk passes above the horizon and the period just after this) and sunset (the period just before the sun disk passes below the horizon) as the operation is programmed to switch off 30 mins before sunrise and switch on 30 mins after sunset, respectively.

Study Area and Scope of the Assessment

1.9.15 The Study Area for the night-time WLA assessment is similar to the daytime WLA assessment in that it relates to the light intensity ZTV, calculated to hub height as illustrated in **Figure 6.4.C.**

1.9.16 One night-time viewpoint has been illustrated for the WLA as agreed with NatureScot and illustrated as follows:

- **Figure 6.3.K** - WLA 24: Night-time Viewpoint N15: Meall a'Mhadaibh.

1.9.17 The same WLQs as assessed in the daytime assessment have been considered and where appropriate, assessed as part of the night-time assessment.

Baseline

1.9.18 The WLA Descriptions included in the assessment makes no mention of any wild land qualities at night and none of these areas are formally valued or promoted for their dark skies.

1.9.19 There is no GIS mapping to support the night-time baseline, but the baseline satellite imagery of the night sky is illustrated in **Figure 6.3.B** confirming that this area is dark and unlit. Areas of visible lighting are limited to areas to beyond the WLA boundary including settlements, roads and other light sources as identified in **Technical Appendix 6.3**.

Other Wind Farms with Aviation Warning Lights

1.9.20 As stated above, there are two existing wind farms and one consented wind farm within the northern part of the 20km study area with aviation warning lights, as follows:

- Corriemoillie (four aviation warning lights);

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- Lochuichart (two aviation warning lights); and
- Consented Kirkan (six aviation warning lights at 2000/200cd).

1.9.21 There are no other application wind farms proposed to be lit within the study area. It is, however, unclear if the scoping pre-application Fairburn Extension Wind Farm would be lit, therefore it is excluded from the assessment.

Table 6.4.3 Night-time WLA Assessment of WLA24: Central Highlands – WLQ 1

WLQ 1 ***An extensive and awe-inspiring range of large scale, high and rugged mountains***				
Sensitivity	The NatureScot Technical Guidance: Assessing Impacts on Wild Land Areas (2023) advises that WLAs are of national importance and a High value is accorded in this assessment. The area is not however formally promoted or valued for its dark skies, and for example does not form part of a Dark Sky Park. This latter consideration has not been considered as part of the assessment. The WLA is a dark area with little or no existing lighting within the baseline, meaning that it has a High susceptibility to change. There would, however, be very few people within this area at night, with most people accessing the area during the day. The area is not specifically known for its wild camping. These two latter points have not been considered as part of the assessment. Overall, the sensitivity of this WLQ is assessed as *High*.			
Darkness Survey	Viewpoint 15: Meall a'Mhadaibh, photographed 17 September at 20:20. The dark horizon and silhouettes of hills can just be made out in the foreground and mid-ground. The baseline level of light within the full 360° view is largely dark but not unlit especially in the view towards the proposed development, as illustrated, however, the overall level of light within the full 360° view is largely dark (but not unlit). Across the dark hills in the foreground and mid-ground, scattered lights are visible in the distance associated with the settled landscape including settlements, isolated properties and farms, vehicle lights, lights associated with the Cromarty Firth, the red lights of the Black Isle Transmitter Masts, and the red lights of Kessock Bridge. Viewpoint 4: Beinn a'Bhathaich Ard - Viewing across the low dark hills in the foreground but with multiple light sources in the midground and far distance including lights from the settled landscape including City of Inverness and other scattered smaller settlements, vehicle lights, industrial lights on the Cromarty Firth and the Black Isle Transmitter masts. Viewpoint 16: Sgurr a'Choire Ghlais - Viewing across the low dark hills in the foreground and mid-ground but with light sources in the far distance including lights from the settled landscape including scattered settlements and the Black Isle Transmitter masts.			
Magnitude of Change	Viewpoint 15 - The nearest visible lit turbine is T14 at 14.5km distance and up to four lights would be visible affecting approximately 8° horizontal FoV. None of the physical WLQ are visible. These relate closely to the rugged and rocky geology of the mountains which would not be discernible at night, except in other directions opposite to the proposed development. The magnitude of change would be *Very Low to Zero*. The angle intensity mitigation would have limited effect at this elevated location. Viewpoint 4 - The nearest visible lit turbine is T20 at 5.9km distance and all six lights would be visible affecting approximately 28° horizontal FoV. None of the physical WLQ are visible. These relate closely to the rugged and rocky geology of the mountains which would not be discernible at night, except in other directions opposite to the proposed development. The magnitude of change would be *Low-Very Low to Zero*. The angle intensity mitigation would reduce the lights to between 116-48cd. Viewpoint 16 - The nearest visible lit turbine is T14 at 16.9km distance and up to two lights would be visible affecting approximately 5° horizontal FoV. None of the physical WLQ are visible. These relate closely to the rugged and rocky geology of the mountains which would not be discernible at night, except in other directions opposite to the proposed development. The magnitude of change would be *Very Low to Zero*. The angle intensity mitigation would have limited effect at this elevated location.			
Assessment:	**Sensitivity**	**Magnitude**	**Level of Effect**	**Significance**
	High	Low-Very Low, to Zero	Moderate to Minor, to None	Not Significant

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Cumulative Effects: Scenario 1 (Existing and Consented development)	Lights from the existing Corriemoillie and Lochuichart, and consented Kirkan within 20km of the proposed development would be visible in the north (Very Low magnitude).			
	Additional magnitude	Additional effect	Combined magnitude	Combined effect
	Low-Very Low to Zero	Moderate to Minor, to None	Low-Very Low to Zero	Moderate to Minor, to None
Cumulative Effects: Scenario 2 – N/A No other wind farm applications with lit turbines would be visible.				

Table 6.4.4 Night-time WLA Assessment of WLA 24: Central Highlands – WLQ 2

WLQ 2 ***An extensive, remote mountain interior with strong qualities of sanctuary and solitude.***	
Sensitivity	The NatureScot Technical Guidance: Assessing Impacts on Wild Land Areas (2023) advises that WLAs are of national importance and a High value is accorded in this assessment. The area is not however formally promoted or valued for its dark skies, and for example does not form part of a Dark Sky Park. This latter consideration has not been considered as part of the assessment. The WLA is a dark area with little or no existing lighting within the baseline, meaning that it has a High susceptibility to change. There would, however, be very few people within this area at night, with most people accessing the area during the day. The area is not specifically known for its wild camping. These two latter points have not been considered as part of the assessment. Overall, the sensitivity of this WLQ is assessed as *High*.
Darkness Survey	Viewpoint 15: Meall a'Mhadaibh, photographed 17 September at 20:20. The dark horizon and silhouettes of hills can just be made out in the foreground and mid-ground. The baseline level of light within the full 360° view is largely dark but not unlit especially in the view towards the proposed development, as illustrated, however, the overall level of light within the full 360° view is largely dark (but not unlit). Across the dark hills in the foreground and mid-ground, scattered lights are visible in the distance associated with the settled landscape including settlements, isolated properties and farms, vehicle lights, lights associated with the Cromarty Firth, the red lights of the Black Isle Transmitter Masts, and the red lights of Kessock Bridge. Viewpoint 4: Beinn a'Bhathaich Ard - Viewing across the low dark hills in the foreground but with multiple light sources in the midground and far distance including lights from the settled landscape including City of Inverness and other scattered smaller settlements, vehicle lights, industrial lights on the Cromarty Firth and the Black Isle Transmitter masts. Viewpoint 16: Sgurr a'Choire Ghlais - Viewing across the low dark hills in the foreground and mid-ground but with light sources in the far distance including lights from the settled landscape including scattered settlements and the Black Isle Transmitter masts.
Magnitude of Change	Viewpoint 15 - The nearest visible lit turbine is T14 at 14.5km distance and up to four lights would be visible affecting approximately 8° horizontal FoV. None of the WLQ are visible in the direction of the proposed development ("*remote, secluded interior*" with "*strong perception of sanctuary and solitude")*. Existing light sources are visible in the distance to the northeast in the direction of the proposed development and the aviation warning lights would appear as part of this group adding to some of the existing red colouration. The magnitude of change would be *Very Low to Zero*. The angle intensity mitigation would have limited effect at this elevated location. Viewpoint 4 - The nearest visible lit turbine is T20 at 5.9km distance and all six lights would be visible affecting approximately 28° horizontal FoV. None of the WLQ are visible in the direction of the proposed development ("*remote, secluded interior*" with "*strong perception of sanctuary and solitude")*. Existing light sources are visible in the distance to the northeast in the direction of the proposed development and the aviation warning lights would appear as part of this group adding to some of the existing red colouration. The magnitude of change would be *Low-Very Low to Zero*. The angle intensity mitigation would reduce the lights to between 116-48cd. Viewpoint 16 - The nearest visible lit turbine is T14 at 16.9km distance and up to two lights would be visible affecting approximately 5° horizontal FoV. None of the WLQ are visible in the direction of the proposed development ("*remote, secluded interior*" with "*strong perception of sanctuary and solitude")*. Existing light sources are visible in the distance to the northeast in the direction of

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	the proposed development and the aviation warning lights would appear as part of this group adding to some of the existing red colouration. The magnitude of change would be *Very Low to Zero*. The angle intensity mitigation would have limited effect at this elevated location.			
Assessment:	**Sensitivity**	**Magnitude**	**Level of Effect**	**Significance**
200 cd	High	Low-Very Low, to Zero	Moderate to Minor, to None	Not Significant
Cumulative Effects: Scenario 1 (Existing and Consented development)	Lights from the existing Corriemoillie and Lochuichart, and consented Kirkan within 20km of the proposed development would be visible in the north (Very Low magnitude).			
	Additional magnitude	Additional effect	Combined magnitude	Combined effect
	Very Low to Zero	Low-Very Low, to Zero	Moderate to Minor, to None	Not Significant
Cumulative Effects: Scenario 2 – N/A No other wind farm applications with lit turbines would be visible.				

1.10 Night-time WLA Assessment: Statement of significance

1.10.1 To conclude, the aviation warning lights associated with the proposed development would not significantly affect any of the WLAs or their associated WLQs.

1.10.2 A summary of the assessment is provided in **Table 6.4.5** and the main assessment is provided in **Tables 1.11-16**.

Table 6.4.5 Summary of Night-time Wild Land Area Assessment

Wild Land Area / Quality	Light Intensity	Sensitivity	Magnitude	Level of Effect	Significance
WLA 24: Central Highlands					
WLQ 1:	200cd	High	Low-Very Low to Zero	Minor to None	Not Significant
WLQ 2:	200cd	High	Low-Very Low to Zero	Minor to None	Not Significant

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1.11 References

NatureScot (2023) Assessing Impacts on Wild Land Areas, Technical Guidance.

NatureScot, (November 2024) Guidance on Aviation Lighting Impact Assessment.

NatureScot, (2022) General pre-application and scoping advice for onshore wind farms Guidance, Annex 2.

Landscape Institute (September 2019). Visual Representation of Development Proposals, Technical Guidance Note 06/19.

Scottish Natural Heritage (2017). Description of Wild Land Area 24.

Scottish Natural Heritage (February 2017). Visual Representation of Wind Farms, Version 2.2.

Scottish Government (2014) Scottish Planning Policy.

Scottish Government (2023) National Planning Framework 4.

Scottish Natural Heritage (2014) Wild Land Areas 2014.

Scottish Natural Heritage (2012) Mapping Scotland's Wildness.

Scottish Natural Heritage (2002) Wildness in Scotland's Countryside. Policy Statement 02/03.

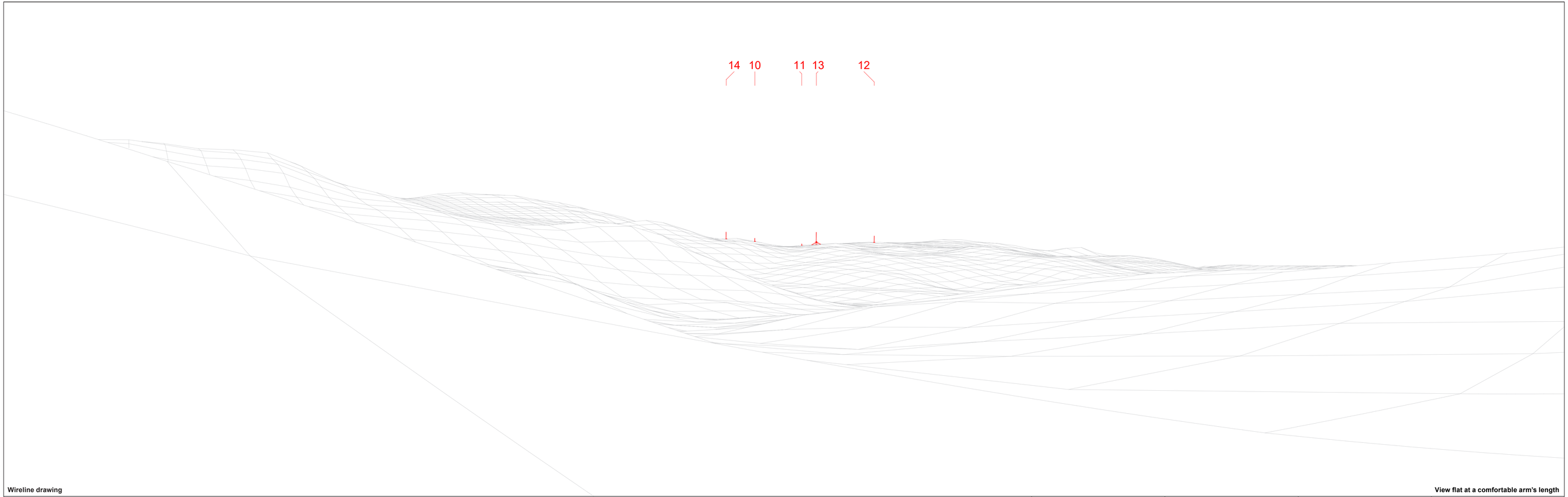
Wind Power Aviation Consultants Ltd (April 2025). Ballach Wind Farm Aviation Lighting and Mitigation Technical Appendix V1.1. Technical Appendix 14.1.

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Annex 1: Glossary of physical attributes and perceptual responses

Physical attributes	Explanation
High degree of perceived naturalness	Within WLAs vegetation cover is primarily composed of natural or semi-natural habitats (which may not be, ecologically, in the best condition). Catchment systems and other geomorphological processes are largely unmodified. The term 'perceived naturalness' reflects that some may consider the vegetation cover to be more 'natural and unmanaged' than they are in fact (for example, managed heather moorland).
A lack of modern human artefacts or structures	There is no or very limited evidence of contemporary buildings, structures or engineering works within WLAs although their presence outwith may be discerned. Older artefacts (for example, shielings and cleared settlements) and small-scale features (for example, fences and stalkers paths) may be evident.
Little evidence of contemporary land uses	Within WLAs no or very limited evidence of more intensive land use, but their presence outwith may be discerned. Extensive grazing and management for field sports may be evident (for example, muirburn, grazing pressure and use of ATVs).
Landform which is rugged, or otherwise physically challenging	Within WLAs, land that has extensive rough terrain or extensive boglands, which is difficult to traverse.
Remoteness and / or inaccessibility	Within WLAs, land that is distant from public motorised access (the nearest public road, ferry landing or railway station), taking account of the distance, barriers to travel (for example, lochs, rivers and cliffs), and ease of travel on foot / bicycle.
A sense of sanctuary or solitude	The perception of separation from the 'modern world', isolation or distance from disturbance, that engenders feelings of respite or tranquillity, that enables a focus on the natural / semi-natural setting.
Risk or, for some visitors, a sense of awe or anxiety	The perception of hazard that arises from being self-reliant in remote settings of large scale, whose rugged natural character and isolation from assistance (if required) engenders respect.
Perceptions that the landscape has arresting or inspiring qualities	An aesthetic reaction to the natural / semi-natural setting, often associated with the 'classic' high, steep and jagged mountains juxtaposed with deep lochs or seas, but can also be prompted by other superlative compositions such as the large scale simplicity of rounded massif, or the seemingly infinite expanse of open peatland or seas.
Fulfilment from the physical challenge required to penetrate into these places	The satisfaction and sense of accomplishment that arises from the physical effort required to traverse these settings, tackling their scale, topography, ground and weather conditions.

Source: NatureScot, Assessing Impacts on Wild Land Areas, Technical Guidance, 2023.



Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Ballach Wind Farm | Existing | Consented | Application | Scoping

OS reference:	E237 547, N839 876	Horizontal field of view:	90º (cylindrical projection)
Eye level:	75.7m AOD	Principal distance:	522mm
Direction of view:	38º	Paper size:	841mm x 297mm (half A1)
Nearest turbine:	8,114m	Correct printed image size:	820 x 260mm

Client: EnergieKontor

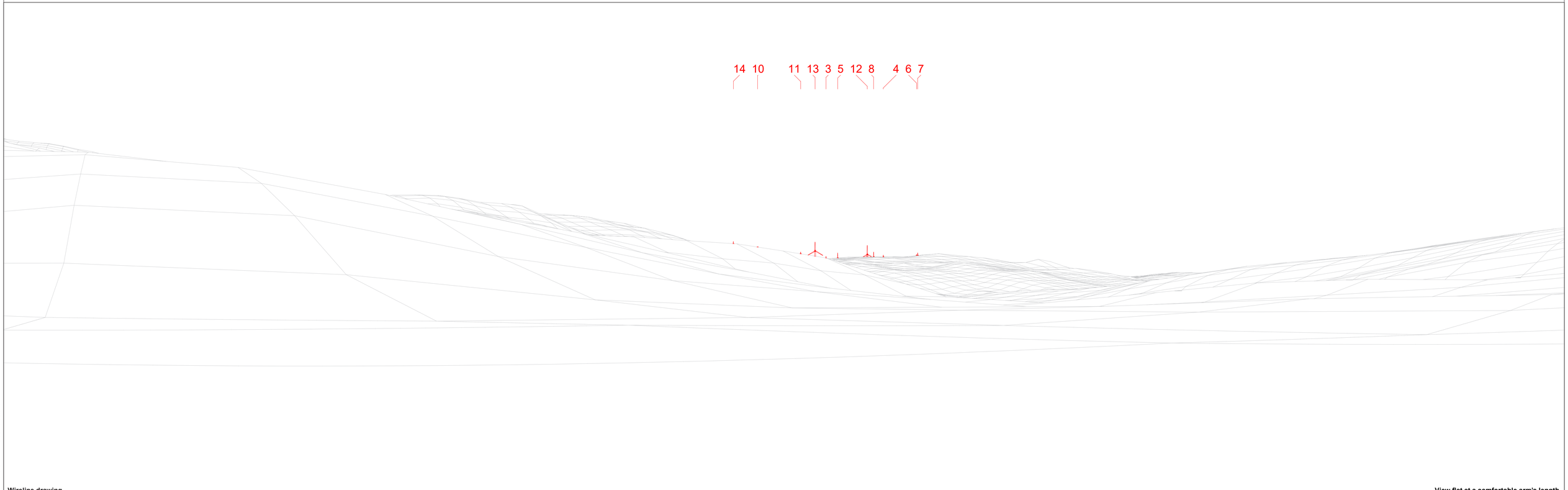
Ballach Wind Farm
EIA Report

Figure: Appendix 6.5.A
Viewpoint: A
Name: Track on eastern edge along Glen Strathfarrar

June 2025

wsp

Appendix 6.5 Extra Wirelines VP12-14 Originator: UKCGW775



Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Ballach Wind Farm | Existing | Consented | Application | Scoping

OS reference:	E236 858, N839 277	Horizontal field of view:	90° (cylindrical projection)
Eye level:	76.6m AOD	Principal distance:	522mm
Direction of view:	39°	Paper size:	841mm x 297mm (half A1)
Nearest turbine:	9,022m	Correct printed image size:	820 x 260mm

Client: EnergieKontor

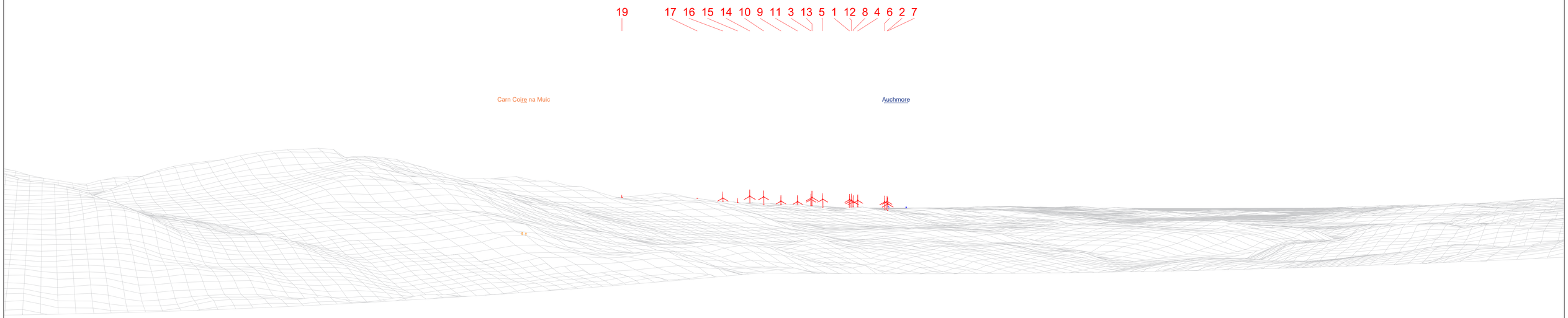
Ballach Wind Farm
EIA Report

Figure: Appendix 6.5.B
Viewpoint: B
Name: Track south of Culligran Wood on eastern end of Glen Strathfarrar

June 2025

wsp

Appendix 6.5 Extra Wirelines VP12-14 Originator: UKCGW775



Wireline drawing

View flat at a comfortable arm's length

Wind Farm Key: Ballach Wind Farm | Existing | Consented | Application | Scoping

OS reference:	E234 315, N837 460	Horizontal field of view:	90º (cylindrical projection)
Eye level:	546.2m AOD	Principal distance:	522mm
Direction of view:	43º	Paper size:	841mm x 297mm (half A1)
Nearest turbine:	11,811m	Correct printed image size:	820 x 260mm

Client: EnergieKontor

Ballach Wind Farm
EIA Report

Figure: Appendix 6.5.C
Viewpoint: C
Name: Carn nam Barran

June 2025

Appendix 6.5 Extra Wirelines VP12-14 Originator: UKCGW775

Ballach Wind Farm

Environmental Impact Assessment Report
Volume 4
Appendix 7.1: Cultural Heritage Background and Gazetteer

July 2025

7 INTRODUCTION

7.1.1 This Appendix contains the Cultural Heritage background related to the proposed development, and provides details of previous archaeological investigations, a historical background, the archaeological potential of the proposed development, and a gazetteer of all heritage assets within the baseline.

7.1.2 Each entry in the gazetteer has a heritage asset (A) reference number which is used to identify it within the assessment and on Figure 7.1: Designated Heritage Assets and ZTV and Figure 7.2: Non-designated Heritage Assets. The heritage assets also have a unique identifying number provided by Historic Environment Scotland (HES) and / or The Highland Council Historic Environment Record (HER).

7 CULTURAL HERITAGE BACKGROUND

7.1 Geology

7.1.1 The proposed development is located 4km west of Kilmorack, on the Erchless and Farley Estates, and lies within the Northern Highlands Terrane and is underlain primarily by metamorphic rocks of the Moine Supergroup. These rocks, consisting largely of psammites and pelites, originated as Neoproterozoic marine sediments and were subsequently metamorphosed during the Caledonian Orogeny, a major tectonic event in the Palaeozoic that deformed much of the Scottish Highlands (British Geological Survey, 2025a). Structural features such as tight folding, faulting, and foliation are common, reflecting the region's complex tectonic history. In some areas, these rocks are in contact with older basement rocks such as those of the Lewisian Gneiss Complex, which date back over 2.5 billion years.

7.1.2 The superficial geology underlying the proposed development is shaped primarily by glacial and post-glacial processes from the Quaternary period. During the last glaciations, ice sheets eroded the bedrock and deposited glacial till across the landscape. As the ice retreated, it left behind characteristic features such as moraines, drumlins, and meltwater channels (British Geological Survey, 2025b). Additionally, post-glacial sediments, including alluvium and peat, have accumulated in valleys and depressions, contributing to the area's varied surface deposits and influencing local hydrology and ecology.

7.1.3 From an archaeological perspective, the variation in superficial deposits has implications for past human activity. Areas of well-drained glacial and alluvial soils would have been more favourable for early settlement, agriculture, and routeways. In contrast, the presence of extensive peat deposits suggests areas of persistent waterlogging, which would have limited habitability but may preserve organic archaeological materials such as wooden structures or information on past environments. The geological context directly informs the archaeological potential of the site, particularly where interfaces between dryland and peatland may have attracted episodic use or preserved buried evidence.

7.2 Walkover Survey

7.2.1 A walkover survey was carried out within the proposed development between the 4th and 6th of June 2025. The purpose of the survey was to record any visible archaeological remains, historical structures, or culturally significant landscape elements that might be impacted upon by the proposed development. During the site walkover much of the site could not be visited due to health and safety concerns associated with attempting to traverse the steep topography.

7.3 Previous Archaeological Work

7.3.1 Previous archaeological studies within the proposed development, or immediately adjacent to it comprise a desk-based assessment and five walkover surveys. These have identified a diverse range of heritage assets, including possible prehistoric features, post-

medieval rural settlements and remnants of early modern infrastructure. These are summarised to follow:

- Hughton water mains renewal, Inverness [EHG1072]- A desk-based assessment and walkover survey in 2004. There were 14 archaeological sites identified on the route or close to, the proposed pipeline, mainly related to former agricultural landscapes partly removed due to agricultural improvements in the late 19th century or early 20th century.

- Forest road construction, Erchless Estate [EHG4746]- A walkover survey prior to the construction of new forestry roads on the Erchless Estate was carried out by P Porteous of Finlayson Hughes Solicitors in 1996. A small number of sites, including ruined croft buildings and associated features were noted.

- Walkover survey, Upper Gleann Goibhre, Kilmorack [EHG3897] – A walkover survey was carried out by members of NOSAS in June 2002 to record the archaeological features within the area of Upper Gleann Goibhre. Eighteen archaeological features were recorded, comprising 15 shieling huts, 2 enclosures, and a pen.

- Topographic survey, Urchany, Kilmorack [EHG3790] – A topographic survey of the earthworks of a possible henge at Urchany, Kilmorack was carried out by members of the North of Scotland Archaeological Society (NoSAS) in 2013.

- Walkover and topographic surveys, Urchany, near Beauly [EHG5395] – Walkover and topographic surveys covering approximately four square kilometres at Urchany were carried out by the North of Scotland Archaeological Society (NoSAS) in 2015. A large number of new archaeological sites were recorded, ranging from prehistoric hut circles to post-medieval settlements.

- Scotland's Rock Art Project (ScRAP) – Site visits, measured survey and photography [EHG6169] – A five-year project (January 2017 – December 2021) run by HES and funded by the Arts and Humanities Research Council (AHRC), aimed at improving understanding and awareness of prehistoric rock art in Scotland. In the Highlands, project coordinators trained and worked with the North of Scotland Archaeological Society (NOSAS) to record rock art panels. These panels were subject to detailed recording, including high-resolution digital photography and the creation of accurate 3D digital photogrammetric models.

7.4 Baseline Discussion

7.4.1 There are 71 heritage assets included within the baseline for this assessment, the locations of which are shown on figures 7.1 and 7.2.

7.4.2 There are 59 Designated Heritage Assets included within the baseline for this assessment. Scheduled Monuments, Category A Listed Buildings and Gardens and Designed Landscapes have been considered within a 10km Study Area of the turbine locations. In Consultation with HES additional assets were also considered that lie outside of the 10km study area. These consist of 42 Scheduled Monuments, five Gardens and Designed Landscapes (GDLs) and five Category A Listed Buildings.

7.4.3 Category B and C Listed Buildings were considered within a 5km study area around the turbine locations. There are four Category B Listed Buildings and three Category C Listed Buildings within the 5km study area.

7.4.4 There are 12 Non-Designated Heritage Assets within the proposed development boundary, consisting of post-medieval agricultural remains such as shielings and clearance cairns.

7.4.5 The heritage assets within the baseline are detailed within the gazetteer (table 1.1) and discussed in the context of a timeline of archaeological periods from prehistoric through to modern.

7.4.5.1 Prehistoric Period (13,000 BCE to CE 400)

7.4.6 The study area surrounding the proposed development contains a rich and diverse range of heritage assets, demonstrating continuous and evolving human activity throughout the prehistoric period. These heritage assets reflect the development of settlement, ritual, and defensive practices, offering a detailed picture of prehistoric life in this part of the Scottish Highlands (Highland Council HER, 2025.; Historic Environment Scotland, 2025.)

7.4.7 There are 14 chambered cairns within the baseline, consisting of Clachan Corrach (SM2466; A7), Preas Mairi (SM2397; A9), Brahan Wood (SM3839; A10), Balvaird Wood (SM4741; A14), Drumrunie (SM4565; A17), Muir of Conon (SM4652; A18), Cairn Irenan (SM3122; A20), Carn Glas (SM3213; A21), Balvaird (SM3635; A22), Kilcoy North (SM4606; A25), Kilcoy South (SM4650, A26), Belladrum (SM2435; A50), Belladrum Home Farm (SM3194; A54), and Auchvaich (SM4744, A58) providing substantial evidence of Neolithic funerary practices. These monuments were often placed in elevated or prominent landscape positions and are closely associated with ancestral veneration and territorial identity. The cairns are primarily located on the valley floor between the rivers Beauly and Conon, to the northeast of the proposed development.

7.4.8 Complementing these are henge monuments consisting of Achilty (SM1667; A4), Conon Bridge (SM1666; A11), Dugary (SM3403; A16), and Castle Hill (SM1665; A29) which are believed to have served ceremonial or astronomical functions, further underscoring the spiritual significance of the area during the Neolithic.

7.4.9 A series of standing stones at Windhill (SM3127; A31, SM3128; A32), as well as the barrow at Urchany (SM13523; A38), also likely played roles in ritual activity, land demarcation, or seasonal observation, consistent with wider patterns of symbolic landscape use in prehistoric Scotland.

7.4.10 In addition to the Neolithic chambered cairns and henge monuments, the study area also contains evidence of continued funerary practices into the Bronze Age, demonstrating a sustained ritual use of the landscape. Notably, three round cairns or barrows, (A10, A17 and A38) are attributed to the Bronze Age. These burial monuments represent a shift from the communal burial practices of the Neolithic chambered cairns to more individual or small-group burials typical of the Bronze Age, while still maintaining continuity in the use of prominent or symbolically significant locations, evidence by these monuments being located close to the earlier neolithic cairns.

7.4.11 The presence of these Bronze Age barrows, along with Neolithic standing stones and henge monuments, many of which likely remained visible and culturally important, supports the interpretation of a long-lived ritual landscape. This continuity helps bridge the narrative between Neolithic ceremonial activity and the later emergence of Iron Age fortified settlements, showing an enduring relationship between people, place, and ancestry across millennia.

7.4.12 The Iron Age period saw increasing social complexity, reflected in the emergence of forts, duns, and brochs. Within the study area there are forts at Knock Farril (SM1672; A2), Carn Na Buaile (SM11056; A5), Dun Mor, near Dunmore (SM3107; A33), Dun Fhamhair (SM5212; A34), Dun Garbhlaich (SM2422; A35), Dun a Chliabhain (SM2424; A37), Dun Mor, near Breakachy Burn (SM4979; A39), Corff House (SM3195; A41), and Dun Mor, Ballindoun (SM2423; A46). There is also a broch at Castle Spynie (SM4653; A51), located approximately 10km from the proposed development, and the dun at Erchless Castle (SM5004; A59), is located approximately 650m from the proposed development.

7.4.13 These structures typically occupy high ground, suggesting a strategic approach to defence, social control, and visibility, often overlooking routes and resources in the surrounding valleys. Their construction and location point to hierarchical societies that placed increasing importance on land control and territorial defence.

7.4.14 Settlement activity is further evidenced by enclosures, such as the one at Phoineas Hill (SM4729; A47), located 9km to the southeast of the proposed development, which may represent domestic, pastoral, or ceremonial enclosures used in later prehistory.

7.4.15 The presence of multiple heritage assets with overlapping periods of use, such as Loch Kinellan crannog (SM3987; A3), located approximately 9km to the north of the proposed development, used in both prehistoric and modern times, illustrates the longevity and adaptability of key locations within the landscape.

7.4.16 Collectively, this network of prehistoric heritage assets illustrates how the area around the proposed development functioned as an active and important hub of human activity. The distribution and variety of heritage assets highlight changing economic strategies, spiritual beliefs, and social organization over millennia. The presence of forts, cairns, standing stones, and ritual enclosures in close proximity to the proposed development underscores the area's continued regional significance throughout prehistory.

7.4.17 While all of the heritage assets described above are located within the wider study area, there are no known prehistoric heritage assets recorded within the boundaries of the proposed development itself. However, based on its topographic setting comprising gently sloping, south-facing ground within a broader landscape rich in prehistoric remains it is likely that the lower lying areas of the proposed development area was utilised during prehistory for low intensity agricultural or pastoral activity. Such use would have supported the subsistence strategies of nearby settlements and may have involved seasonal grazing, crop cultivation, or woodland clearance.

7.4.17.1 Pictish Period (CE 300 – CE 800)

7.4.18 From around CE 300 to CE 800, the area around the proposed development was within the territory of the Picts, a Celtic-speaking people known for their distinctive symbol stones and fortified settlements (Wainwright, 1975). Pictish communities lived in small farmsteads and villages, continuing to clear and manage woodland for agriculture and animal husbandry, while relying on forest resources for fuel and materials (Henderson & Henderson, 2004). Fortified hilltop sites were common in the Highlands, serving defensive and territorial functions near strategic forested and riverine landscapes (Armit, 2013). The Picts are famed for their carved stones, decorated with abstract symbols, animals, and mythological scenes, reflecting complex religious and social systems (Laing, 2006).

7.4.19 Although the wider region was part of Pictish territory during this period, there are no known Pictish heritage assets within the proposed development boundary. Based on current archaeological evidence and the character of surrounding landscapes, it is likely that the lower lying areas of the proposed development was used during this period for low-intensity agricultural activity or seasonal grazing, potentially associated with small, dispersed settlements.

7.4.19.1 Medieval Period (CE 800 – CE 1614)

7.4.20 The medieval landscape surrounding the proposed development demonstrates a transition from prehistoric lifeways to increasingly complex and organized Christian and feudal societies. The collection of medieval heritage assets includes ecclesiastical, defensive, agrarian, and ceremonial sites, reflecting diverse aspects of life during this period.

7.4.21 At the core of ecclesiastical development are heritage assets such as Beauly Priory (SM90031; A36), located within Beauly approximately 7km to the east of the proposed development. Beauly Priory was a significant religious centre founded in the early 13th century by the Valliscaulian order. This extensive priory and burial ground formed part of a broader monastic network across the Highlands and had substantial spiritual, cultural, and economic influence across the region during the medieval and post-medieval periods. Nearby, Kiltarlity Old Parish Church (SM5570; A43), located approximately 5km to the southeast of the proposed development and Gilchrist, Old Church of Kilchrist (SM1682; A30), located approximately 8km to the east of the proposed development, reflect the later medieval consolidation of Christian parish structures, marking the deepening religious and administrative control over rural communities.

7.4.22 Defensive and domestic elements from the medieval period are represented by heritage assets such as David's Fort, Balavil Wood (SM2500; A13) a homestead moat located approximately 10km to the northwest of the proposed development, that likely served as a moated farmstead or minor fortified residence, possibly occupied by a local landholder during the 12th–14th centuries. Similarly, the earthwork at Achnasoul (SM13629; A24), located approximately 5km to the northwest of the proposed development, represents another medieval defensive or domestic site, strategically located with visibility over its surroundings, consistent with rural lordship or agricultural control.

7.4.23 Corff House fort (SM3195; A41), while initially a prehistoric site, likely experienced reoccupation or modification during the medieval period, illustrating how older monuments continued to play a role in the spatial strategies of later societies either reused for defence or invested with cultural significance. The fort is located on high ground overlooking the River Beauly, approximately 6km to the east of the proposed development.

7.4.24 The stepped mound at Tom na Croiseige (SM3196; A56), located approximately 8km east of the proposed development, may relate to medieval ceremonial or judicial activity, possibly functioning as a moot hill or symbolic gathering place. Such mounds were commonly associated with early local assemblies, proclamations, or legal customs under the evolving feudal framework.

7.4.25 Although fewer in number than the prehistoric remains, these medieval heritage assets suggest a structured and hierarchical landscape, rooted in landholding, religious practice, and seasonal agrarian cycles. The shift from dispersed ritual landscapes of prehistory to fixed centres of power, worship, and administration is evident in both the spatial and typological characteristics of these sites.

7.4.26 Within the proposed development, seasonal pastoral activity may have been the dominant land use during the medieval period, continuing into and expanding throughout, the later post-medieval period.

7.4.26.1 Post-medieval Period (CE 1624 – CE 1900)

7.4.27 The post-medieval landscape within and surrounding the proposed development reflects a period of significant transformation, driven by shifts in landownership, infrastructure, estate development, and early industrial activity. The distribution and character of the heritage assets from this period point to the region's integration into wider social, economic, and architectural changes unfolding across the Highlands from the 16th to 19th centuries.

7.4.28 Prominent among these are the designed landscapes and elite residences that emerged during the post-medieval period, a reflection of the subdivision of land into private estates. The heritage assets of Castle Leod (GDL00094; A1), Brahan (GDL00068; A12), Fairburn (GDL00174; A15), Beaufort Castle (GDL00052; A45), and Belladrum (GDL00415; A60), are all recorded as Gardens and Designed Landscapes (GDLs), demonstrating the fashion for estate improvement and formal landscape design from the 17th century onwards. These properties often formed the heart of extensive estates, incorporating ornamental planting, woodland management, and productive farmland, and typically centred around Category A listed houses such as Coul House (LB1769; A8), located approximately 8km to the north of the proposed development and Fairburn Tower (LB14030; A19), located approximately 4km to the north of the proposed development; the latter an exceptional surviving example of a 16th-century tower house. While these lie within the wider study area, the landscape around the proposed development area would have been influenced by the estate policies and land use practices developed at these centres.

7.4.29 Evidence of pastoralism and seasonal transhumance in the Highlands during the post-medieval period, and possibly earlier, is captured in the shieling huts at Gleann Goibhre

(A61), Rie Fask in dune (A64) and Allt na Creagach, Kilmorack (A62). These temporary summer dwellings reflect a land-use pattern where people moved livestock to upland pastures during warmer months, a practice deeply embedded in Highland culture and economy across multiple periods.

7.4.30 It is also possible that some of these features or similar structures in the surrounding area date to later periods and may relate to the depopulation of the Highlands during the 18th and 19th centuries, particularly during the Highland Clearances. During this time, many tenant communities were evicted by estate owners to make way for more profitable sheep grazing. The reuse or adaptation of upland landscapes for extensive grazing would have continued the visibility of pastoral structures even after traditional transhumance systems had declined.

7.4.31 The former township located on the access track to the proposed development area may provide physical evidence of this process. Its abandonment may reflect the widespread displacement of rural populations and transformation of land use patterns typical of the Clearance period.

7.4.32 The Beaufort Castle estate (LB8068; A44, GDL00052; A45) exemplifies these broader Highland estate trends, blending military origins with later architectural refinements, and framed by structured parklands. Its proximity to the study area demonstrates the political and economic influences shaping land management near the proposed development, reflecting the role of the Clan Fraser and later proprietors in shaping the local post-medieval environment.

7.4.33 Infrastructure development is represented by a series of bridges that facilitated movement across the region's rivers and glens. Old Bridge, Contin (LB1789; A6), located approximately 9km to the north of the proposed development, Orrin Bridge (LB14020; A27), located approximately 3.5km to the north of the proposed development and Lovat Bridge (LB8083; A40), located approximately 6km to the east of the proposed development, are all within the study area, with Lovat Bridge being of particular note as being Category A listed for its engineering and historical significance. These structures supported the increasing mobility of people and goods during the 18th and 19th centuries, especially as the military and drove road networks were expanded to integrate the Highlands with the rest of Scotland.

7.4.34 Smaller scale but still historically valuable are estate cottages and domestic buildings, including Druim Cottage (LB7127; A48), Smithy Cottage (LB49020; A49), and the Lodge and main house at Aigas (LB7126; A53, LB7125; A55). These Category B and C listed buildings, all located approximately 4km to the southeast of the proposed development, represent the expansion of estate-based housing, often built to serve estate workers, gamekeepers, or as part of agricultural improvement efforts.

7.4.35 Lastly, Kilmorack Manse (LB7124; A42), located approximately 4.5km to the southeast of the proposed development, a Category B listed former clerical residence, underscores the enduring influence of ecclesiastical landholding and religious authority in the post-Reformation period. Its architecture and siting near established parishes link it to earlier religious institutions while marking a new phase of Protestant clerical presence in the region.

7.4.36 Together, these heritage assets portray a post-medieval environment shaped by estate consolidation, architectural refinement, expanding infrastructure, and evolving land-use practices. The proposed development did not remain entirely isolated but would have been focussed on rural, pastoral activity that captures the changes in the Highland way of life.

7.4.36.1 Modern (CE 1900 – Present)

7.4.37 The modern period in the area surrounding the proposed development reflects ongoing social change, religious transformation, rural adaptation, and the preservation or re-use of earlier heritage assets.

7.4.38 The only new, modern development in the study area is the Orrin Dam (LB51708; A28), introducing modern infrastructure and early hydro-electric development, reflecting 20th-century industrial interventions into the post-medieval landscape.

7.4.39 Loch Kinellan crannog (SM3987; A3), originally constructed during prehistory, was reportedly used as a hunting seat by the Earls of Ross in the medieval period and later functioned as a kitchen garden in the 19th century. Its dual designation (Prehistoric/Modern) suggests long-term continuity of interest in the artificial island, including possible 18th or 19th century reinterpretations in line with antiquarian or estate landscaping trends.

7.4.40 Although the modern period is underrepresented in terms of wholly new designated heritage assets, it is nonetheless visible through the adaptation of earlier structures, the ongoing use of traditional land-use systems, and the emergence of heritage consciousness, which began to take shape during the Victorian period and continued into the 20th century. These factors contribute to the composite historical character of the study area, where past and present remain visibly intertwined.

7.4.41 Archaeological Potential

7.4.42 This section discusses the archaeological potential of the proposed development area to contain currently unknown archaeological remains. The archaeological potential is assessed for each chronological period, based on the archaeological and historical background of the area, its geology and topography, the likelihood for evidence of past activity, and considering past disturbance which may have affected survival. For example, the proposed development area may have high potential for the presence of an activity of a particular period, but with low survival. This section also includes professional opinion on the likely cultural significance of such remains, where there is low to high potential for such to be present. For each chronological period where the potential is assessed as negligible, this implies that remains from the period are not anticipated to be present within the proposed development, and an assessment of cultural significance is not made. The assessment of archaeological potential has also been informed by a site visit which included a walkover of the access route and accessible turbine locations.

7.4.42.1 Prehistoric Period

7.4.43 The proposed development has low potential to contain previously unknown prehistoric archaeology. The only known heritage assets within the proposed development are of post-medieval origin and are still upstanding, with no evidence of features having been ploughed out. The proposed development area itself is situated on steep, boggy ground, with poor drainage and challenging topography. These environmental factors would have made the location unsuitable for permanent prehistoric settlement or cultivation. The more level sections of the access track may present slightly greater archaeological potential, as would the area around the Urchany Barrow (SM13523, A38) but overall, the landscape characteristics of the development area suggest low potential for prehistoric remains. No features of archaeological interest were noted within the access route during the site walkover. Accordingly, any prehistoric archaeological remains within the proposed development area would be unexpected and are likely to be isolated archaeological remains related to transient activity, and of low value.

7.4.43.1 Pictish Period

7.4.44 The proposed development has negligible potential to contain Pictish archaeological remains. There is no known evidence of Pictish activity within the study area, and the proposed development is located on the margins of earlier prehistoric and later medieval and post-medieval activity. While Pictish remains elsewhere in the Highlands are typically represented by symbol stones, carved monuments, or settlement near prominent prehistoric features or key routeways, none of these indicators are present within or immediately adjacent to the proposed development.

7.4.44.1 Medieval Period

7.4.45 The proposed development has low potential to contain medieval archaeological remains. The only potential heritage assets from this period are shieling huts, which are still upstanding and have already been recorded. Given the steep, boggy terrain and remote upland setting, the area was unlikely to have supported permanent settlement or significant agricultural activity during the medieval period. The potential for discovering previously unrecorded medieval remains within the proposed development would be confined to additional shielings, field boundaries, or other agricultural remains. These would likely be of negligible to low archaeological value due to their ubiquity and relatively recent origin within the medieval to post-medieval transition.

7.4.45.1 Post-medieval Period

7.4.46 The proposed development has low potential to contain post-medieval archaeological remains. Within the proposed development, the archaeological potential for unknown post-medieval remains is limited and primarily associated with pastoral agricultural use. The topography and geology of the proposed development as steep, upland, and boggy in places, would not have supported intensive or permanent settlement. It is therefore anticipated that any surviving archaeological remains would relate to seasonal or low-intensity land use, such as grazing. Any additional archaeological remains encountered are likely to be small-scale, of vernacular construction, and of limited extent. These would generally be of negligible to low value depending on their preservation and context,

primarily contributing to our understanding of historical pastoral land management in upland Highland landscapes.

7.4.46.1 Modern Period

7.4.47 The proposed development has negligible potential to contain modern archaeological remains. All modern structures, features, and land use changes in the area are already recorded through existing mapping and aerial survey data. No previously unrecorded modern heritage assets were identified during desk-based assessment or the site visit, and given the openness of the landscape and lack of disturbance, it is unlikely that any such features remain undiscovered.

7.5 References

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Cultural Heritage Gazetteer

Table 1.1. Cultural Heritage Gazetteer

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A1	GDL00094	248626	859329	Castle Leod	Garden & Designed Landscape	This heritage asset consists of a medieval castle which has a landscape which was mainly developed from the 17th to mid-19th century.	Medieval
A2	SM1672; NRHE 12782; MHG7152	250496	858527	Knock Farril, fort, Knockfarrel, Fodderty	Scheduled Monument	This heritage asset consists of a vitrified hillfort on a ridge that overlooks Loch Ussie from the north. It is sub-rectangular in plan measuring 116m northeast to southwest by 30m northwest to southeast and the wall averages 4.5m in width.	Prehistoric
A3	SM3987; NRHE 12467; MHG43472, and MHG6285	247111	857588	Loch Kinellan, crannog	Scheduled Monument	This heritage asset consists of a crannog, measuring 76m east to west and 36m north to south, rising about 0.6m above the water. It is overgrown with bushes, with only a small section of walling visible at the	Prehistoric/Modern

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						west end and becomes accessible from the mainland when the water level is low. Historically, it served as a hunting seat of the Earls of Ross, one of whom hosted Robert the Bruce, and was the departure point for Kenneth MacKenzie's campaign against the Macdonalds between 1485 and 1488. In the 19th century, it was used as a kitchen garden.	
A4	SM1667; NRHE12470; MHG7792	244112	856925	Achilty, henge 180m NE of The Croft	Scheduled Monument	This heritage asset consists of the remains of a Late Neolithic or Early Bronze Age henge. It measures about 9.5m in diameter within a ditch and external bank. The ditch is about 6m broad and broken by an entrance causeway on the east-southeast while the surrounding bank is continuous with no entrance gap.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A5	SM11056; NRHE12474; MHG7789	241151	856689	Carn Na Buaile fort, 780m NNW of Comrie	Scheduled Monument	This heritage asset consists of a prehistoric fort, visible as a tumbled stone wall defining an oval shape enclosure. It measures approximately 28m by 16m.	Prehistoric
A6	LB1789; NRHE12457; MHG6295	245403	856672	Old Bridge, Contin	Category A Listed Building	This heritage asset consists of a Thomas Telford (1812/3) high arched bridge. It has three wide segmental headed arch rings decreasing slightly in height and span from east to west, triangular cutwaters carried up to parapets height as shallow pilasters.	Post-medieval
A7	SM2466; NRHE12414; MHG7888	248840	856544	Clachan Corrach, chambered cairn 375m E of Beallach Farm	Scheduled Monument	This heritage asset consists of the remains of a chambered cairn. The cairn is polygonal measuring 4m by 3m. There is a pair of low jamb stones on the east, three low side slabs and a pair of portal stones marking as a passage, with one lintel in position.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A8	LB1769; NRHE105490; MHG14110	246249	856404	Coul House	Category A Listed Building	This heritage asset consists of an 1821 unusual villa, which is centred on two octagons. This building was extended in 1860 in an identical masonry style now 2-storeys in varying heights.	Post-medieval
A9	SM2397; NRHE12409; MHG6308, and MHG7893	246084	855847	Preas Mairi, chambered cairn	Scheduled Monument	This heritage asset consists of an Orkney Cromarty rectangular chambered cairn with only two portal stones surviving.	Prehistoric
A10	SM3839; NRHE12792; MHG7142	250465	855215	Brahan Wood, chambered cairn 835m NW of Brahan House	Scheduled Monument	This heritage asset consists of megalithic remains at Brahan Wood, featuring several stones with only three still erect, each about 0.76m. The site, once an Orkney-Cromarty round cairn with two polygonal chambers, is now heavily robbed, leaving only parts of a two-compartment chamber visible.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A11	SM1666; NRHE12781; MHG9059	254293	855071	Conon Bridge, henge 230m NE of Riverford	Scheduled Monument	This heritage asset consists of a well-preserved henge. The height is approximately 26m in diameter and consists of a flat oval area surrounded by a 2.7m wide ditch. The outer bank is 3.6m wide. An entry causeway is located through the ditch to the southeast but no break through the ditch.	Prehistoric
A12	GDL00068	251863	854891	Brahan	Garden & Designed Landscape	This heritage asset features a 17th-century designed landscape enhanced by 18th- and 19th-century improvements, showcasing an exceptional collection of specimen trees. Closely associated with the Earls of Seaforth, the landscape includes parkland, woodland, and gardens, and plays a significant role in shaping the character of the surrounding scenery.	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A13	SM2500; NRHE12866; MHG8986	253941	853288	David's Fort, homestead moat, Balavil Wood	Scheduled Monument	This heritage asset consists of David's Fort, a trapezoid-shaped homestead moat with a deep wet ditch and surrounding bank. It features a circular depression inside and is still partially water-filled, originally fed by a nearby artificial pond. Some areas show signs of original entrances and natural changes over time.	Medieval
A14	SM4741; NRHE12863; MHG8989	254128	852797	Balvaird Wood, chambered cairn 450m NNE of East End	Scheduled Monument	This heritage asset consists of an Orkney-Cromarty, polygonal, round chambered cairn, truncated by a field wall, with almost all cairn material removed. Nine stones remain of the chamber, with an entrance in the east, and the main chamber was once oval, measuring approximately 3m by 2m.	Prehistoric (Neolithic)

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A15	GDL00174	246349	852719	Fairburn	Garden & Designed Landscape	This heritage asset consists of a late 18th to early 19th century designed landscape featuring a harmonious blend of gardens, woodlands, and architectural elements, creating a striking impression on the surrounding scenery. Fairburn is particularly renowned for its trees, notably the conifers planted by John Stirling in the 1870s.	Post-medieval
A16	SM3403; NRHE12843; MHG9008	252323	852672	Dugary, henge 425m SE of	Scheduled Monument	This heritage asset consists of a circular earthwork located in a cultivated field on the southeast side of a small hillock. The earthwork features a bank visible in the north and southeast quadrants, enclosing a level circular platform 20m in diameter with a ditch approximately 10m wide and 0.7 m deep.	Prehistoric
A17	SM4565; NRHE12838;	255004	852597	Drumrunie, chambered cairn 170m WNW of Drumrunie Cottage	Scheduled Monument	This heritage asset consists of a completely ruined round cairn spread	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	MHG9013					over an area with a diameter of 21 m. The central region features a single upright slab, likely the back slab of an Orkney-Cromarty type chamber, protruding from the debris.	
A18	SM4652; NRHE12871	254611	852498	Muir of Conon, chambered cairn 630m ENE of East End	Scheduled Monument	This heritage asset consists of a ruined chambered cairn with a diameter of approximately 20m, featuring a passage leading to a chamber divided into two compartments. The site, covered in whin and standing 1.5m high, has eight slabs forming the burial chamber, with the entrance positioned at the east northeast.	Prehistoric
A19	LB14030	246952	852356	Fairburn Tower	Category A Listed Building	This heritage asset consists of a 16th century tower house with early 17th century additions and was restored in 2020-22. The tower comprises 4 storeys and an attic, the walls	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						are lime pointed and harled rubbled.	
A20	SM3122; NRHE12824; MHG9027	256661	852296	Cairn Irenan, chambered cairn	Scheduled Monument	This heritage asset consists of nine boulders arranged in a circle around a cairn, but only four remain standing in their original positions. It is located within a private garden.	Prehistoric
A21	SM3213; NRHE12837; MHG14136	257840	852071	Carn Glas, chambered cairn, 275m SSE of Ross Hill	Scheduled Monument	This heritage asset consists of a chambered cairn of Camster type, significantly reduced due to stone removal. Excavated in 1955, it measures approximately 21m in diameter with a bi-partite chamber containing Neolithic and Beaker pottery, and arrowheads, indicating two successive periods of burial.	Prehistoric
A22	SM3635; NRHE12842; MHG9009	253944	851931	Balvaird, chambered cairn 250m E of Balvaird House	Scheduled Monument	This heritage asset consists of a chambered cairn located at Balvaird, which has been significantly reduced due to stone removal.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						The cairn is 1m high and contains 10 stones, each with a maximum height of 1m, forming a burial chamber with two visible compartments on top. Additionally, there is a third compartment on the east edge, formed by much smaller stones	
A23	SM3123; NRHE12836; MHG9015	257745	851887	Cairns, 430m S of Ross Hill, Kilcoy	Scheduled Monument	This heritage asset consists of a cairn which is about 13m diameter and 2.5m high. The cairn is virtually cut into two halves by Woodhams excavation trench running approximately east to west. Boulders and clay have rolled into the trench and there is no sign of the alleged cist.	Prehistoric
A24	SM13629; NRHE274702; MHG29192	248808	851821	Achnasoul, medieval earthwork 440m SSE of	Scheduled Monument	This heritage asset consists of a moated enclosure, visible as a ditch and concentric internal and external banks which encloses a sub circular area measuring around 43m northwest to	Medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						southeast by 39m northeast to southwest.	
A25	SM4606; NRHE12833; MHG9018	257039	851738	Kilcoy North, chambered cairn 750m NW of Kilcoy Castle	Scheduled Monument	This heritage asset consists of a considerably denuded Orkney-Cromarty type polygonal round chambered cairn, standing 1m high with a diameter of 18m. It features a bipartite chamber with an entrance in the east, though it has been damaged by stone clearance, excavation, and a water tank in the eastern segment.	Prehistoric
A26	SM4650; NRHE12834; MHG9017	257021	851605	Kilcoy South, chambered cairn 700m NW of Kilcoy Castle	Scheduled Monument	This heritage asset consists of an Orkney-Cromarty type polygonal, short horned cairn measuring approximately 15m by 18m long. It features a passage leading to a main polygonal compartment and a circular cell, with remains including pottery sherds, a	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						saddle quern, white quartz, and burnt bones.	
A27	LB14020; NRHE228846	247642	851570	Orrin Bridge, Aultgowrie	Category B Listed Building	This heritage asset consists of a mid-19th century high single span bridge coursed rubble, dressed rubble arch ring and ashlar coped parapet with shaped terminals, splayed approached; and shallow end buttresses.	Post-medieval
A28	LB51708; NRHE288754	240269	850365	Orrin Dam With Integrated Fish Pass, Conon Valley Hydro Electric Scheme	Category B Listed Building	This heritage asset consists of an Orrin Dam, which is a large-scale mass gravity dam, dominating the upper reaches of the Glen Orrin and providing storage capacity and flow regulation for the power station which forms part of the Conon Valley hydroelectric scheme	Modern
A29	SM1665; NRHE12670; MHG9108	252728	849716	Castle Hill, henge	Scheduled Monument	This heritage asset consists of a class 11 henge, with extreme diameters from crest to crest between 30m to 32m. The use of the henge is as a green	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						on Muir of Ord golf course and a short stretch of northwest arc of ditch has been filled in.	
A30	SM1682; LB14037; NRHE12672; MHG9106, and MHG31406	253890	849214	Gilchrist, Old Church of Kilchrist	Scheduled Monument	This heritage asset consists of a roofed redundant chapel with an old kirkyard. Restored in 1870 and now used as a mausoleum.	Medieval
A31	SM3127; NRHE12704; MHG9079	253273	848342	Windhill, standing stone NNE of	Scheduled Monument	This heritage asset consists of a standing stone at a height of 2.3m and about 0.55m square. Located 6.4m to the southwest is stone protruding through the turf and measuring 0.8m by 0.5m by 0.5m high, which may possibly be the remains of a second standing stone.	Prehistoric
A32	SM3128; NRHE12668;	253096	848323	Windhill, standing stone N of	Scheduled Monument	This heritage asset consists of a standing stone 1.7m high by 0.9m broad and 0.3m thick, facing	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	MHG9110					northwest to southeast and tilted to the northwest.	
A33	SM3107; NRHE12671; MHG9107	251268	847195	Dun Mor, fort	Scheduled Monument	This heritage asset consists of a roughly circular dun and outworks. The dun is severely mutilated but its outworks, comprising double ramparts and ditch are well preserved. There is a stone lying on the north arch of the inner rampart bearing a single cup mark.	Prehistoric
A34	SM5212; NRHE12377; MHG2652	248416	847068	Dun Fhamhair, fort	Scheduled Monument	This heritage asset consists of a fort situated on a prominent shoulder with an easy approach from the northeast. The fort is oval, measuring approximately 43m by 35m, with a tumbled wall and visible outer face stones. It features a surrounding modern wall, an outer rampart, and a ditch.	Prehistoric
A35	SM2422;	246605	846572	Dun Garbhlaich, fort, Kilmorack	Scheduled Monument	This heritage asset consists of a fort	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	NRHE12375; MHG2654					situated on a rocky summit. The shape is roughly D shaped and measures 35m east to west by 28m transversely with a drystone wall which has completely tumbled.	
A36	SM90031; NRHE12700; MHG3336, and MHG31423	252755	846473	Beauly Priory, priory and burial ground	Scheduled Monument	This heritage asset consists of the roofless remains of a 13th-century Valliscaulian priory founded by Sir John Bisset. Notable features include a cruciform church with rare 13th-century trefoil windows, a 15th-century east window, and tombs of notable figures such as Sir Kenneth Mackenzie. Remnants of monastic buildings lie south of the church.	Medieval/Post-medieval/Modern
A37	SM2424; NRHE12376; MHG2653	247701	846069	Dun a Chliabhain, fort	Scheduled Monument	This heritage asset consists of an oval dun which measures about 21.5m by 11m within a wall about 3.6m thick with an entrance on the east. The outer wall does not seem to form part	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						of a defence. There is an additional wall outside the bank and the purpose is unknown.	
A38	SM13523; NRHE345775; MHG23302, and MHG56050	244268	845507	Urchany, barrow 595m SW of	Scheduled Monument	This heritage asset consists of a prehistoric burial monument dating to the Bronze Age. A circular grass mound with stone visible, measuring approximately 9m in diameter by 3.5m wide and stands up to 0.9m high.	Prehistoric
A39	SM4979; NRHE12378; MHG2651	245737	845150	Dun Mor, fort	Scheduled Monument	This heritage asset consists of a sub-oval fort on an isolated crag, measuring 24.2m north northeast to south southwest by 16m within a tumbled wall, with a wall thickness of 4.5 to 5.9m. It features an outer wall around the east and south sides, and a further wall to the south enclosing the crag's shoulder	Prehistoric (Iron age)
A40	LB8083; NRHE12741;	251615	844964	Lovat Bridge	Category A Listed Building	This heritage asset consists of a Thomas	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	MHG3405					Telford, five span bridge built 1810.	
A41	SM3195; NRHE12745; MHG3401	251382	844787	Corff House, fort SW of	Scheduled Monument	This heritage asset consists of a fort, which features a double ditch enclosing an area and is believed to be either a fort from the Early Iron Age to Pictish period or a motte from the medieval period	Prehistoric/medieval
A42	LB7124; NRHE228924; MHG15766, and MHG43552	249282	844363	Kilmorack Manse	Category B Listed Building	This heritage asset consist of a later 18th century house which doubled in size in mid-19th century.	Post-medieval
A43	SM5570; NRHE12381; MHG2649, and MHG31353	249744	843928	Kiltarlity Old Parish Church	Scheduled Monument	This heritage asset consists of a roofless church built of roughly coursed masonry with rubble infill, measuring 17.6m by 7m. Its gables stand to full height with paired windows, while side walls reach up to 2.5m. The interior holds burial monuments, and the	Medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						surrounding graveyard remains in use.	
A44	LB8068; NRHE12746; MHG45242, and MHG3400	250673	843006	Beaufort Castle	Category A Listed Building	This heritage asset consists of a large baronial mansion mainly 3 storeys and attic.	Post-medieval
A45	GDL00052; NRHE12746; MHG45242, and MHG3400	250734	842925	Beaufort Castle	Garden & Designed Landscape	This heritage asset consists of an extensive designed landscape of high scenic importance in the Aird and Beauly Firth, comprising 19th century landscape park and pleasure grounds, incorporating an earlier designed landscape associated with an earlier castle.	Post-medieval
A46	SM2423; NRHE12734; MHG3411	253441	842904	Dun Mor, fort, Ballindoun	Scheduled Monument	This heritage asset consists of a fort on Phoineas Hill. It appears to comprise of a citadel which encloses a ruinous stone wall and several vitrified masses.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A47	SM4729; NRHE12735; MHG3410	253353	842554	Phoineas Hill, enclosure 900m ESE of Phoineas House	Scheduled Monument	This heritage asset consists of an enclosure, featuring a stone wall across the southwest approach to a rocky hill summit, isolating an area of 120m northeast to southwest by 80m. The wall, averaging 3m wide, has remnants of outer and inner faces, with a 3.5m wide entrance on the southwest side and another possible entrance in the west corner.	Prehistoric
A48	LB7127; NRHE228901; MHG15733, and MHG38678	246770	842341	Druim Cottage, Crask Of Aigas	Category C Listed Building	This heritage asset consists of a later 19th century single storey, 3 bay cottage set at a right angle forming a T plan. It includes centre doors with gabletted porches supported by rustic wooden columns with decorative barge boards and pendants.	Post-medieval
A49	LB49020; NRHE228899;	246740	842263	Smithy Cottage, Crask Of Aigas	Category C Listed Building	This heritage asset consists of a later 19th century single storey rectangular cottage with 3 bays. Later	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	MHG31422, and MHG38677					additions added to create an L-shaped plan, the porch is supported by rustic timber columns and decorative barge boarding to all gables including dorm heads (expect rear elevations).	
A50	SM2435; NRHE12748	251417	842120	Belladrum, chambered cairns 250m NNE of Brockie's Lodge	Scheduled Monument	This heritage asset consists of a chambered cairn comprising of irregular heavy boulders with the tallest being 1.06m. There is no structure present in the centre of the cairn and no sign of monoliths.	Prehistoric
A51	SM4653; NRHE12751; MHG3395	254173	842053	Castle Spynie, broch	Scheduled Monument	This heritage asset consists of a probable broch (or dun), situated on a rocky knoll with steep sides to the north and shallower approaches to the south and west. It features an entrance on the southwest, visible outer and inner wall faces, and traces of outer fortifications.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A52	SM2425; NRHE12397; MHG2733	249180	841810	Couriering cairn & stone circle	Scheduled Monument	This heritage asset consists of a ring cairn in a group of trees beside the public road. The cairn comprises of rounded boulders and the kerb is large irregular boulders. There is a modern wall around the kerb on the southwest side. There are eight monoliths recorded.	Prehistoric
A53	LB7126; NRHE228898; MHG38676, and MHG15634	246146	841631	Lodge, Aigas House	Category C Listed Building	This heritage asset consists of a later 19th century single storey L-plan gate lodge; harled with ashlar dressings.	Post-medieval
A54	SM3194; NRHE12750; MHG3396	251610	841580	Belladrum Home Farm, chambered cairn WNW of	Scheduled Monument	This heritage asset consists of five upright standing stones forming part of a circle 2.4m in diameter. The field has been ploughed up to the bases of the stones and there is no sign of any other structure.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A55	LB7125; NRHE104079; MHG15448	245973	841451	Aigas House	Category B Listed Building	This heritage asset consists of a baronial mansion fronting and partially encasing early 19th century house.	Post-medieval
A56	SM3196; NRHE12749; MHG3397	251269	841346	Tom na Croiseige, stepped mound	Scheduled Monument	This heritage asset consists of the burial ground of Tomnacross, which includes the 'Seat of Judgement', an ancient circular mound with a smaller one on top, known for the 'Hanging Tree'. The structure is a grass-covered mound in the form of a truncated cone, measuring 3m in height with a surface diameter of 12m and a basal diameter of about 21m, likely a motte.	Medieval
A57	SM5004; NRHE12398; MHG2732	240440	841036	Erchless Castle, dun 650m WNW of	Scheduled Monument	This heritage asset consists of a sub-circular dun on a low knoll, measuring 12.3m northeast to southwest by 13m transversely within a tumbled wall. The entrance is in the southeast arc, with	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						fragmentary remains of a breastwork outside the south and east arcs.	
A58	SM4744; NRHE12736	252362	840392	Auchvaich, chambered cairn 650m W of	Scheduled Monument	This heritage asset consists of the remains of a Neolithic chambered cairn with a two-compartment burial chamber, now surviving as four upright stones and nine fallen stones with an entrance from the east. The cairn material has been reduced to a rubble scatter, suggesting an original diameter of about 16m.	Prehistoric
A59	GDL00415	252607	841736	Belladrum	Garden & Designed Landscape	This heritage asset consists of the Belladrum estate, located 15km west of Inverness and 4km south of Beauly, on northwest-facing slopes in the Aird—a landscape of rolling glens and ridges above farmed plains. The estate's designed landscape saw sustained development	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						beginning in the late 18th century.	
A60	MHG59521	240607	848203	Building or shieling hut, Allt na Creagach, Kilmorack	Non-designated	This heritage asset consists of a possible building or shieling hut with rectangular stone footings (5m by 2m, north to south aligned) was noted on the east edge of boggy ground at Allt na Creagach.	Post-medieval
A61	NRHE354824 MHG59460, MHG59463, MHG59464, MHG59465, MHG59466, MHG59470, MHG59471, MHG59473, MHG59474, MHG59475, MHG59476, MHG59479, MHG59480, MHG59481, MHG59482, MHG59483, MHG59484,	240250	848000	Shieling Hut(S), Gleann Goibhre	Non-designated	This heritage asset consists of 34 structures and possibly enclosing bank. Due to a pipeline with parallel track which traverse the south part of the site, and its construction may have destroyed some of the features.	Medieval/Modern

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
	MHG59485, MHG59486, MHG59487, MHG59488, MHG59489, MHG59490, MHG59491, MHG59492, MHG59493, MHG59494, MHG59495, MHG59496, MHG59515, MHG59516, MHG59517, and MHG59518						
A62	MHG59519, MHG59520	241285 241288	847980 847950	Shieling huts, Allt na Creagach, Kilmorack	Non-designated	This heritage asset consists of a pair of shieling huts. The main structure is a sub-rectangular building measuring approximately 6.9 metres by 5.4 metres overall. Nearby, a turf mound likely marks the site of a smaller hut associated with the shieling complex.	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A63	MHG59523	239995	847941	Building/Pony shed, Kilmorack	Non-designated	This heritage asset consists of a possible building or shieling hut at Allt na Creagach (5m by 2m, north to south aligned, on boggy ground), and a possible building or pony shed (c.4m by 2m, northeast to southwest aligned), recessed into a north-facing slope with 1m high earth banks and a 1m wide entrance to the west. It lies beside a former fenced enclosure and both are depicted on the OS map.	Post-medieval
A64	MHG62718	243719	846797	Rie Fask in dune' shieling - Coulnabottach	Non-designated	This heritage asset consists of a subtle shieling platform called Rie Fask or Rie Faskindun, located northwest of Coulnabottach near Urchany. It measures about 3.5m by 2m, lies just south of a small burn, and is marked by a few stones along its east and west edges.	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A65	MHG63929-MHG63939	245327 245310	846662 846600	Cairns - Coul-na-bottach	Non-designated	This heritage asset comprises a group of 10 cairns, all situated within close proximity to each other. These cairns are accessible within a short distance, forming a cohesive cluster.	Post-medieval
A66	MHG63928	245095	846473	Cairn or clearance cairn - Coul-na-bottach	Non-designated	This heritage asset consists of a probable cairn measuring roughly 2.5m by 1.5m. This feature may be a clearance cairn, created through the collection and piling of stones cleared from nearby ground, likely during agricultural activity. Its elevated position overlooking the gully suggests it may also have been intended to mark territory or aid in navigation.	Post-medieval
A67	MHG63927	245088	846459	Still bothy - Coul-na-bottach	Non-designated	This heritage asset consists of remains of a still bothy, a small, makeshift structure likely used for illicit whisky distillation. These rudimentary shelters were often built in remote	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						locations to avoid detection, and the site's secluded position near a water source would have made it ideal for such clandestine activity.	
A68	MHG63926, and MHG63928	245060	846473	Hut circle - Coul-na-bottach	Non-designated	This heritage asset consists of a hut circle situated on a prominent mound to the east of the upper reaches of the Allt na Criche. Measuring approximately 4m by 4m, it consists of a low stone circle with scattered stones at its centre. Its position and construction suggest it may have once been a simple domestic or seasonal structure, potentially re-used in later periods.	Prehistoric

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
A69	MHG23302, MHG62196 (Still house), MHG62183 (Building), MHG62184 (Building), and MHG62194 (Probable Limekiln)	243987	845427	Township - Claiginn, Urchany	Non-designated	This heritage asset consists of a township with nine unroofed buildings appearing on the 1st edition OS map (1876–81), with only three unroofed buildings, an enclosure, and field walls shown on the 1992 OS map. An archaeological survey by NoSAS in 2015 identified a possible illicit still (Site B177) north of Claiginn Township, marked by a low stone wall on a burn-side platform.	Post-medieval
A70	MHG63081	243477	844884	Possible shieling - Beinn a Chlaonaidh	Non-designated	This heritage asset consists of a possible shieling located on the southern slopes of Beinn a Chlaonaidh, featuring a flattened area approximately 100m by 50m. On a prominent knoll within this platform lies a raised rectangular structure, about 2.5m by 1.5m, with faint walls around 0.15m high, oriented east to west, lacking an obvious entrance,	Post-medieval

Heritage Asset no.	Ref no.	National Grid Ref		Heritage Asset name/ Type	Designation	Description	Period
		Easting	Northing				
						and with a deficient east wall.	
A71	NRHE 109987; MHG22963	241400	841300	Enclosure, Erchless Forest Cottage	Non-designated	This heritage asset consists of an enclosure which is depicted on the 1st edition of the OS 6inch map (Inverness-shire 1876-81) but is not on the current map. It is represented as rectangular in shape and appears similar in form to surrounding buildings on the historic map. A well is associated with the building, suggesting a domestic or functional use.	Post-medieval

Ballach Wind Farm

Environmental Impact Assessment Report
Volume 4
Appendix 7.2: Cultural Heritage Assessment

July 2025

7 INTRODUCTION

7.1 This Appendix provides assessments of impacts on heritage assets from the operation phases of the proposed development. Predicted impact magnitude is Negligible Adverse or No Change, resulting in effects which are **Slight Adverse** or **Neutral** (not significant), while the impact magnitude is respectively.

7.2 Any construction phase effects on the setting of heritage assets within the study area have been scoped out of this assessment due to their temporary nature, as detailed within the main chapter.

Operational Phase Impacts

7.3 Any potential impacts to cultural heritage assets during the operation of the proposed development would relate to changes within the setting of heritage assets due to the addition of modern infrastructure within the existing landscape. As part of the assessment of potential impacts, the designated heritage assets are shown alongside a bare earth Zone of Theoretical Visibility (ZTV) on Figure 7.1: Designated Heritage Assets and ZTV. The ZTV displays theoretical visibility from the proposed turbines and was used in the initial assessment to determine the potential for significant effects.

Simple Assessment

7.4 There are 33 Scheduled Monuments, four Gardens and Designed Landscapes (GDLs), five Category A Listed Buildings, four Category B Listed Buildings, and three Category C Listed Buildings that have had a 'simple assessment' undertaken due to one, or a combination of the following factors;

- No visibility of the proposed development according to the ZTV;
- Wide landscape views from the heritage asset not contributing to the cultural significance of the heritage asset;
- The area containing the proposed development not forming a key element of the setting of the heritage asset; and,
- Views of the proposed development not being possible due to intervening screening such as woodland or buildings etc.

7.5 The relevant assessments are discussed in more detail below.

7.6 Castle Leod designed landscape (GDL00094, A1)centred on a medieval castle, is located approximately 12km from the proposed development. The ZTV indicates that the proposed development is not visible from much of the south and north of the GDL, with some areas having visibility of 1 to 15 turbines. The significance of the GDL is derived from its Horticultural, Historical, Architectural, Archaeological and Scenic interests within the boundaries of the designed landscape. Views southwards include modern development within Strathpeffer village, and wider landscape views beyond this are not an important element of the GDL's cultural significance. Despite there being some views of the

proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.7 Knock Farril, fort, Knockfarrel, Fodderly (SM1672, A2) is located approximately 12km from the proposed development. As a hill fort, wide landscape views would form part of its cultural significance, but at this distance and direction, the area containing the proposed development would not form a key element of the setting of the heritage asset, and there would be no change to any key views or relationships the monument has with its localised setting. The magnitude of impact would be Negligible Adverse to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.8 Loch Kinellan, crannog (SM3987, A3) is located approximately 10km from the proposed development, and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The monument sits on a small island within Loch Kinellan, and key elements of the setting of the monument are localised to this loch and the immediate vicinity, with wider landscape views available to the west, south and east, making a minor contribution towards the cultural significance of the monument. The distant views towards the area containing the proposed development do not form a key element of the setting of the heritage asset. As there would be limited visibility, at distance, of the proposed development, which is interrupted by intervening vegetation and topography, the magnitude of impact would be negligible to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.9 Achilty, henge 180m NE of The Croft (SM1667, A4) is located approximately 8km from the proposed development, and has no visibility on the ZTV. As such there would be no impacts on this monument. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.10 Carn Na Buaile Fort, 780m NNW of Comrie (SM11056, A5) is located approximately 9km from the Proposed Development, and has low visibility on the ZTV, with 1 to 5 turbines being visible. Wide landscape views from the fort form part of its cultural significance but the area containing the proposed development would not form a key element of the setting of the heritage asset due to its distance from the fort. The magnitude of impact would be Negligible Adverse to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.11 Contin Bridge over river Black Water (LB1789, A6) is a category A Listed Building located approximately 9km from the proposed development. The ZTV indicates that between 1 to 5 turbines would be visible from the bridge. The bridge is surrounded by woodland that screens any wider landscape views towards the proposed development, and as such there would be no unobstructed views of the proposed development from the bridge. Also, wide landscape views do not form an important element of the bridge's cultural significance. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.12 Clachan Corrach, chambered cairn 375m E of Beallach Farm (SM2466, A7) is located approximately 10km from the proposed development, with the ZTV indicating that between 16 to 20 turbines would be visible from the monument. The cairn is part of a group of chambered cairns around the Cromarty Firth, and the setting of the monument is tied to the landscape in which these monuments sit, and their intervisibility. Wide landscape views from the monument are not an important element of its cultural significance. The area containing the proposed development would not form a key element of the setting of the heritage asset, and it would not intrude on the local setting or block any potential views between these monuments. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.13 Coul House Hotel Formerly Coul House (LB1769, A8) is a category A Listed Building located approximately 9km from the proposed development. The ZTV indicates that between 6 to 10 turbines would be visible from the Listed Building. Views looking south to the proposed development are screened by woodland that surrounds the Listed Building. Additionally, the mansion fronts to the east and west, meaning views south, and in particular, wide landscape views towards the area containing the proposed development would not form part of its cultural significance. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.14 Preas Mairi, chambered cairn (SM2397, A9) is located approximately 8km from the proposed development and is situated within an area of mature woodland, which restricts wider landscape views and means that the setting of the monument is closely contained to its immediate surroundings (and there is no turbine visibility according to the ZTV). As views of the proposed development would be screened from the cairn by the woodland, there would be no changes to the cultural significance of this monument. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.15 Brahan Wood, chambered cairn 835m NW of Brahan House (SM3839, A10) is located approximately 9.5km from the proposed development, and the ZTV indicates that between 16 to 20 turbines would be visible from the monument. Key elements of its setting include localised views along the River Conan and towards the contemporary monuments in the local area. Wide landscape views may form an important element of the monument's cultural significance, but the area containing the proposed development does not form a key element of the setting of the heritage asset. The magnitude of impact would be Negligible to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.16 Conon Bridge, henge 230m NE of Riverford (SM1666, A11) has low visibility on the latest ZTV with only 1 to 5 turbines being visible. The monument is located approximately 8km from the proposed development. The position of the monument within a modern housing development, partially screens longer views and has separated the monument from its wider landscape, such that wide views no longer contribute towards the cultural significance of the monument. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.17 David's Fort, homestead moat, Balavil Wood (SM2500, A13) is located approximately 12km from the proposed development with the ZTV indicating that between 16 to 20 turbines would be visible from the monument. The key elements of the setting of the monument are the localised views within the flood plains where the rivers Orrin and Conon meet. A modern road and railway line sit approximately 100m to the west of the fort. Due to the dominance of the road and railway line adjacent to the monument, which disconnects the monument from its wider setting, wide landscape views would not form an important element of the heritage assets cultural significance. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.18 Balvaird Wood, chambered cairn 450m NNE of East End (SM4741, A14) is located approximately 10.5km from the proposed development, and the ZTV indicates that between 16 to 20 turbines would be visible from the monument. The key elements of the setting of the monument are localised views within the immediate landscape which contains other similar monuments. The wider landscape does not form an important element of the monuments cultural significance and distant views towards the proposed development are not an important element of the cultural significance of the monument. Despite there being some theoretical visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.19 Fairburn (GDL00174, A15) is located approximately 4.5km from the proposed development. The ZTV indicates that the proposed development is not visible from many areas within the GDL, with certain areas having visibility of 1 to 10 turbines. Mature woodland along the banks of River Orrin on the south border of the GDL would also screen longer views southwards towards the proposed development. The significance of the GDL primarily derives from its Horticultural, Scenic and Architectural interests within the designed landscape itself, and wider landscape views to the south are not an important element of the GDLs cultural significance given the level of screening from the bordering woodland. Despite there being some theoretical views to the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.20 Dugary, henge 425m SE of (SM3403, A16) is located approximately 9km from the proposed development, and the ZTV indicates that between 11 to 15 turbines would be theoretically visible from the monument. Wide landscape views form an important element of the monument's cultural significance, but the views towards the proposed development are dominated by existing electrical infrastructure and would not be key to its cultural significance, with views to the east and south more important aspects. Despite there being some visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.21 Drumrunie, chambered cairn 170m WNW of Drumrunie Cottage (SM4565, A17) is located approximately 11km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The key elements of the setting of the monument are the more localised views within its immediate landscape which contains other similar monuments (and their intervisibility). Distant landscape views

towards the proposed development are not an important element of the cultural significance of the monument. Despite there being some theoretical visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.22 Muir of Conon, chambered cairn 630m ENE of East End (SM4652, A18) is located approximately 11km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The key elements of the setting of the monument are localised views within the immediate landscape which contains other similar monuments. The wider landscape does not form an important element of the monuments cultural significance, and views towards the proposed development are not an important element of the cultural significance of the monument. Despite there being some visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.23 Fairburn Tower (LB14030, A19) is a category A Listed Building located within Fairburn GDL approximately 4.3km from the proposed development. The ZTV indicates that no turbines would be visible from the tower, and this was confirmed by a wireline produced from the tower (Visualisation 12.2). The magnitude of impact has been assessed as No Change. There are no views of the proposed development from Fairburn Tower due to intervening topography, as a result there would be no impacts on the setting of this asset. As a heritage asset of high cultural significance, the significance of effect would be **Neutral** (not significant).

7.24 Cairn Irenan, chambered cairn (SM3122, A20) is located approximately 12.5km from the proposed development, and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The monument is part of a group of cairns located in the immediate vicinity, and the setting of the monument is tied to the landscape in which these monuments sit. The intervisibility between the cairns would form a key element of the monuments setting, and wide landscape views beyond this are not an important element of the monuments cultural significance. Views towards the area containing the proposed development are not an important element of the monument's cultural significance. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.25 Carn Glas, chambered cairn, 275m SSE of Ross Hill (SM3213, A21) is located approximately 14km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The monument is part of a group of prehistoric heritage assets located in the immediate vicinity, and the setting of the monument is tied to the landscape in which these monuments sit. The intervisibility between the cairns would form a key element of the monuments setting, and wide landscape views beyond this are not an important element of the monuments cultural significance. Views in the direction of the proposed development do not form an important element of the monument's cultural significance. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.26 Balvaird, chambered cairn 250m E of Balvaird House (SM3635, A22) is located approximately 10km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The setting of the monument is dominated by the modern building at its northern edge, and there are other farms and houses in all directions from the cairn. Wide landscape views may still form an element of the monument's cultural significance but the area containing the proposed development does not form a key element of the setting of the heritage asset. the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.27 Cairns, 430m S of Ross Hill, Kilcoy (SM3123, A23) are located approximately 14km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The monument is part of a group of cairns located in the immediate vicinity, and the setting of the monument is tied to the landscape in which these monuments sit. The intervisibility between the cairns would form a key element of the monuments setting, and wide landscape views beyond this are not an important element of the monument's cultural significance. Views towards the area containing the proposed development are not an important element of the monument's cultural significance. Despite there being some visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.28 Achnasoul, medieval earthwork 440m SSE of (SM13629, A24) is located approximately 6km from the proposed development. The ZTV indicates that there is theoretical visibility of 11 to 15 turbines. Wide landscape views do not form part of its cultural significance, with key views or relationships with other monuments being more localised. For example, views towards Fairburn Tower would not be interrupted by the proposed development. Despite there being some visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.29 Kilcoy North, chambered cairn 750m NW of Kilcoy Castle (SM4606, A25), and Kilcoy South, chambered cairn 700m NW of Kilcoy Castle (SM4650, A26), are located approximately 13km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from these monuments. There is no potential for impacts on key views or relationships the monument has with other similar monuments in the immediate vicinity. The key elements of the setting of the monument are localised views within the immediate landscape which contains other similar monuments, and the wide landscape views do not form an important element of its cultural significance. Distant landscape views towards the proposed development do not make a contribution to the cultural significance of the monument. Despite there being some views of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.30 Orrin Bridge (LB14020, A27) is a Category B Listed Building situated over the River Orrin, located approximately 5km from the proposed development. The bridge has no visibility of the proposed development according to the ZTV. The magnitude of impact would be

No Change to the setting of a heritage asset of High cultural significance, resulting a significance of effect of **Neutral** (not significant).

7.31 Conon Valley Hydroelectric Scheme, Orrin Dam with Integrated Fish Pass (LB61708, A28) is a category B Listed Building located approximately 2km from the proposed development. The ZTV indicates that between 16 to 20 turbines would be theoretically visible from the dam. The views towards the area containing the proposed development are not a key element in the dam's cultural significance and the introduction of the proposed development into the wider landscape would not impact on the important elements of the Listed Building's cultural significance. The magnitude of impact would be No Change to a heritage asset of High cultural significance, resulting a significance of effect of **Neutral** (not significant).

7.32 Castle Hill, henge (SM1665, A29) has low theoretical visibility on the ZTV with only 1 to 5 turbines being theoretically visible. The monument is located approximately 8km from the proposed development. Wide landscape views and intervisibility with contemporary monuments in the valley within which it sits would be an important aspect of its cultural significance, but views towards the area containing the proposed development would not form a key element of the setting of the heritage asset. As the monument is in use as a green for a golf course, its relationship with its historic landscape appears much diminished. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.33 Gilchrist, Old Church of Kilchrist (SM1682, A30) has low theoretical visibility on the ZTV with only 1 to 5 turbines being theoretically visible. The monument is located approximately 9km from the proposed development. The setting of the monument is defined by the church grounds in which it sits, the nearby agricultural buildings and the surrounding fields. Wide landscape views are not an important element of its cultural significance, and therefore the proposed development would not impact upon it. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.34 Windhill, standing stone NNE of (SM3127; A31) and Windhill, standing stone N of (SM3128, A32) are located approximately 8.5km from the proposed development and have no visibility on the ZTV. As a result, there would be no impacts on these monuments. The magnitude of impact would be No Change to the setting of heritage assets of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.35 Dun Mor, fort (SM3107, A33) is located approximately 6km from the proposed development and has low visibility on the ZTV, with only 1 to 5 turbines being theoretically visible. Wider landscape views would form part of its cultural significance but the area containing the proposed development would not form a key element of the setting of the heritage asset, as key aspects would be views to the south and east and across the River Beauly. The magnitude of impact would be Negligible to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.36 Beauly Priory, priory and burial ground (SM90031, A36) is located approximately 8km from the proposed development with wider landscape views being blocked by surrounding woodland and housing, such that there are no views to the proposed development. Longer reaching views are not possible from most locations around the priory, and do not contribute towards its cultural significance, which is primarily derived from its standing remains, below ground remains, and its localised setting within Beauly. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.37 Lovat Bridge over river Beauly (LB8083, A40) is a category A Listed Building located approximately 7km from the proposed development. The ZTV shows that the proposed development would not be visible from much of the span of the bridge, with only the east and west banks having theoretical visibility of between 1 to 15 turbines. Mature trees surrounding the bridge on both banks also screen wider landscape views, meaning that the proposed development is not visible from the bridge. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.38 Corff House, fort SW of (SM3195, A41) is located approximately 6.7km from the proposed development, and the ZTV indicates that between 11 to 15 turbines would be theoretically visible from the monument. Views in the direction of the proposed development already contain an electrical substation and sand and gravel quarry and would not be key to the setting of the fort. Despite the visibility of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.39 Kilmorack Manse and Steading (LB7124, A42) is a Category B Listed Building located close to the River Beauly. The proposed development would sit approximately 4.5km to the northwest of the Listed Building, with the closest turbine being 5km to the northwest. The ZTV indicates that between 6 to 10 turbines would be theoretically visible from the Listed Building. The Listed Building is screened from long ranging views by mature trees that border the grounds of the manse, though glimpsed views of the development are likely possible. The setting of the building seems contained to the grounds in which it sits and the immediate landscape bordering the River Beauly, with wide landscape views not being an important element of the building's cultural significance. The magnitude of impact has been assessed as No Change to the setting of a heritage asset of high cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.40 Kiltarlity Old Parish Church (SM5570, A43) is located approximately 5.5km from the proposed development, with wider landscape views being blocked by surrounding mature woodland. Therefore, the proposed development would not interrupt or change any key view of relationships, so there is a no potential for impacts to occur. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.41 Beaufort Castle (LB8068, A44) is a category A Listed Building located approximately 7km from the proposed development. The ZTV indicates that between 16 to 20 turbines would be theoretically visible from the Listed Building. Key views between the castle and Home Farm would not be interrupted by the proposed development, and wider ranging views

towards the area containing the proposed development are not key elements to the cultural significance of the Castle, which primarily derives its interest from its architectural form, and views to the north over the River Beauly. Additionally, views looking northwest towards the proposed development are screened by mature woodland unless viewed from the roof. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.42 Beaufort Castle (GDL00052, A45) is located approximately 5.6km from the proposed development, and the ZTV indicates that there is theoretical visibility of 1 to 20 turbines from most areas within the GDL. Woodland within the GDL and along its borders, screens views of the proposed development from most areas, key views between the castle and Home Farm would also not be affected. Wider landscape views are not an important element of the GDLs cultural significance, with its setting being contained to the river valley in which it sits. Despite there being some views of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.43 Dun Mor, fort, Ballindoun (SM2423, A46) is located approximately 9km from the proposed development, with the ZTV indicating that between 16 to 20 turbines are theoretically visible from the monument. Key views would be down towards the River Beauly valley to the north, with the proposed development a peripheral and background area. Wide landscape views form part of its cultural significance, but at this distance and direction, the area containing the proposed development would not form a key element of the setting of the heritage asset. The magnitude of impact would be Negligible Adverse to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.44 Phoineas Hill, enclosure 900m ESE of Phoineas House (SM4729, A47) is located approximately 9km from the proposed development, with the ZTV indicating that between 16 to 20 turbines are theoretically visible from the monument. Wide landscape views form part of its cultural significance, but at this distance and direction, the area containing the proposed development do not form a key element of the setting of the heritage asset. As there are views of the proposed development, the magnitude of impact would be Negligible Adverse to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.45 Crask of Aigas, Druim Cottage (LB7127, A48), and Crask of Aigas, Smithy Cottage (LB49020, A50) are Category C Listed Buildings located approximately 5km from the proposed development. The Listed Buildings have no visibility on the ZTV due to the surrounding topography. As a result, there would be no impacts on these heritage assets. The magnitude of impact would be No Change to the setting of heritage assets of Medium cultural significance, resulting a significance of effect of **Neutral** (not significant).

7.46 Belladrum, chambered cairns 250m NNE of Brockie's Lodge (SM2435, A50) is located approximately 8km from the proposed development and is situated within an area of mature woodland. The woodland restricts wider landscape views to the north, northeast and northwest, meaning that the proposed development would not be visible from the monument. The magnitude of impact would be No Change to the setting of a heritage

asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.47 Culburnie, ring cairn & stone circle (SM2425, A52) is located approximately 6.6km from the proposed development, and the ZTV indicates there is theoretical visibility of 11 to 15 turbines. However, the cairn is dominated by the modern buildings and gardens of the adjacent buildings, with mature woodland also restricting wider landscape views, meaning there would likely be no views of the proposed development. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.48 Belladrum Home Farm, chambered cairn WNW of (SM3194, A54) is located approximately 8.5km from the proposed development and the ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. The setting of the monument relates to views along the Dounie Burn to the south and north, rather than any long ranging views to the northwest containing the proposed development. The area containing the proposed development does not form a key element of the setting of the asset. Despite there being some visibility of the proposed development, the magnitude of impact would be Negligible Adverse to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Slight Adverse** (not significant).

7.49 Aigas House (LB7125, A55) is a Category B Listed Building, and Aigas House Gate Lodge (LB7126, A54) is a Category C Listed Building, both located approximately 5km from the proposed development. The Listed Buildings have no visibility on the ZTV due to the surrounding topography. As a result there would be no impacts on these heritage assets. The magnitude of impact would be No Change to the setting of heritage assets of High and Medium cultural significance, resulting a significance of effect of **Neutral** (not significant).

7.50 Tom na Croiseige, stepped mound (SM3196, A56) is located approximately 8km from the proposed development. The ZTV indicates that between 16 to 20 turbines would be theoretically visible from the monument. Wide landscape views are not part of the important elements of the monument's cultural significance. The monument has a localised setting due to its use as a moot hill, which would not be impacted by the proposed development. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.51 Auchvaich, chambered cairn 650m W of (SM4744, A58) is located approximately 11km from the proposed development, and is surrounded by mature woodland that restricts wider landscape views, meaning that the proposed development is not visible from the monument. The magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

7.52 Belladrum (GDL00415, A59) is located approximately 8km from the proposed development. The ZTV indicates that between 16 to 20 turbines would be theoretically visible from within the GDL, and the wireline (Visualisation 12.14) shows that 20 turbines are at least partially visible from the highest point within Belladrum. However, wider landscape

views looking west would be screened by woodland both within the GDL and along its western border and key views are more localised and relate to Beaufort Castle and the landscape of the Beauly valley. The wider landscape views are not considered to be an important element of the GDLs cultural significance. Despite there being views of the proposed development, the magnitude of impact would be No Change to the setting of a heritage asset of High cultural significance, resulting in a significance of effect of **Neutral** (not significant).

Detailed Assessment

7.53 The remaining nine designated heritage assets within the baseline had a detailed assessment undertaken due to the potential for impacts to result in a significant effect. These were determined following an initial assessment, or as a recommendation from HES. The results of the detailed assessment concluded that the following two designated heritage assets would have a magnitude of impact of negligible adverse and no change respectively. The assessment of the remaining seven designated assets is provided within Chapter 12: Cultural Heritage.

Castle Spynie, broch (SM4653, A51)

7.54 The monument is the remains of a broch dating to the Iron Age, comprising a thick stone wall which stands to 1m in height with an entrance in the southwest. Below the broch and to the northeast is an outer defence consisting of a line of boulders, a rampart and a ditch. Another ditch to the southwest provides added defence. The monument is situated on high ground above the Aird where it would have been visible from, and be provided with extensive views of the Beauly Firth to the north-northeast and inland toward Strathglass.

7.55 The site is of national importance as a well-preserved example of an Iron Age broch. The broch is of particular interest because of the survival of outer defensive works, which utilise natural rock outcrops. The monument has the potential to considerably enhance our understanding of Iron Age settlement and the development of brochs. The setting of the monument is an important aspect of the monument's cultural significance. Key aspects relate to the relationship the monument has with other prehistoric defensive sites within the wider landscape, including the nearby Phoineas Hill (SM4729, A48) and Dun Mor fort, Ballindoun (SM2423, A47). There are also extensive views from the monument over the Beauly Firth to the north and northeast, and east toward Strathglass.

7.56 The proposed development would sit approximately 10km west northwest of the monument. The ZTV indicates that 16-20 turbines would be theoretically visible from the monument, while the wireline (Visualisation 12.12) shows that eighteen turbines could be visible from the monument, with seven turbines being partially visible in theory, behind the crest of the hill. The existing windfarms Fairburn and Auchmore are visible further in the distance to the north of the proposed development, and appear in far-reaching views towards Phoineas Hill enclosure (SM4729; A48). The proposed development would be to the west of the distant views over the Phioneas Hill enclosure (SM4729; A48), and would not impact on any of the other key views towards the Beauly Firth and Strathglass.

7.57 The magnitude of impact has been assessed as Negligible Adverse due to very minor changes within the setting of the broch. The 10km distance of the proposed development

is such that the setting of the monument would not be significantly changed by the introduction of the turbines. The proposed development does not interrupt any key views or relationships the monument has with the nearby Phoineas Hill, enclosure 900m ESE of Phoineas House (SM4729, A48) and Dun Mor, Ballindoun (SM2423, A47), with the development only being in the distant background. There would be no changes that the monument has to the northeast across the Beauly firth or inland towards Strathglass.

7.58 As a heritage asset of high cultural significance, the significance of effect would be **Slight Adverse** (not significant).

Erchless Castle, dun 650m WNW of (SM5004, A57)

7.59 Erchless Castle comprises the remains of a sub-circular dun dated to the Iron Age. The dun is defined by a tumbled wall whose inner and outer faces are occasionally visible, with an entrance in the southeast. The footings of an outer wall can be seen to the south and east of the dun wall.

7.60 The monument is of national importance as a well-preserved dun which has the potential to considerably enhance our understanding of Iron Age settlement and defensive structures. The setting of the monument is an important element of the fort's cultural significance, with the position of the dun in the landscape and its relationships with other duns in the area, able to inform on how people viewed and interacted with the landscape. Reciprocal views between this and other forts, as well as contemporary settlement, are also likely to have been equally important in demonstrating the status and control of the fort's occupants. Key views to other duns in the area and long reaching views south along the base of the valley are key to our understanding of this monument. The entrance to the south-east suggests the approach was from this direction, and is a key view looking towards the fort.

7.61 The proposed development would sit approximately 700m to the east of the monument at the south end of the access track. The closest turbine is located approximately 5.4km to the north. The ZTV indicates that 1 to 5 turbines would be theoretically visible from the monument, while the wireline (Visualisation 12.13) shows that no turbines are visible on approach to the dun from the A831 at Struy Bridge.

7.62 The magnitude of impact has been assessed as No Change, as the proposed development will not impact on any key views, and visibility from the castle is minimal, with no impacts to the views on approach either. As a heritage asset of high cultural significance, the significance of effect would be **Neutral** (not significant).

Ballach Wind Farm – Technical Appendix 8.1

Habitat Survey and Peatland Condition Assessment

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Introduction

The proposed Ballach wind farm is located approximately 11km to the west of Beauly, Invernesshire, (grid reference: NH 4146). Three surveys have been carried out to inform the planning and design stages of the proposed development. These included a National Vegetation Classification (NVC) survey, a Groundwater Dependent Terrestrial Ecosystem (GWDTE) and a Peatland Condition Assessment. The survey area is approximately 1393ha in size and is dominated by a mosaic of upland peatland communities but also contains a variety of swamp, grasslands and mires.

The site boundary and the total survey areas can be seen in Figure 1 below.

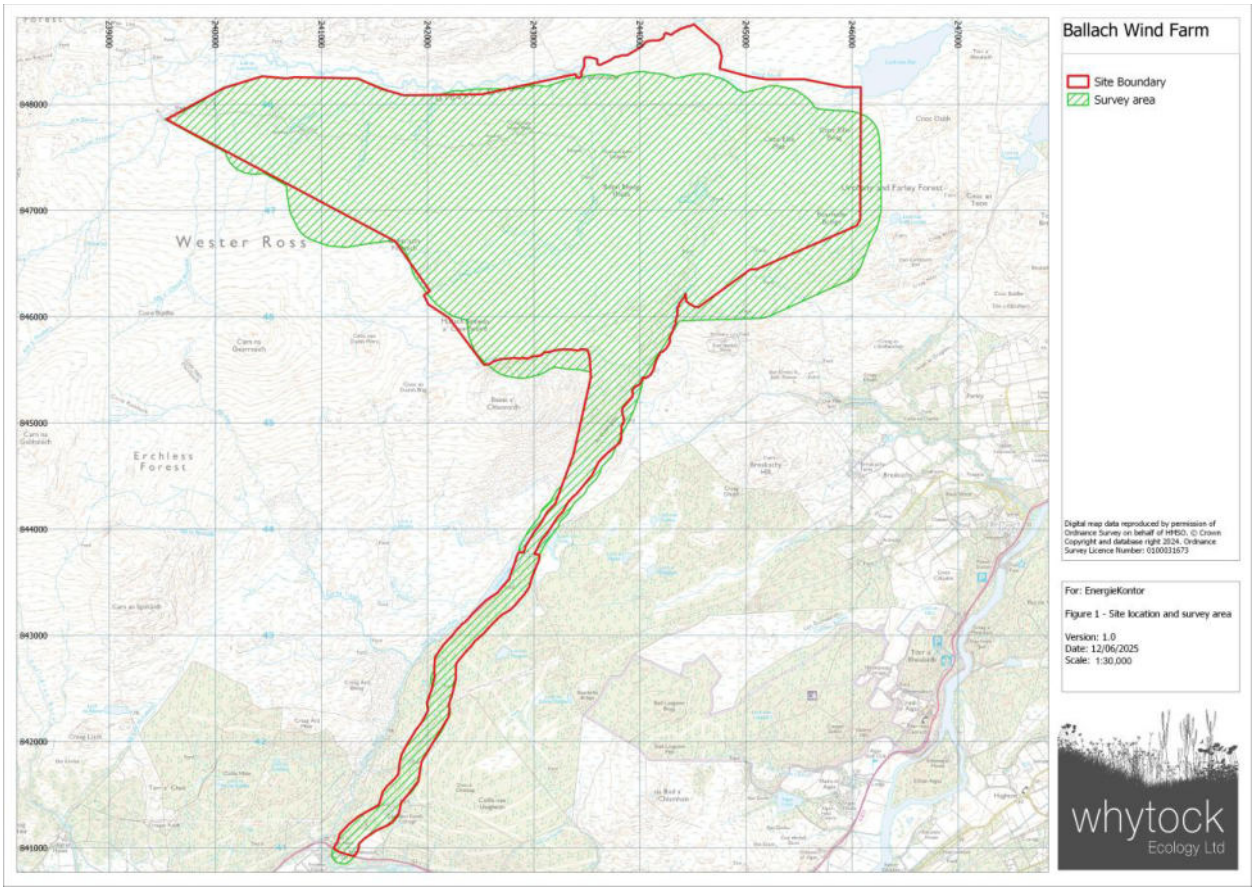


Figure 1: Map showing the site boundary line and total survey area

Habitat survey methods

Survey areas

A total of three surveys have been carried out to inform the baseline for the project. The original survey was carried out in 2022 by Atmos Consulting Ltd. Following this, A further survey in the west of the site boundary was carried out in 2024. to cover areas not previously recorded. The 2022 survey results were not detailed enough to carry out a sufficient assessment in line with the current NatureScot guidance (2025). This resulted in a further survey of all areas surrounding 250m of proposed infrastructure to provide a greater level of accuracy of habitat mapping, particularly within the original 2022 survey area.

The original habitat surveys were carried out by Atmos Consulting Ltd. in 2022. The remainder of the NVC surveys were carried out by Rory Whytock ACIEEM on the 25th and 26th of April 2024 and the 24th and 25th of May 2025. The different survey areas covered in each visit are shown in Figure 2 below.

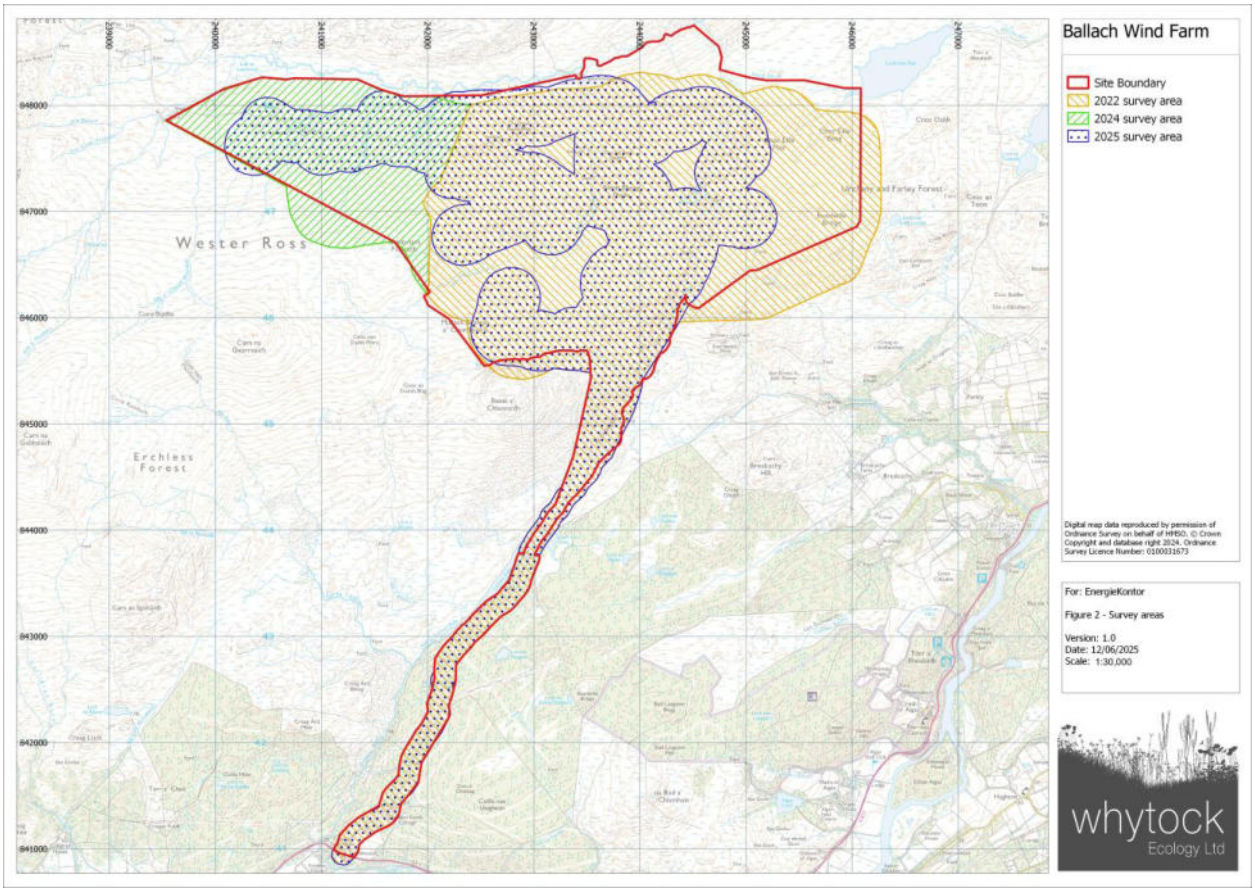


Figure 2: Map showing the site boundary line and the three survey areas covered.

Methods

The NVC communities within the survey area were mapped by eye and classified according to Rodwell (1998a, 1998b, 2003). Where required, 2 x 2m quadrats were set up for each habitat type where detailed floristic samples were recorded to allow the habitat to be categorised later into the appropriate NVC classification. Phase 1 categories have also been assigned to NVC communities.

Small areas of interest and general descriptions of features were made using target notes as per Phase 1 survey methodology (JNCC, 2010). The NVC survey area was mapped in the field then digitised using GIS to produce a detailed map of dominant and sub-dominant community composition.

Higher plant nomenclature follows that of Stace (2019), bryophyte nomenclature follows that of the Blockeel *et al.* (2021) and lichens follow Coppins (2002).

Groundwater Dependent Terrestrial Ecosystems (GWDTEs) survey methods

As described above, the NVC habitats were mapped according to their dominant NVC community, though many of these habitats were made up of mosaics of NVC communities. Hence when determining whether a particular habitat was potentially groundwater dependent the composition of the mosaic was considered.

In order to establish whether any of the identified communities were considered groundwater dependent, an evaluation was carried out. In the first instance, this involved identifying whether there was an obvious groundwater feature (i.e. a springhead). If this was not apparent, plant species that required base-rich conditions were checked for. If these were located, further investigations took place to check whether the community was associated with an obvious rain-fed surface water feature. Obvious surface water features include:

- Watercourses (drains/streams/valleys)
- Waterbodies
- Floodplains
- Downslope of a rain-fed community
- Adjacent to ponding locations such as marshes or swamps

If any of these features are present, they are followed upstream to establish whether the source of the feature is groundwater dependent or not. If a groundwater source is found, the community is determined to be groundwater dependent.

Areas supporting communities which are potentially dependent on groundwater sources were also classified according to guidance issued by SEPA (2017).

Peatland Condition Assessment Methods

The assessment of peatland condition has been carried out to help inform the design and planning stages of the proposed development. Within the survey area, peatlands are the most abundant habitat type. In order to assess the quality of peatlands, only habitats that have been categorised as blanket bog (Phase 1 habitat code: E1.6.1), or mosaics containing blanket bog have been selected for the assessment.

Peatland condition methods follow two separate assessments. NatureScot's Peatland Action guidelines (2017) have been used to inform the state of degradation of each blanket bog polygon. This places each peatland community into one of four categories:

- Near Natural
- Modified
- Drained, and
- Actively eroding

An assessment is made during field surveys with notes on the condition and degradation (if any). Following this, each functional peatland unit is then categorised into one of the four categories above.

A further assessment follows NatureScot guidance (2025) which classifies each blanket bog polygon considered to be of possible national interest or not. The methods include assessing whether each polygon is capable of actively forming peat, presence of drains, whether there is an absence of woodland or scrub and a natural surface pattern. Full details on the range of criteria are detailed in NatureScot's guidance (2025).

Limitations

The 2024 NVC surveys were carried out at an early time of year (April). As such some species of plants that grow later in the growing season may be under-recorded or over-looked. This limitation however, does not affect the accuracy of defining NVC community composition

NVC survey results

The NVC survey recorded a total of 24 communities. Where these communities were floristically distinct, they were assigned into corresponding sub-communities. The communities recorded during the survey were:

- Mires flushes and springs: M1, M2, M3, M4, M6, M10, M17, M18, M19, M20, M23, M25 & M32
- Wet heaths: M15 & M16
- Dry heaths: H10, H12 & H21
- Tall herb and fern: U20
- Grasslands: MG6, U4 & U5
- Woodlands: W4 & W17

A number of semi-natural habitats were not recorded as they are not included in the NVC system. These have been assigned into their respective Phase 1 Habitat categories. The habitats that did not fit into any of the NVC communities are:

- Plantation woodland (A1.2.2)
- Standing water (G1)
- Running water (G2)
- Infrastructure such as tracks/roads (J4 & J3.6)

The following sections describe the NVC communities recorded on site and detail the flora, structure and condition of each of the habitats. Maps of the survey results can be found in Appendix A with target notes describing notable species or features found during the survey in Appendix D.

Mires and Flushes

M1 Sphagnum auriculatum bog pool community

The M1 *Sphagnum auriculatum* bog pool community is dominated by this species. However, it is moderately rich with other species due to the mildly base rich conditions. These species include *Sphagnum inundatum, Straminergon stramineum* and *Carex flacca*. This community occurs among other mire communities where peat soil depth is varied.

M2 Sphagnum cuspidatum/fallax bog pool community

The M2 *Sphagnum cuspidatum/fallax* bog pool community is dominated by a large floating mat of *S. cuspidatum* and *S. fallax*. Around the margins of the pool there is an assemblage of species including *Sphagnum medium*, *Drosera rotundifolia* and *Sphagnum papillosum*. This community was sparsely distributed throughout the survey area.

M3 Eriophorum angustifolium bog pool community

M3 bog pools are found in depressions in relatively undisturbed mires where the ground becomes waterlogged. The dominant species of this community, *Eriophorum angustifolium*, occurs with few associates but *Sphagnum fallax, Sphagnum papillosum* and *Sphagnum medium* can occur in various amounts. This community was recorded in several locations throughout the survey area. There are no sub-communities associated with this community.

M4 Carex rostrata - Sphagnum fallax mire

M4 communities are sparsely distributed within the survey area. They are restricted to permanently wet depressions or gullies where water moves slowly through the vegetation. All M4 communities within the survey area were species poor and dominated almost exclusively by *Carex rostrata* as the vascular plant component. *Sphagnum fallax* is the dominant component of the bryophyte assemblage. Few other species were recorded within these communities, though common sedge *Carex nigra*, *Philonotis fontana* and *Viola palustris* were locally frequent in some stands.

M6 Carex echinata - Sphagnum fallax/denticulatum mire

This community is found on peat substrates that are fed primarily by base-deficient water. These mires are widely distributed in valley bottoms, with sloping valley sides or channels within the site where water flows slowly over a shallow peat surface.

This community is defined by the dominance of *Sphagnum* species such as *S. fallax, S. cuspidatum* and *S. palustre*. Rushes and grasses are the other dominant species commonly found within this community. M6 can be differentiated from similar NVC communities such as M23 *Juncus effusus/ acutiflorus – Galium palustre* mires as these typically lack the abundance of *Sphagnum* found in M6 communities.

There are four sub-communities associated with M6 habitat types, with M6a and M6c sub-communities recorded within the survey area. M6c communities are species poor throughout and dominated by few other species than *Juncus effusus, Sphagnum fallax, Cardamine pratensis*, *Succisa pratensis* and *Viola palustre*. The M6a community has quite a different composition with a diverse range of sedges including *Carex nigra*, *Carex echinata* and *Carex flacca* often becoming dominant or co-dominant with *Juncus effusus* or occasionally *Juncus acutiflorus*.

M10 Carex dioica – Pinguicula vulgaris mire

This community was restricted to small stands within the survey area. This community is dependent on base-rich water flushing the surface vegetation which prevents them from drying out. The base-rich conditions allow suitable habitat for species such as dioecious sedge *Carex dioica*, *C. panicea*, *Carex demissa, Carex lepidocarpa* and butterwort *Pinguicula vulgaris.*

This community also contained a diverse assemblage of bryophytes species such as *Scorpidium revolvens, Scorpidium scorpioides, Aneura pinguis, Scapania undulata, Palustriella falcata* and *Warnstorfia exannulata*. Some

species more suited to acidic conditions were also recorded within this community, this was largely due to the small nature of these mires where encroachment from plants more suited to acidic conditions from the surrounding peaty substrates was common.

The community was assigned to the M10a *Carex demissa - Juncus bulbosus sub-community*.

M17 Trichophorum germanicum - Eriophorum vaginatum blanket mire

M17 communities were widely recorded on waterlogged peat which contained a significant sphagnum layer that dominated underneath tussocks of *Trichophorum germanicum*, *Erica tetralix* and *Calluna vulgaris*. Sphagnum species include many important peat-forming mosses such as *Sphagnum medium*, *Sphagnum papillosum* and *Sphagnum capillifolium s. str.*. *Sphagnum fuscum s. str.* was also present but was recorded in a single location. This community is suffering from sever degradation throughout the survey area, with very few areas that are undisturbed. Photographs of typical M17 communities are shown in Figures 9 and 10 in Appendix E.

Three sub-communities were recorded throughout the survey area. The M17a *Drosera rotundifolia – Sphagnum* species sub-community was recorded where degradation was less pronounced. The M17b *Cladonia* species sub-community is well defined and contains a distinctive composition of lichens such as *Cladonia uncialis, Cladonia portentosa* and *Cladonia arbuscula*. These are conspicuous throughout the community due to their grey/white colour against the backdrop of dark coloured dwarf shrubs. In less disturbed areas, large hummocks of *Racomitrium lanuginosum* are conspicuous. Other species frequent within the community include *D. intermedia, D. rotundifolia* and *Empetrum nigrum*. The M17c was recorded *Juncus squarrosus – Rhytidiadelphus loreus* sub-community is found more in areas of higher degradation and contains a lower water-table.

M18 Erica tetralix - Sphagnum papillosum raised and blanket mire

This community is rare within the survey area and occupies medium sized stand in a single location. It is a community that is found on deep or very deep, saturated peat. The very wet conditions allow ideal habitat for peat forming Sphagnum species such as *S. papillosum, S. medium* and *S. capillifolium*. Other bryophyte species frequent within the community included *Aulacomnium palustre, Pleurozium schreberi*, and *Polytrichum strictum*. *Erica tetralix* is the dominant dwarf shrub within this community, though *Calluna vulgaris* occurs where the peat layer is slightly drier in nature, particularly around the margins of the community. Vascular plants recorded included *Drosera rotundifolia*, *Eriophorum vaginatum, Eriophorum angustifolium, Vaccinium oxycoccos and Narthecium ossifragum*.

The M18b *Empetrum nigrum ssp. nigrum-Cladonia* sub-community was the only one to be recorded within the survey area.

M19 Calluna vulgaris - Eriophorum vaginatum blanket mire

This habitat is dominated by large swathes of *Calluna vulgaris, Eriophorum vaginatum* and regular shoots of *Eriophorum angustifolium*. Bryophytes are dominated by common pleurocarpous mosses including *Hylocomium splendens, Pleurozium schreberi, Rhytidiadelphus loreus* and *Hypnum jutlandicum*. Sphagnum species are not as well represented in this community as either M17 or M18 blanket mires. However, *S. capillifolium s. str.* can be conspicuous and is the most common *Sphagnum* species, though *S. papillosum* was present in small amounts.

The M19a *Erica tetralix* sub-community was the only sub-community to be recorded within the survey area. M19a is often located where the topography is flat or only slightly inclined so that a continuous peat layer can form. The community was rather uniform in composition and contained *Trichophorum germanicum*, *Molinia caerulea* and *Empetrum nigrum* where they were all occasional with species such as *Narthecium ossifragum* and *Drosera rotundifolia* occurring in wetter areas.

M20 Eriophorum vaginatum Blanket and raised mire

This is a community where *Eriophorum vaginatum* is dominant and contains thick tussocks allowing few other species to compete. It is a community characteristic of ombrogenous peatland habitats that have been negatively affected by drainage and/or grazing. Unlike many of the *Calluna* dominated mires, Sphanga are rare or scarce. Pleurocarpous mosses are confined to common species such as *Polytrichum commune*, *Polytrichum strictum*, *Hylocomium splendens, Pleurozium schreberi* and *Hypnum jutlandicum*.

All stands recorded within the survey area where *Eriophorum vaginatum* was overwhelmingly dominant were assigned to the M20a species poor community.

M23 Juncus effusus/acutiflorus – Galium palustre rush pasture

Despite being a ubiquitous community throughout Scotland, M23 communities are sparsely distributed throughout the survey area. They are found mainly in valley bottoms that have gentle slopes with slow but constant water movement. This habitat is closely associated with M6 *Carex echinata – Sphagnum fallax* mires and is often found adjacent to them but M23 differs in having a greater diversity of rushes and a lesser amount of *Sphagnum* species.

Two sub-communities are described for the M23 community, one of which was recorded within the survey area. The M23b *Juncus effusus* sub-community is dominated by *J. effusus* but other species recorded within this community included *Viola palustris, Succisa pratensis, Galium palustre, Cirsium palustre* and *Ranunculus repens*. Though many of these species are only found where the density of *J. effusus* is low.

M25 Molinia caerulea – Potentilla erecta mire

This community occurs on moderately wet, shallow peat and is abundantly distributed within the survey area. *Molinia caerulea* is the most dominant species within this community and can form large conspicuous tussocks. Bryophyte diversity is often poor and restricted to robust common pleurocarpous mosses such as *Hylocomium splendens* and *Hypnum jutlandicum*.

Only one sub-community was recorded within the survey area. The M25a *Erica tetralix* sub-community is derived from blanket bog communities and contain species typical of those communities such as *Empetrum nigrum, Calluna vulgaris* and *Erica tetralix*. Sphagnum species such as *S. fallax* can be present but it is occasional. Species-poor stands dominated by little other species than *Molinia caerulea* are not assigned to a sub-community.

M32 Philonotis fontana – Micranthes stellaris spring

This community was recorded as small stands within the survey area and are fed by a springhead. The vegetation relies on groundwater arising from the sub-surface which keeps the ground conditions permanently wet. The chemical composition of the groundwater is important to maintain the vegetation within these communities.

These habitats have a rich bryophyte assemblage including *Philonotis fontana, Scapania undulata, Dichodontium palustre, Bryum pseudotriquetrum, Warnstorfia exannulata* and *Sphagnum denticulatum*. Vascular plants are equally as varied as the bryophytes and are dominated by species such as *Chrysosplenium oppositifolium*, *Ranunculus flammula*, *Montia fontana*, *Myosotis secunda*, *Epilobium palustre*. *Micranthes stellaris* was not recorded within the community, this may be due to the early date of the survey.

The M32a *Sphagnum denticulatum* sub-community was the only one of its type to be recorded in the survey area.

Wet Heath

M15 Trichophorum germanicum – Erica tetralix wet heath

This community is widely distributed within the survey area but occupied small areas. The M15 community illustrates a wide variation in its flora including species that occur as dominants or co-dominants. Species that were recorded in high frequency included *Trichophorum germanicum*, *Erica tetralix* and *Calluna vulgaris*. It is possible that some areas of M15 have been derived from blanket bog communities and still occurs on a peat layer exceeding 50cm in depth. However, areas of M15 occurring on deep peat within the survey area is largely restricted to where they form mosaics with other blanket bog communities. Comparing the results of the NVC with peat depth survey data will inform which M15 communities are considered to be blanket bog and those which are classified as wet heath.

Two sub-communities were recorded within the survey area. The M15b Typical sub-community is dominated by *Trichophorum germanicum*, but also contains frequent *Erica tetralix* and *Calluna vulgaris*. Other frequently recorded species included *Juncus squarrosus,* and *Vaccinium myrtillus*. The M15d Vaccinium myrtillus sub-community occupies driers soils and contains a grassier assemblage, typically with *Nardus stricta* being the most frequent.

M16 Erica tetralix-Sphagnum compactum wet heath

This community formed medium sized stands often in a mosaic with M15 communities. It is a wet heath which occupies shallow peat soils and has quite a varied assemblage. *Sphagnum compactum* is conspicuous but otherwise the assemblage contains a mix of species such as *Erica tetralix, Calluna vulgaris*, *Succisa pratensis*, and *Trichophorum germanicum*. One of the four described sub-communities, the M16a Typical sub-community, was recorded within the survey area.

Dry Heath

H10 Calluna vulgaris – Erica cinerea heath

This heathland was widespread on steep, south facing ground within the survey area. The community is dominated by dwarf shrubs including *Calluna vulgaris* and *Erica cinerea.* The dwarf shrubs within this community are characteristically short due to constant browsing from herbivores and muirburning activities (in some locations). Other species recorded within the community include *Carex binervis*, *Vaccinium myrtillus, Galium saxatile* and *Potentilla erecta*. Robust pleurocarpous bryophytes are common within this community, frequently recorded species included *Rhytidiadelphus loreus, Hylocomium splendens, Pleurozium schreberi and Hypnum jutlandicum.*

Two sub-communities were assigned to H10 communities within the survey area. The H10a sub-community has no real distinguishing features other than a lack of species listed as notable within other sub-communities. The H10c *Festuca ovina – Anthoxanthum odoratum* sub-community was recorded in areas where the soil was composed of a mineral nature which allows grasses to be more prominent within the heathland. Apart from the grasses for which the sub-community is named, species recorded included *Agrostis capillaris*, *Galium saxatile*, *Potentilla erecta* and small amounts of *Nardus stricta*.

H12 Calluna vulgaris - Vaccinium myrtillus heath

H12 *Calluna vulgaris – Vaccinium myrtillus* heath was recorded widely throughout the survey area. The community covered moderate sized areas that were uniform in their composition. It is a dry heath community with *Calluna vulgaris* and *Vaccinium myrtillus* often occurring as co-dominants and is found on a range of shallow peat substrates (<50cm in depth).

Dwarf shrubs are overwhelmingly dominant and provide little room for other plant growth. V*accinium vitis-idaea, Festuca ovina, Huperzia selago* and *Avenella flexuosa* were also present but were patchy in their occurrence. The vegetation is thick and interspersed with a familiar common assemblage of robust

bryophytes growing through the dwarf shrubs. Moss species recorded include *Rhytidiadelphus loreus, Hylocomium splendens, Pleurozium schreberi* and *Hypnum jutlandicum*.

One of the three described sub-communities were recorded within the survey area. The H12a *Calluna vulgaris* sub-community has no real distinguishing species of its own.

H21 Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium heath

This is a heath community that has many similarities with blanket bog vegetation, though it occurs on shallow peatland habitats (often <50cm in depth). *Calluna vulgaris* is frequent to abundant but also contains a mixture of *Avenella flexuosa* and *Vaccinium myrtillus* throughout the community. S*phagnum capillifolium* is the most frequent Sphagnum species which can form low humps or hummocks, though *Sphagnum subnitens* is occasional to frequent in some areas. Robust pleurocarpous mosses such as *Hylocomium splendens, Pleurozium schreberi, Hypnum jutlandicum* and R*hytidiadelphus loreus* were frequent to abundant.

The only sub-community recorded within the survey area was the H21a *Calluna vulgaris-Pteridium aquilinum* sub-community which is defined by the presence and frequency of *Pteridium aquilinum*. Many other stands did not conform to any of the other described sub-communities and were therefore not assigned to one.

Grasslands

U4 Festuca ovina - Agrostis capillaris - Galium saxatile grassland

This habitat is thinly spread throughout the survey area. U4 grassland communities occur on predominantly mineral soils where frequent grazing maintains a short sward length. It typically occupies areas on free draining, slightly acidic soils. Species within this community are varied which is illustrated by having five sub-communities to accommodate the differences in composition. The most frequently recorded species are *Festuca ovina*, *Agrostis capillaris, Holcus lanatus*, *Galium saxatile* and *Anthoxanthum odoratum.*

Four of the five sub-communities were recorded during the NVC survey. The U4a sub-community was recorded where frequent grazing and subsequent nutrient enrichment maintains conditions for more nutrient demanding species. The U4b *Holcus lanatus – trifolium repens* contains a higher frequency of nutrient demanding species. The U4d *Luzula multiflora-Rhytidiadelphus loreus* sub-community is the most frequent (by area) of the two sub-communities within the survey area. It has a thick sward of common bryophytes such as *Hylocomium splendens, Pleurozium schreberi* and *Pseudoscleropodium purum*. The U4e *Vaccinium myrtillus - Avenella flexuosa* are rather similar to U4d sub-communities but contain a greater frequency of heath species.

U5 Nardus stricta – Galium saxatile grassland

U5 grassland has a scarce distribution within the survey area. This community is found on rather moist, acidic soils often with a mix of peat substrates. *Nardus stricta* is the most frequent grass and often grows in thick wiry clumps. Other species recorded within the community include *Agrostis capillaris, Festuca ovina* and lesser amounts of *Avenella flexuosa* and *Anthoxanthum odoratum*. *Galium saxatile* can form intricate patches in places and is generally widespread throughout. A familiar suite of mosses including *Hylocomium splendens, Pleurozium schreberi, Hypnum jutlandicum* and *Rhytidiadelphus squarrosus* are present in varying amounts throughout the community.

Three sub-communities were recorded within the survey area which included the U5a species poor, The U5b *Agrostis canina-Polytrichum commune* sub-community and the U5c *Carex panicea-Viola riviniana* sub-community.

Improved grassland

MG6 Lolium perenne – Cynosurus cristatus grassland

This habitat was recorded as medium-sized stands in lowland situations within the survey area. It is a grassland that is indicative of agricultural improvement. The community is dominated by nutrient demanding species like *Lolium perenne* and *Cynosurus cristatus*, *Bellis perennis* and *Trifolium repens*. The MG6a typical sub-community was recorded where soils are more improved. The MG6b *Anthoxanthum odoratum* sub-community occurred where the soil is typically less improved, where a greater abundance of grass species such as *Festuca rubra* and *Agrostis capillaris*. This is a habitat which is of high value for grazing but low in biodiversity and of limited conservation value.

Tall herb and fern

U20 Pteridium aquilinum – Galium saxatile community

Pteridium aquilinum is the overwhelmingly dominant species within this habitat. Where U20 habitat occurred, fronds of *Pteridium aquilinum* carpeted much of the ground and smothered the growth of most other species. As such, species diversity was low throughout

Where *Pteridium aquilinum* fronds were growing in loose clumps, a grassy assemblage of *Agrostis capillaris, Anthoxanthum odoratum, Holcus lanatus* and *Festuca ovina* were all frequent. Pleurocarpous mosses formed conspicuous patches on the ground beneath the fronds. Species recorded included *Rhytidiadelphus loreus, Pleurozium schreberi*, *Hypnum jutlandicum*, *Hypnum cupressiforme s.s.* and *Hylocomium splendens* which were found to be frequent to abundant in places.

Two sub-communities were recorded within the survey area, U20a *Pteridium aquilinum – Galium saxatile* and U20b *Vaccinium myrtillus – Dicranum scoparium* sub-communities. The U20a contains a grassier assemblage than U20b. The U20b sub-communities are located on well drained, steep slopes set within peatland communities. As such, the U20b sub-community often contained some heath and bog vegetation such as *Calluna vulgaris*, *Potentilla erecta, Avenella flexuosa* and *Vaccinium myrtillus*. The U20c

species-poor sub-community has few species other than *Pteridium aquilinum* in thick mats that smother all other species.

Woodland

W4 Betula pubescens - Molinia caerulea woodland

This community formed medium sized stands in the north of the survey area. *Betula pubescens* was dominant throughout but occurred as a mosaic with W19, so juniper was locally frequent also. *Pteridium aquilinum* and *Calluna vulgaris* are the most dominant species on the ground layer, but the vascular plant component varied with herbaceous species including *Primula vulgaris* and *Anemone nemorosa*.

Two sub-communities were recorded within the survey area. The W4b *Juncus effusus* sub-community contains *Juncus effusus*, *Deschampsia cespitosa, Sphagnum palustre* and *Dryopteris dilatata* in the ground layer. The W4c Sphagnum sub-community is located on wetter soils and contains a good range of sphagnum species including *S. fallax, S. fimbriatum, S. palustre* and *S. quinquefarium*.

W17 Quercus petraea-Betula pubescens-Dicranum majus woodland

This woodland contains a mix of *Quercus petraea, Betula pubescens* and *Sorbus aucuparia*. This community was recorded as a mosaic with W4 woodlands and did not occur as pure stands within the survey area. This was an indistinctive example of W17 due to occurring as a mosaic and because of its relatively small area. It corresponded in composition to the W17d *Hylocomiadelphus triquetrus* sub-community.

NVC results summary

A number of the recorded communities are considered to have conservation value at a European level (Annex 1) or at a national level (Scottish BAP). A summary of habitats that have conservation designations assigned to them can be found in Table 1 below.

Table 1: Summary of conservation value

Phase 1 code	NVC code	Annex 1 code	Scottish Biodiversity List (SBL)	Area (Ha)
Semi-natural broadleaved woodland (A1.1.1)	W4	H91D0	Wet woodland	7.01
	W17	H91A0	Upland oak woodland	3.50
Conifer plantation woodland (A1.2.2)	N/A	N/A	N/A	59.56
Unimproved acid grassland (B1.1)	U4	N/A	Lowland dry acid grassland	13.54
	U5	N/A	Lowland dry acid grassland	0.69
Improved acid grassland (B1.2)	U4	N/A	Lowland dry acid grassland	7.78
Improved grassland (B4)	MG6	N/A	N/A	0.91
Marshy Grassland (B5)	M23	N/A	Purple Moor Grass and Rush Pastures	0.21
	M25	N/A	Purple Moor Grass and Rush Pastures	7.03
Bracken (C1)	U20	N/A	N/A	29.31
Dry heath (D1.1)	H10	H4030	Upland heathland	27.65
	H12	H4030	Upland heathland	160.20
	H21	H4030	Upland heathland	63.67
Wet heath (D2)	M15	H4010	Upland heathland	174.8
	M16	H4010	Upland heathland	3.92
Blanket bog (E1.6.1)	M1	H7120	Blanket bog	5.14
	M2	H7120	Blanket bog	2.42
	M3	H7120	Blanket bog	0.75
	M17	H7120	Blanket bog	433.01
	M18	H7120	Blanket bog	0.39
	M19	H7120	Blanket bog	328.07
	M20	H7120	Blanket bog	1.34
Wet modified bog (E1.7)	M25	H7120	Blanket bog	22.59
Acid/neutral flush (E2.1)	M4	H7140	Upland Flushes, Fens and Swamps	2.05
	M6	N/A	Upland Flushes, Fens and Swamps	25.88
Basic flush/spring (E2.2)	M10	H7230	Upland Flushes, Fens and Swamps	0.06
Bryophyte dominated spring (E2.3)	M32	N/A	Upland Flushes, Fens and Swamps	0.13
Oligotrophic standing water (G1.3)	Non - NVC	N/A	Oligotrophic and Dystrophic Lochs	2.06
Buildings (J3.6)	Non - NVC	N/A	N/A	0.43
Bare ground (J4)	Non - NVC	N/A	N/A	9.72
			Total	**1393.82**

Groundwater Dependent Terrestrial Ecosystems (GWDTE) Results

GWDTEs are classified according to SEPA (2017), defining each NVC community on their potential dependency on groundwater. Groundwater dependency is often linked to wetlands that contain flora that is dependent upon the chemical composition of the water fed from a groundwater source. SEPA defines the habitats with regard to their potential for groundwater dependency, therefore not all communities listed may be truly groundwater dependent.

Table 2 lists the NVC communities that have a potential for groundwater dependency. The table categorises each habitat type according to whether they are likely to be moderately or highly groundwater dependent as defined by SEPA (2017). In total, there are two communities listed as moderate and six communities listed as having high potential for groundwater dependency.

Table 2: Potential GWDTE recorded on site

NVC code	NVC community name	GWDTE potential
M15	*Trichophorum germanicum - Erica tetralix* wet heath	**Moderate**
M25	*Molinia caerulea - Potentilla erecta* mire	**Moderate**
M6	*Carex echinata – Sphagnum fallax* mire	**High**
M10	*Carex dioica – Pinguicula vulgaris mire*	**High**
M16	*Erica tetralix-Sphagnum compactum wet heath*	**High**
M23	*Juncus effusus/acutiflorus – Galium palustre rush pasture*	**High**
M32	*Philonotis fontana-Saxifraga stellaris spring*	**High**
W4	*Betula pubescens - Molinia caerulea woodland*	**High**

Maps showing locations of GWDTEs and their associated groundwater potential can be found in Appendix B.

Several communities were assessed as being dependent on groundwater within the survey area. All M10 and M32 communities were assessed as groundwater dependent due to evidence of groundwater arising from a springhead or percolating through the ground which creates permanently basic conditions for calcicolous plant species to grow. In addition, Some M6 sub-communities within the survey area are all maintained from springheads and are therefore groundwater dependent. All communities considered to be groundwater dependent are illustrated in Figures 4a-e and Figure 5 in Appendix B.

Peatland condition assessment results

A total of 254 mapped polygons have been selected for the peatland condition assessment using Peatland Action criteria (NatureScot 2017). While the polygons represent distinct NVC communities, many of these communities will function together as hydrologically connected bog units (mesotopes). The use of the polygons rather than mesotope allows for greater accuracy for assessing peatland condition due to their smaller size.

Of the 254 polygons, 60 are classified as near natural, 93 are classified as modified, 45 are classed as drained and 56 are categorised as actively eroding. Details including a map showing the location and distribution of each polygon has been provided in Appendix C.

All blanket bog (or mosaics containing blanket bog) polygons within a 250m radius of proposed infrastructure were also assessed in line with current NatureScot Guidance (2025). A total of 152 polygons were selected for this part of the assessment. Of the 152 identified polygons within a 250m buffer from all proposed infrastructure, a total of 141 were classified as having possible national interest, 11 were not.

The high number of polygons categorised as having a possible national interest was predominantly due to a combination of being 'active' (able to actively form peat) and the lack of scrub / tree encroachment. Despite this, the majority of these blanket bog communities show varying signs of severe degradation. The Peatland Action condition assessment results (Figures 6a-e in Appendix C) provide more details regarding this. Maps and full details illustrating the results are provided in Figures 7a-e in Appendix C.

Recommendations

There are two main constraints to the proposed development, communities that are considered to be groundwater dependent and peatland communities.

GWDTEs

As a guide, excavations <1m in depth should be sited at least 100m away from the sensitive receptors (See Figure 3 in Appendix B). Excavations >1m in depth should be sited at least 250m away from the sensitive receptors (SEPA, 2017). Where this is not possible, mitigation measures will be required to ensure the GWDTEs are not negatively affected. Appropriate mitigation measures in this instance should include robust silt mitigation plans to avoid pollution events or sedimentation deposition within the sensitive receptors. Installations of infrastructure should also be sited below the topographical level of the GWDTE where possible so as not to disrupt the natural flow of water within the communities. An Ecological Clerks of Works (ECoW) will be required to ensure that mitigation measures are constructed and maintained to an acceptable standard.

Peatlands

NatureScot (2025) advise that bog pool communities (NVC codes: M1, M2 & M3) must be avoided. The proposed development is also likely to negatively affect many peatland communities (NVC codes: M17, M18, M19, M20). Infrastructure should avoid blanket bog communities where possible. Where not possible, it is important to maintain the hydrological integrity of the communities and minimise negative effects.

Mitigation measures should be specific to the location and integrity of the community being negatively affected, but good practice will involve the use of floating roads and micro-siting of infrastructure where negative effects are kept to an absolute minimum. As excavations within the peatland communities are likely to be unavoidable for the proposed development, a site-specific Peat Management Plan will be needed so that all peat removed/ excavated can be stored correctly and reinstated accordingly.

Summary

An NVC survey was carried out at the proposed Ballach wind farm in 2022, 2024 and 2025. The survey area is dominated by a range of peatland habitats including blanket bog, heath, acid grasslands and acid/neutral flushes. A number of communities were identified as having conservation value at either a European or national level.

A peatland condition assessment has been carried out on all blanket bog communities within the survey area. Of the 254 polygons, 60 are classified as near natural, 93 are classified as modified, 45 are classed as drained and 56 are categorised as actively eroding. In addition, all blanket bog (or mosaics containing blanket bog) polygons within a 250m radius of proposed infrastructure were also assessed in line with current NatureScot Guidance (2025). A total of 152 polygons were selected for this assessment, of this total 141 were classified as having possible national interest, 11 were not.

A number of potential GWDTE communities were recorded within the surveyarea. After the evaluation process, a small number of these are considered to be dependent on groundwater due to their floristic assemblage, location of springheads or a combination of both factors. Recommendations have been provided to avoid or mitigate negative impacts upon these communities.

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Appendix A – NVC Survey Results

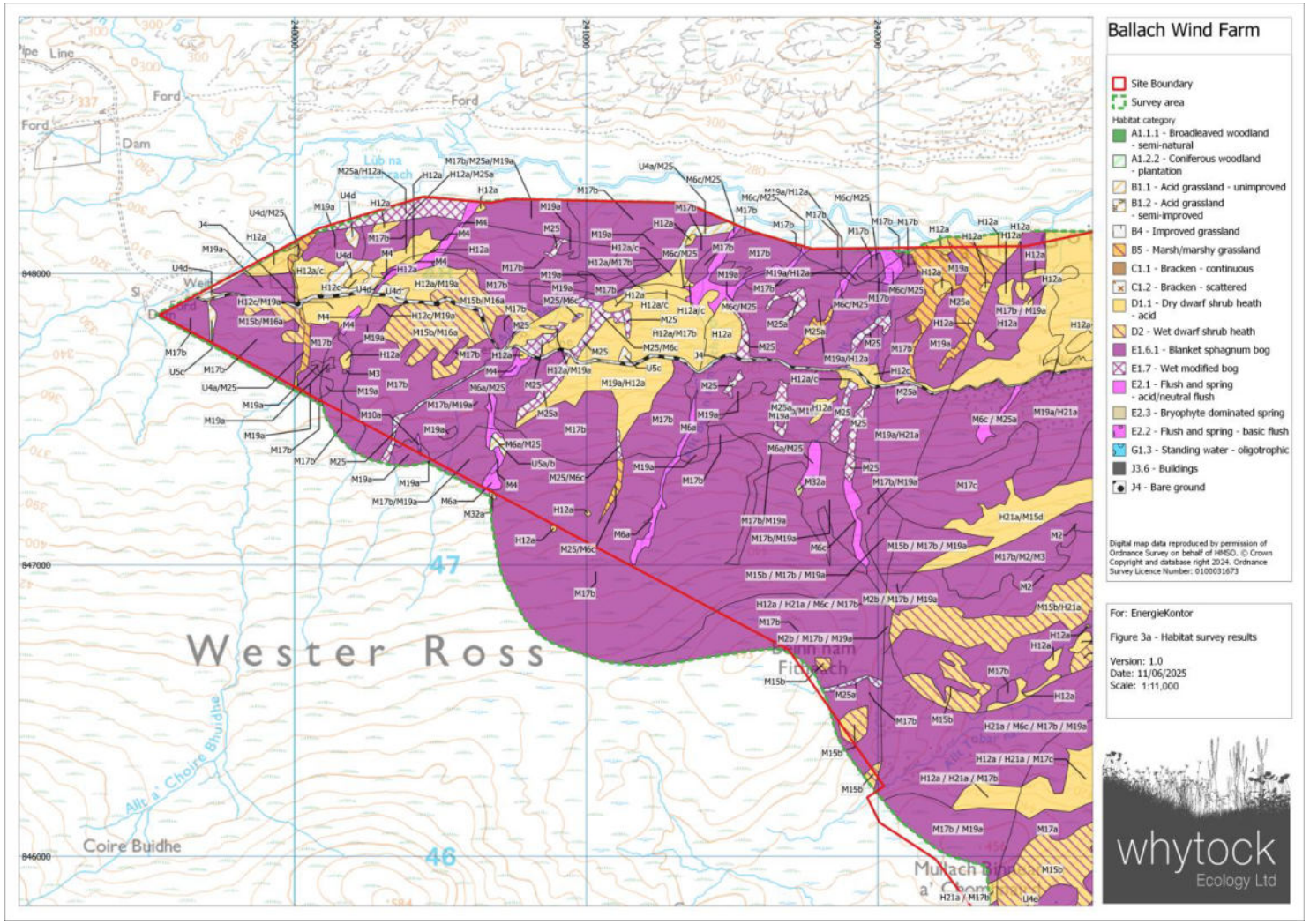


Figure 3a: Habitat survey results. Colour coded by Phase 1 habitat categories and labelled with NVC communities

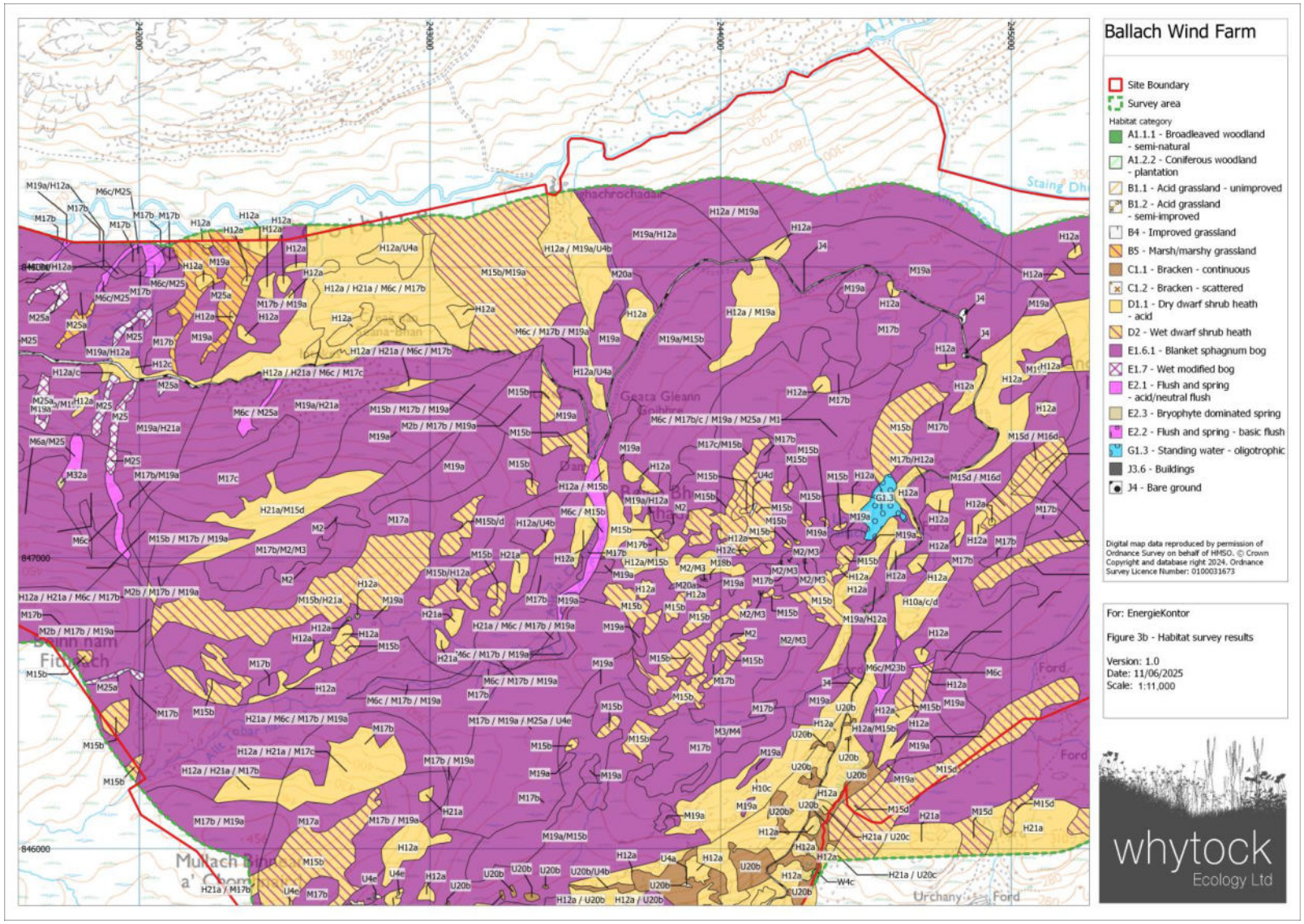


Figure 3b: Habitat survey results. Colour coded by Phase 1 habitat categories and labelled with NVC communities

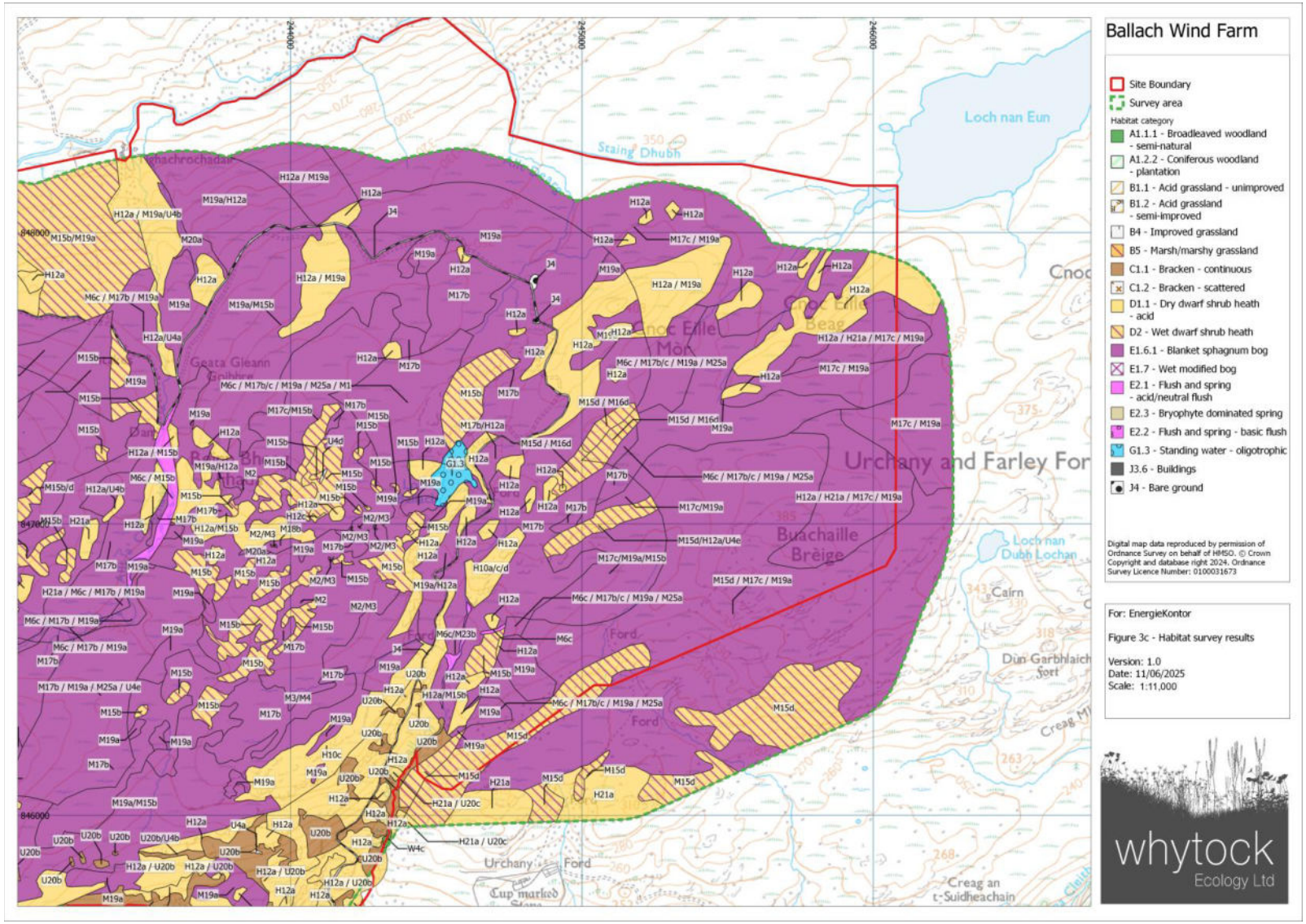


Figure 3c: Habitat survey results. Colour coded by Phase 1 habitat categories and labelled with NVC communities

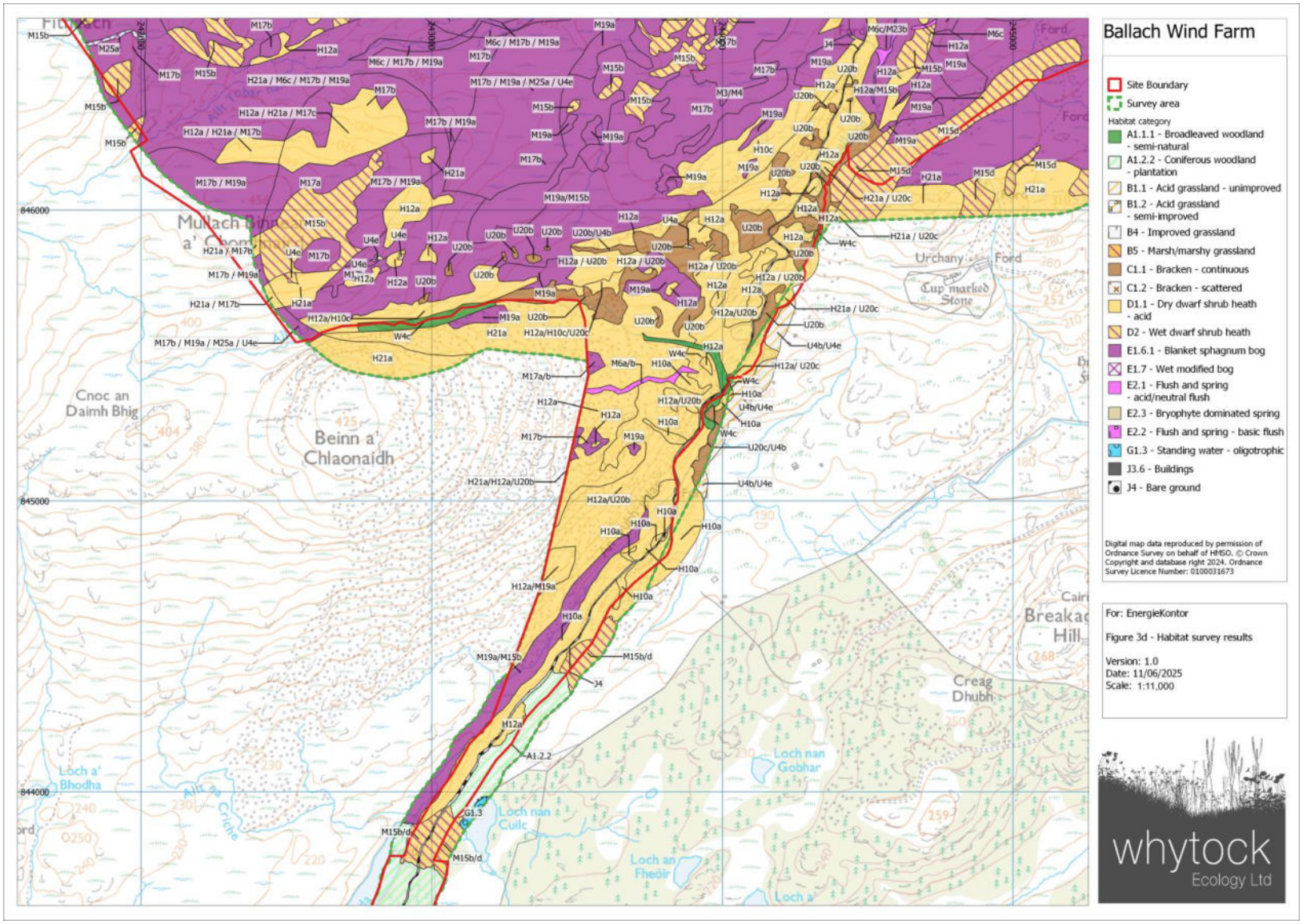


Figure 3d: Habitat survey results. Colour coded by Phase 1 habitat categories and labelled with NVC communities

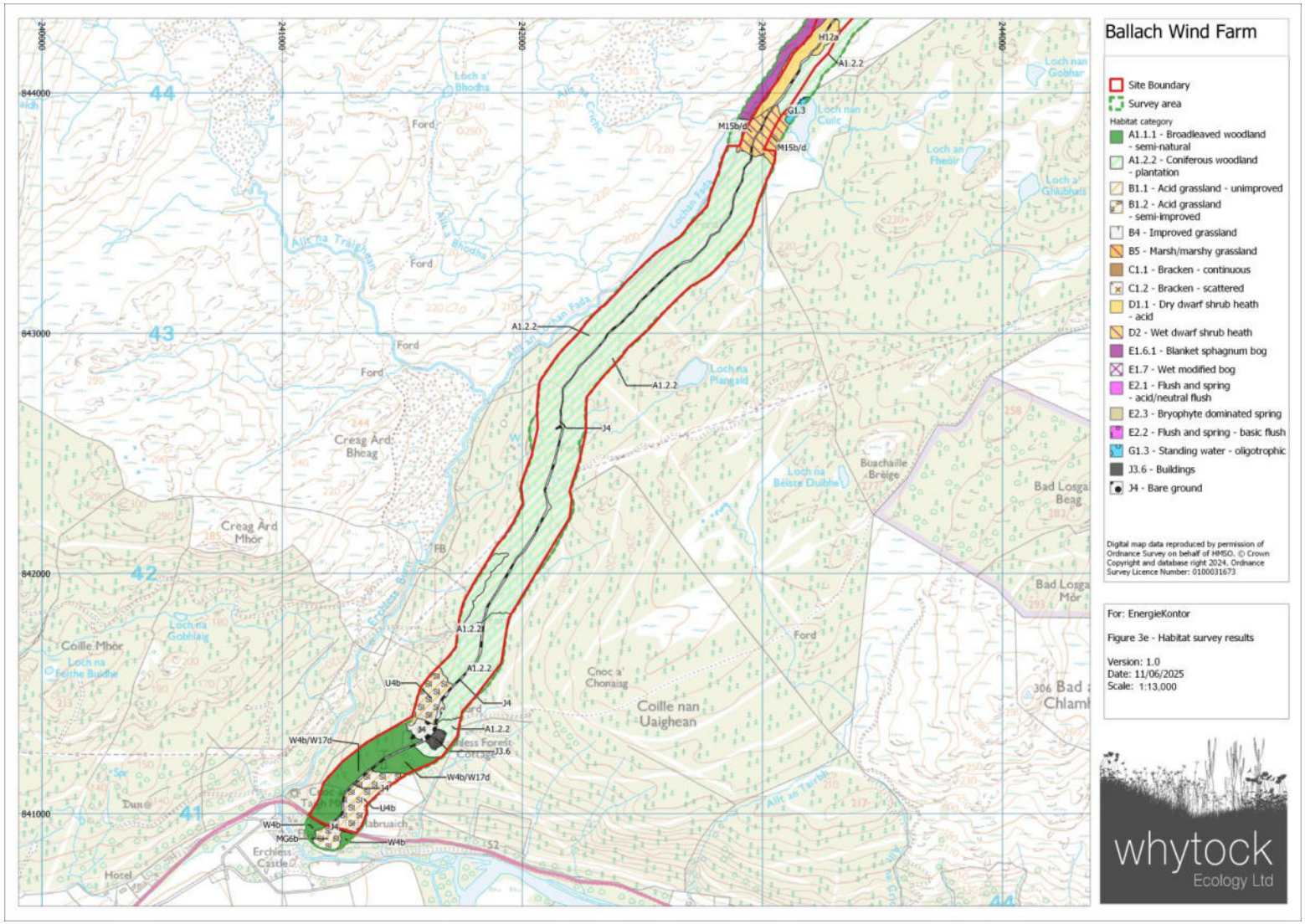


Figure 3e: Habitat survey results. Colour coded by Phase 1 habitat categories and labelled with NVC communities

Appendix B – GWDTEs

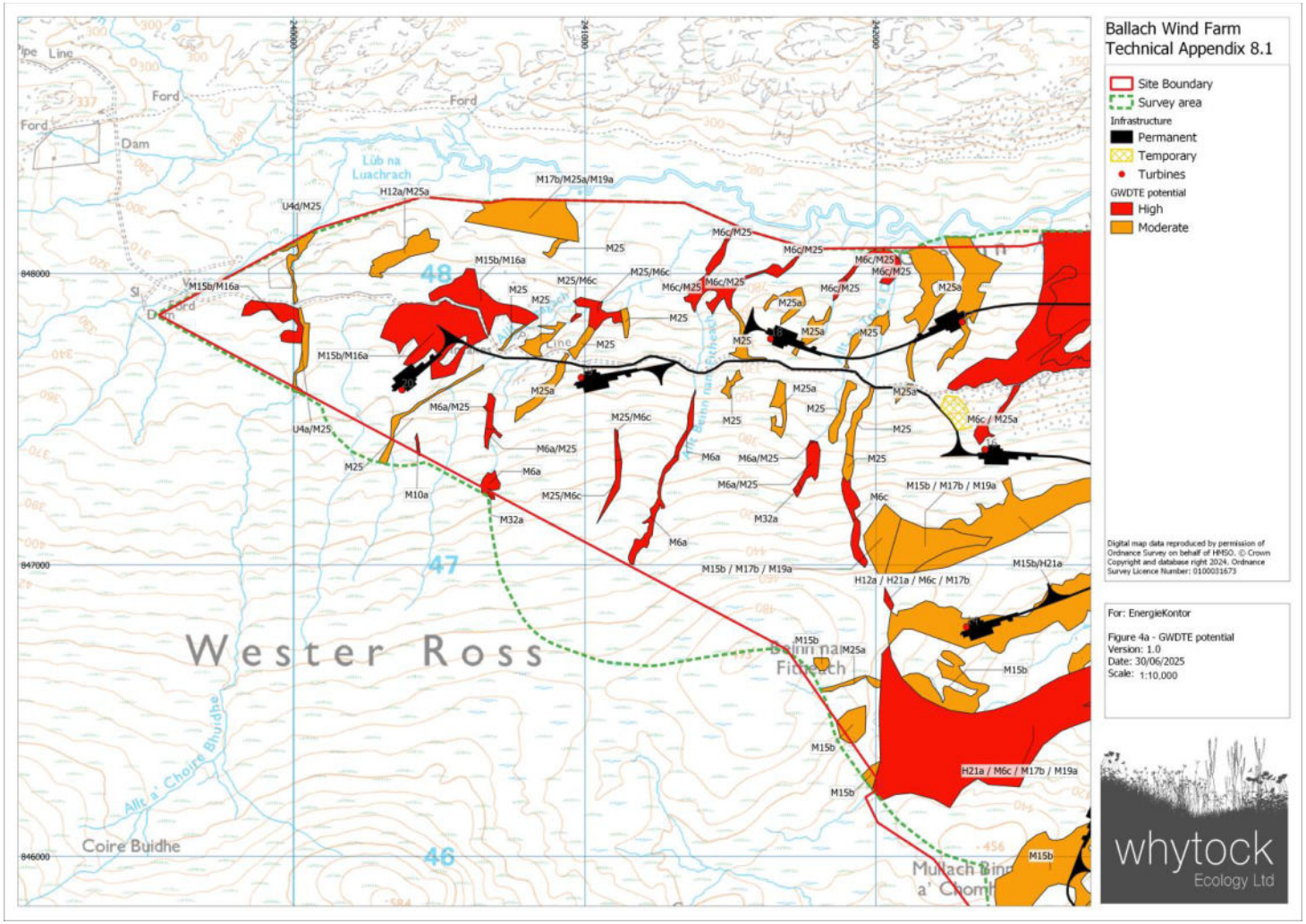


Figure 4a: GWDTE communities and their associated potential for groundwater dependency recorded within the survey area

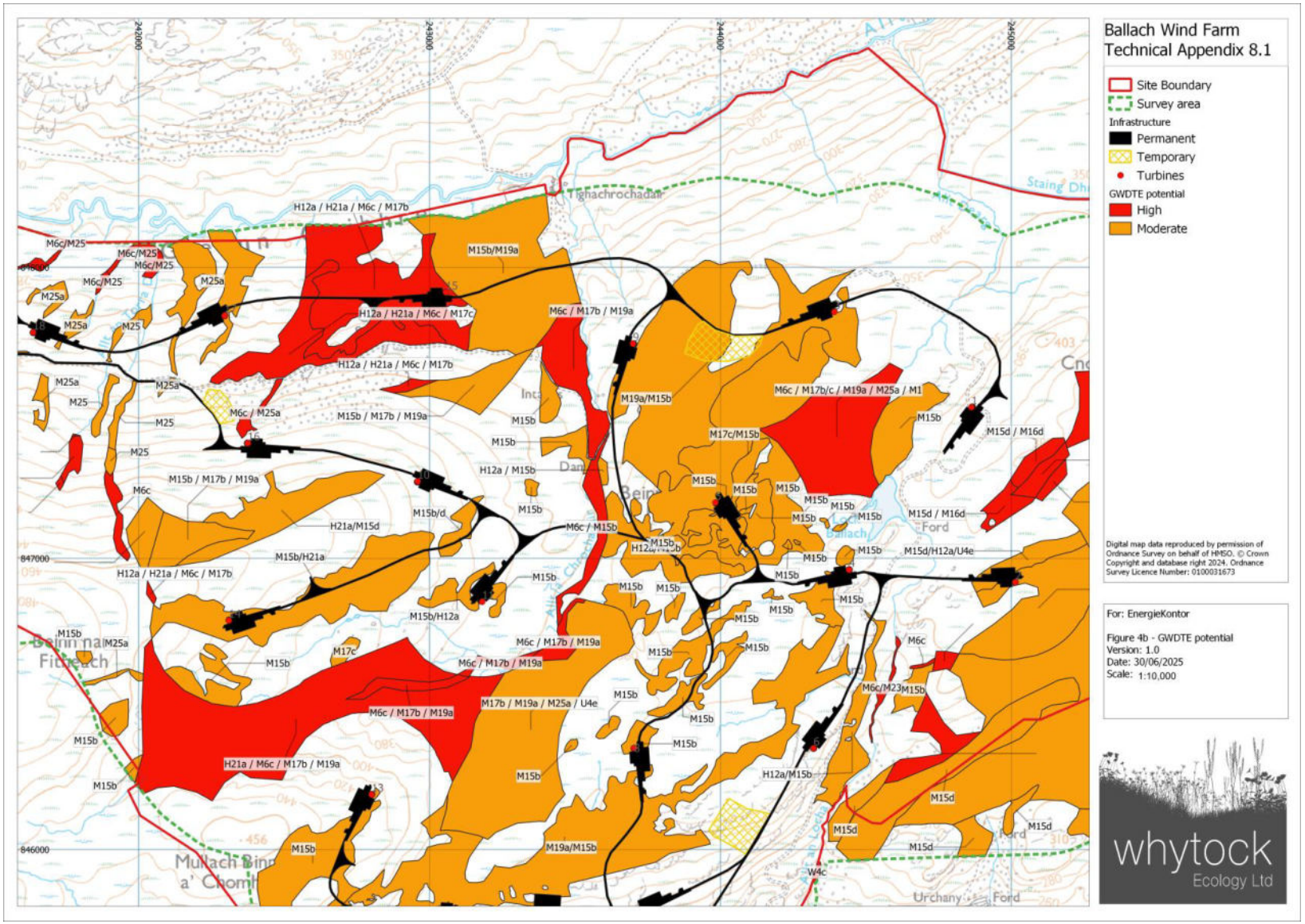


Figure 4b: GWDTE communities and their associated potential for groundwater dependency recorded within the survey area

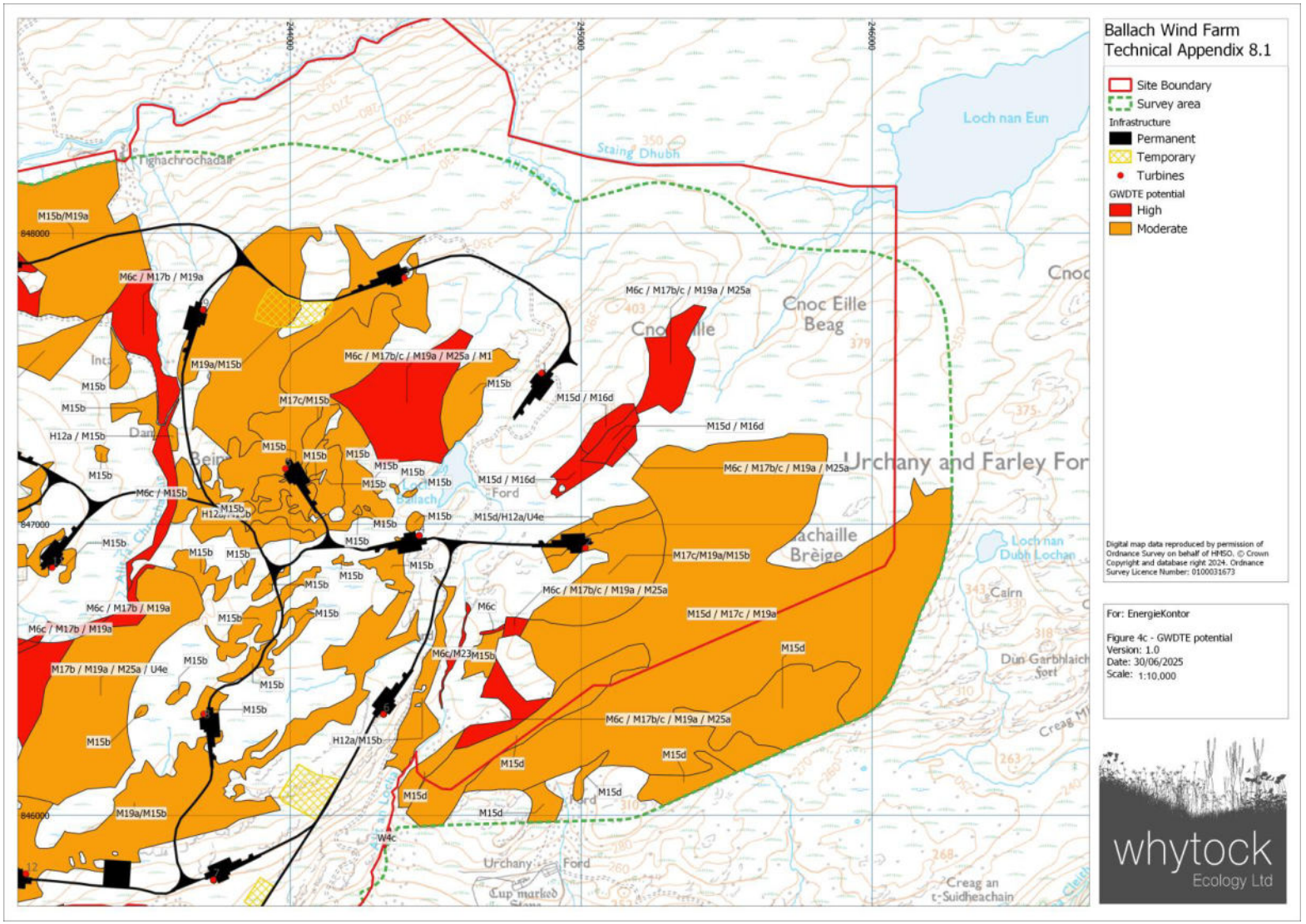


Figure 4c: GWDTE communities and their associated potential for groundwater dependency recorded within the survey area

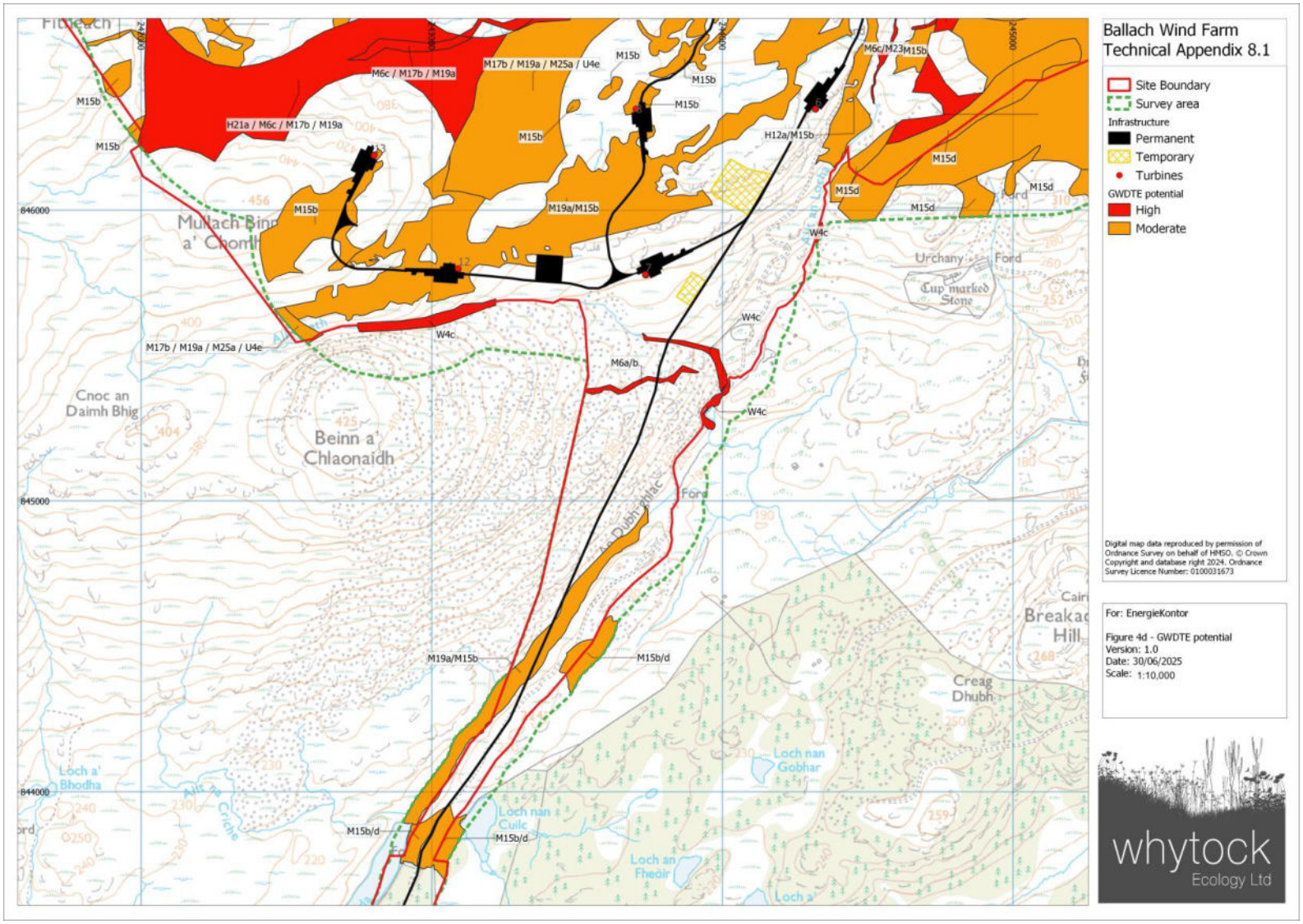


Figure 4d: GWDTE communities and their associated potential for groundwater dependency recorded within the survey area

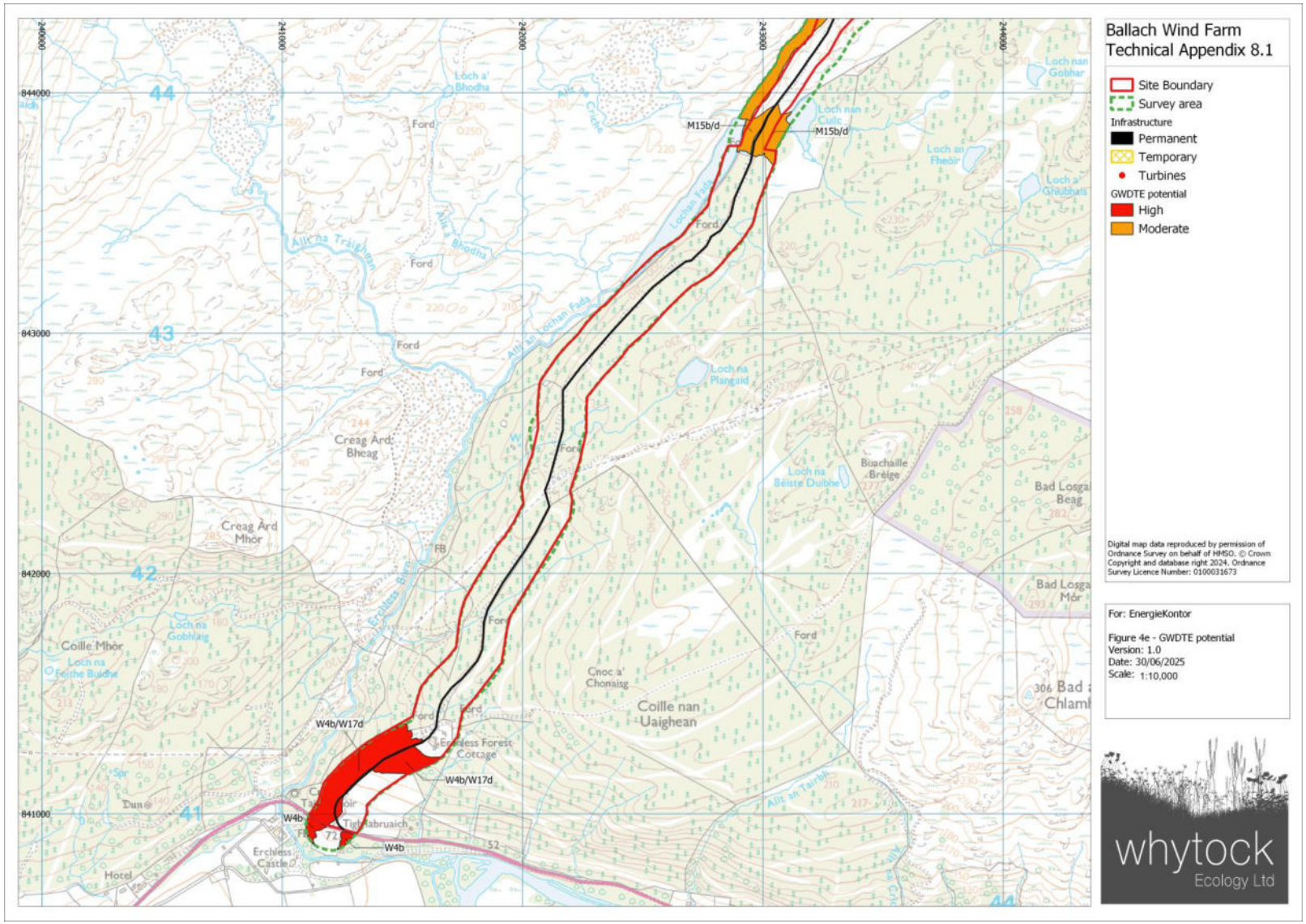


Figure 4e: GWDTE communities and their associated potential for groundwater dependency recorded within the survey area

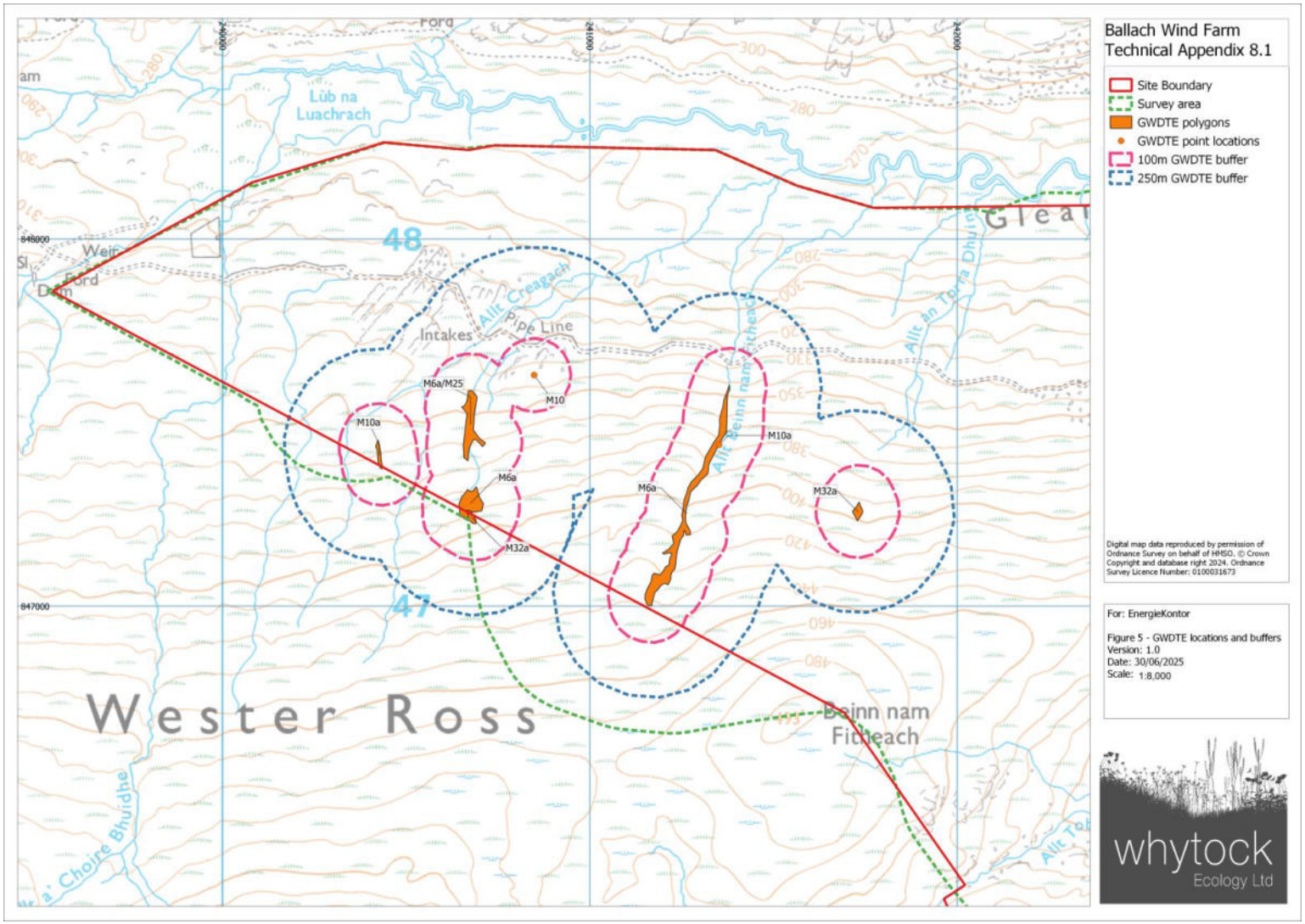


Figure 5: Confirmed GWDTE communities recorded within the survey area

Appendix C – Peatland condition assessment results

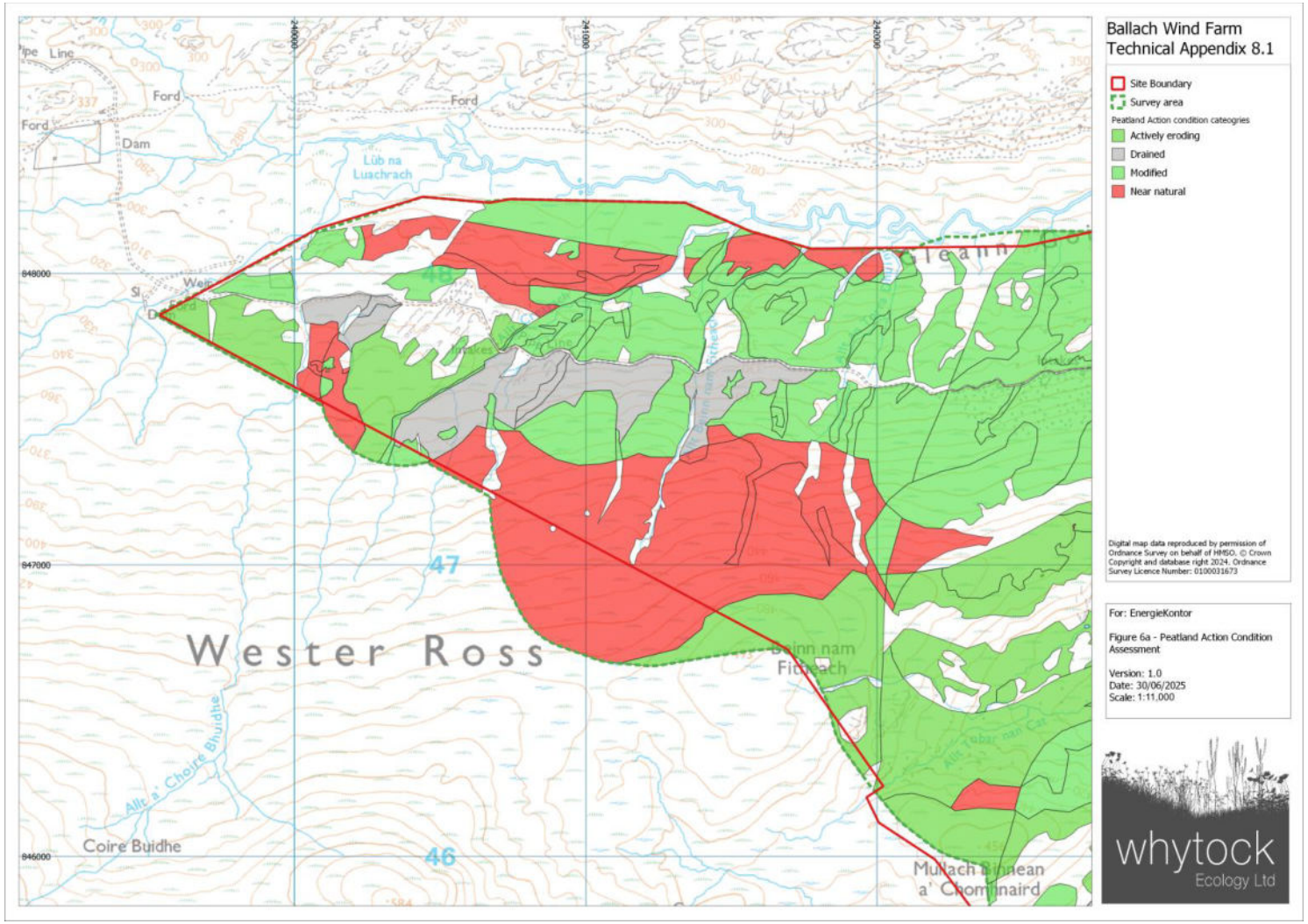


Figure 6a: Peatland Action condition assessment categories

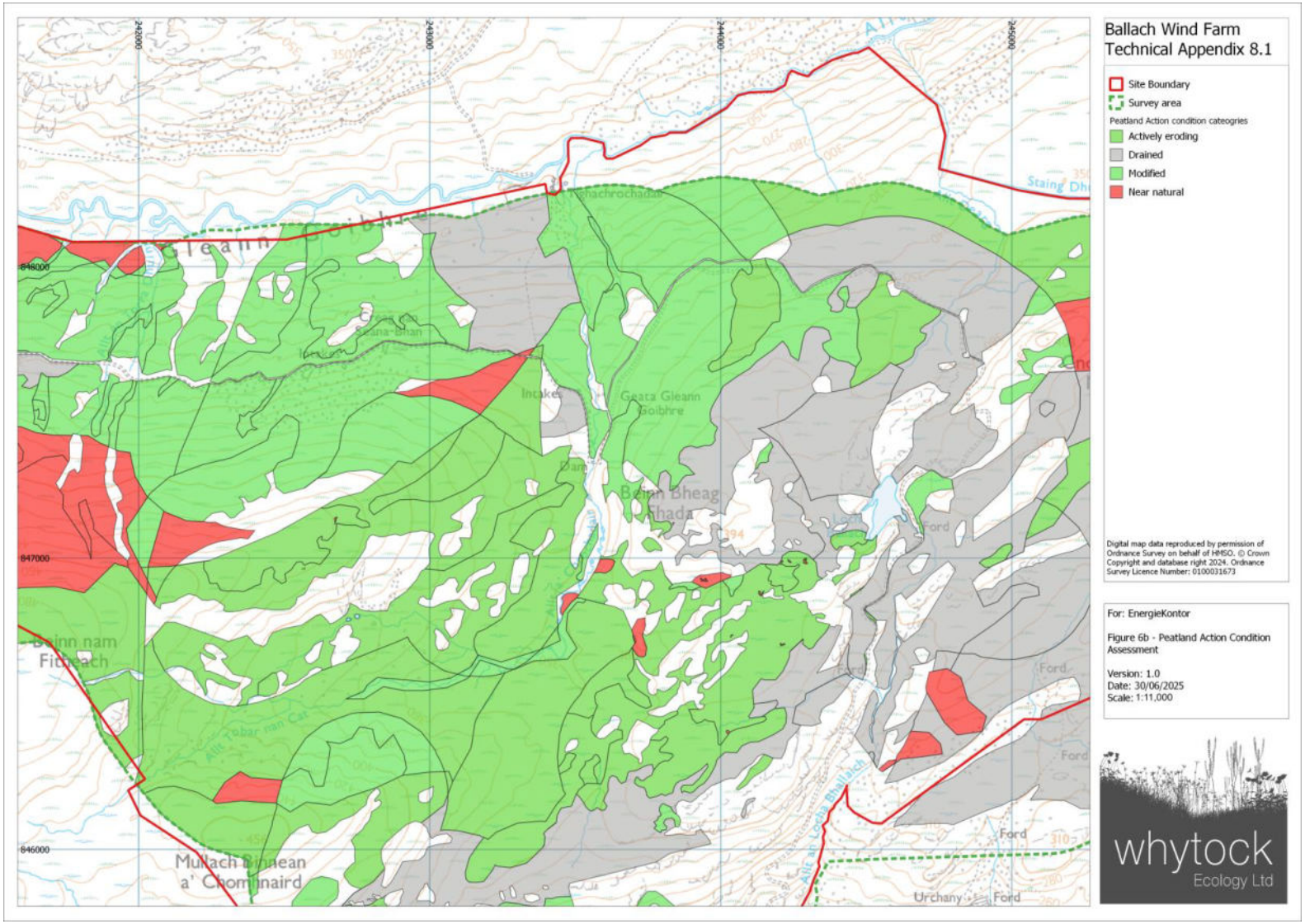


Figure 6b: Peatland Action condition assessment categories

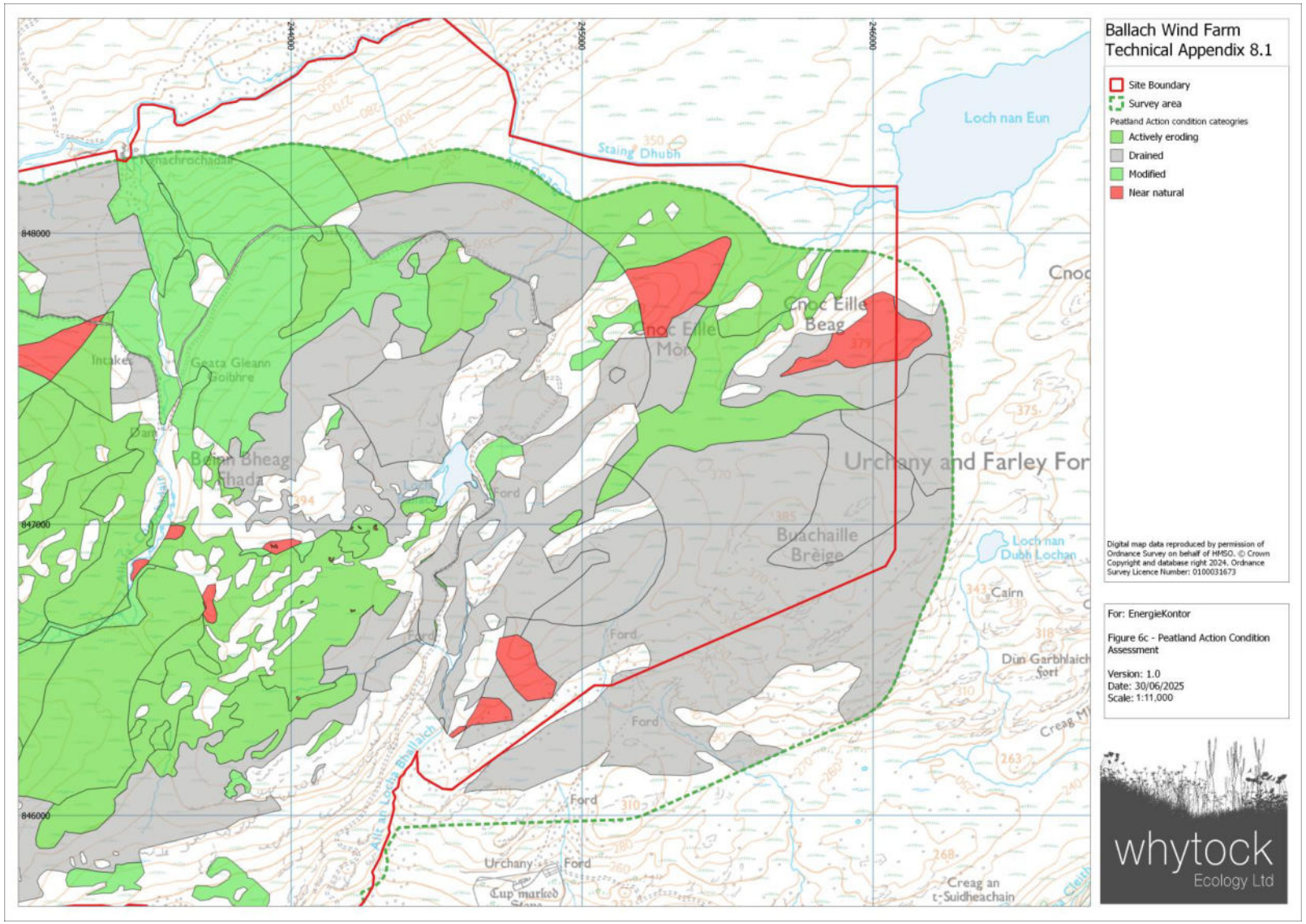


Figure 6c: Peatland Action condition assessment categories

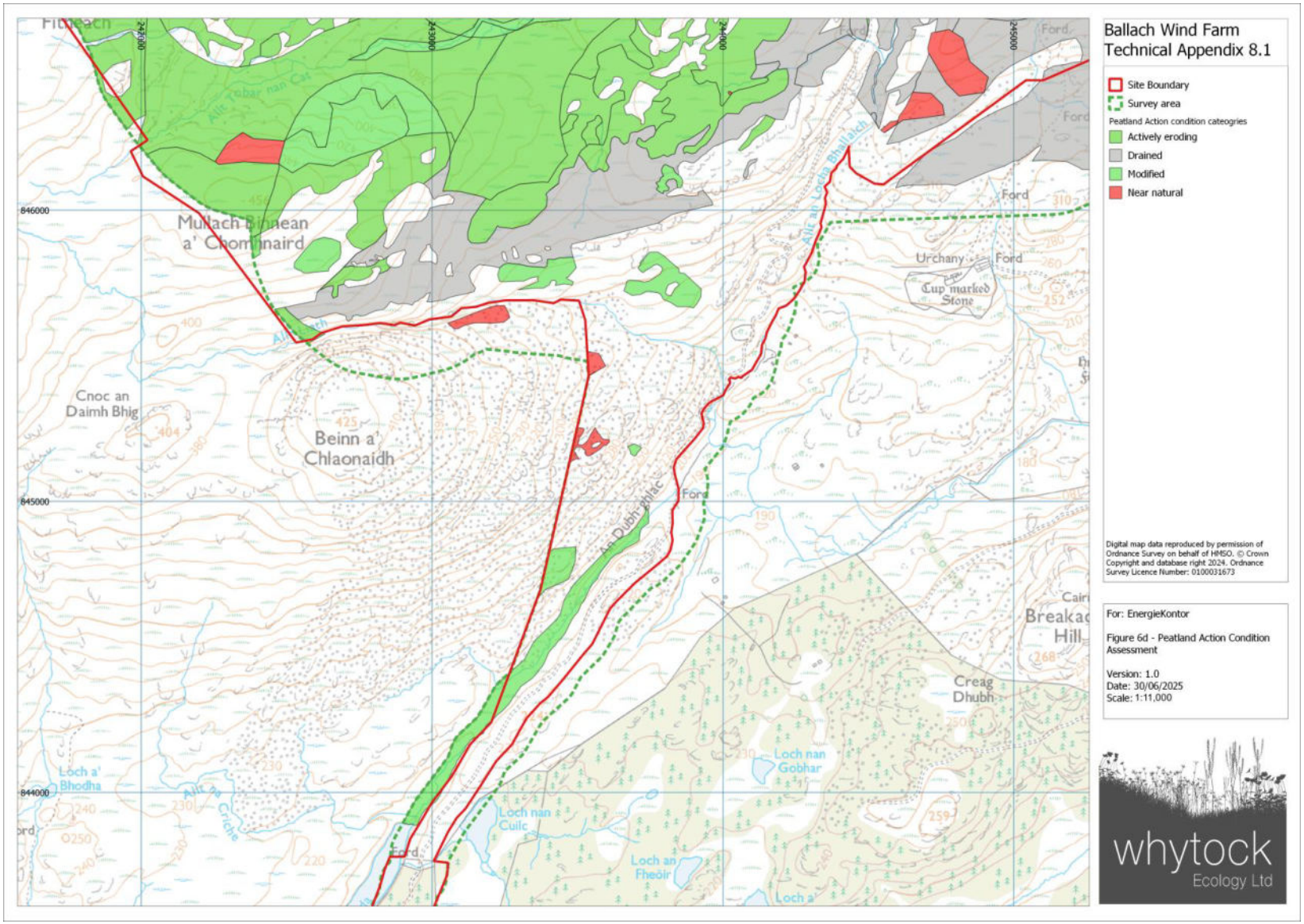


Figure 6d: Peatland Action condition assessment categories

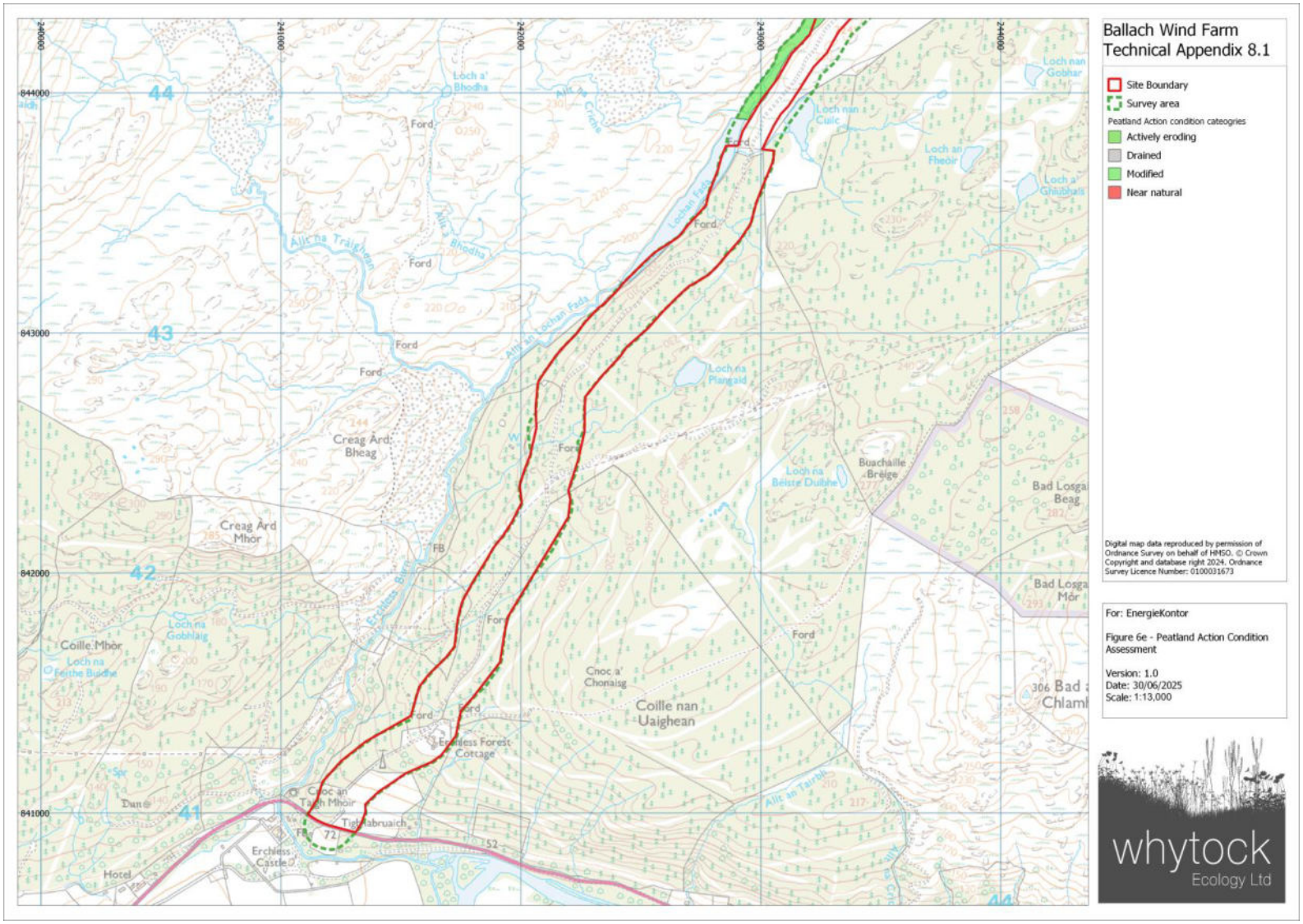


Figure 6e: Peatland Action condition assessment categories

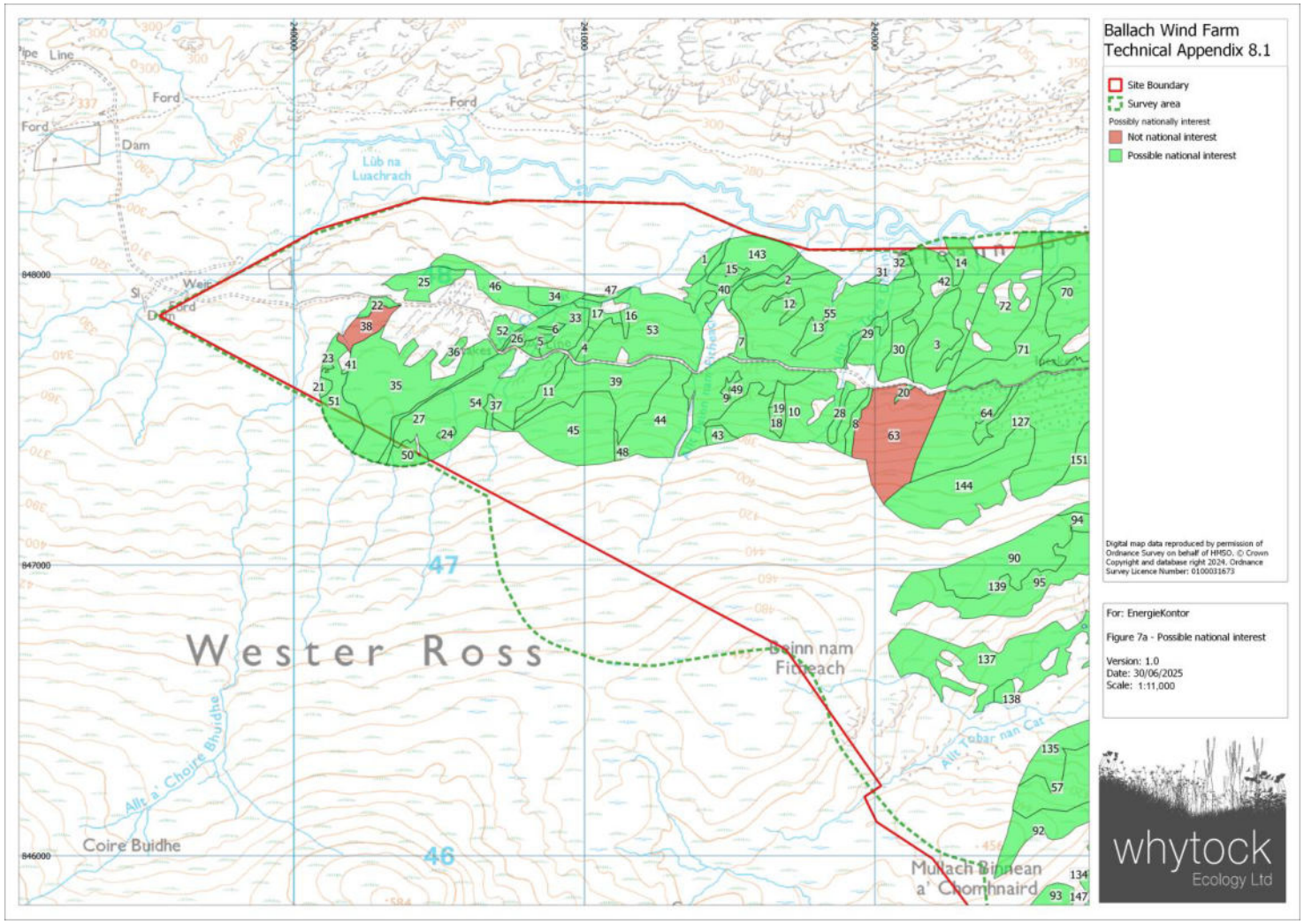


Figure 7a: Possible national interest condition assessment categories

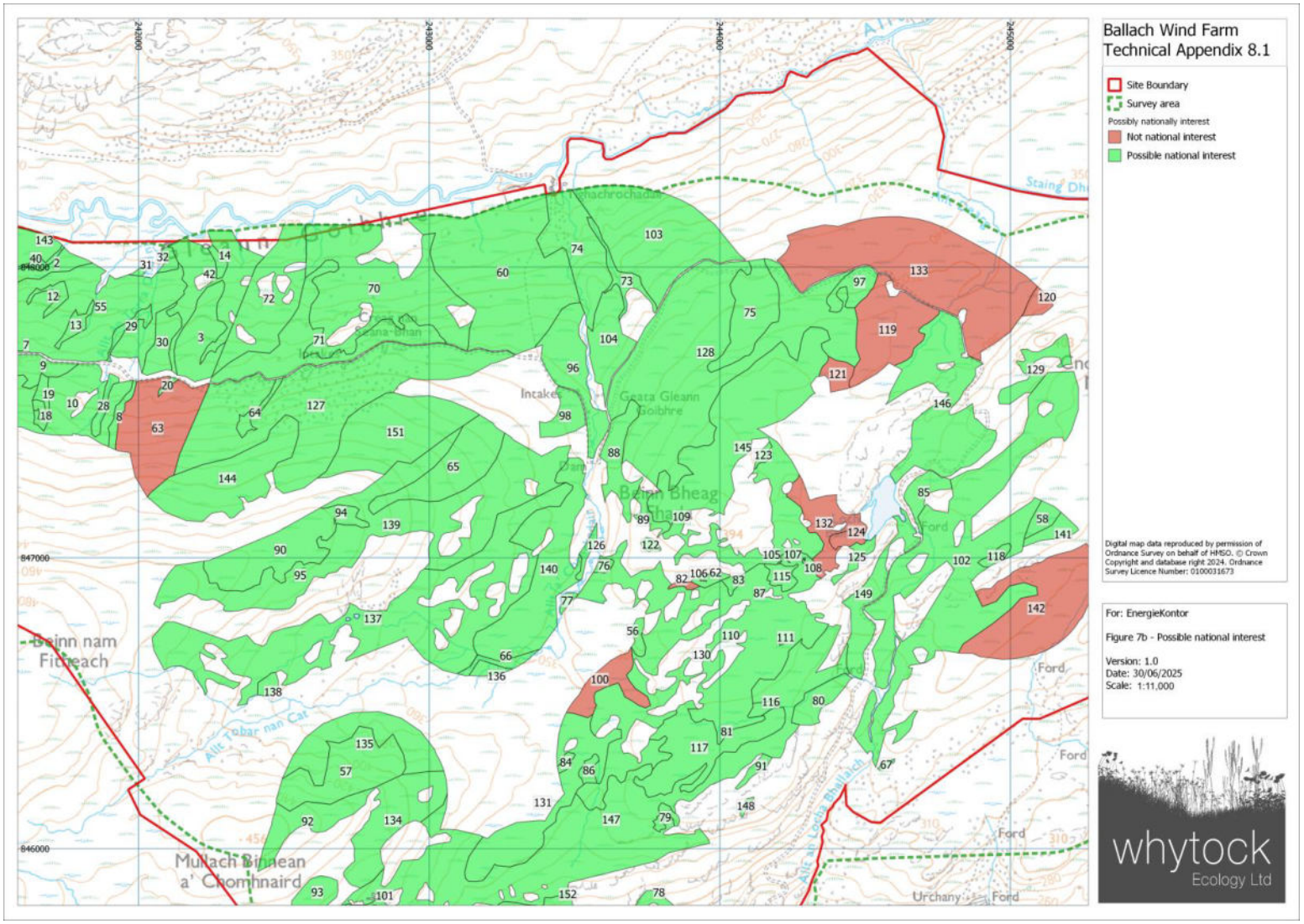


Figure 7b: Possible national interest condition assessment categories

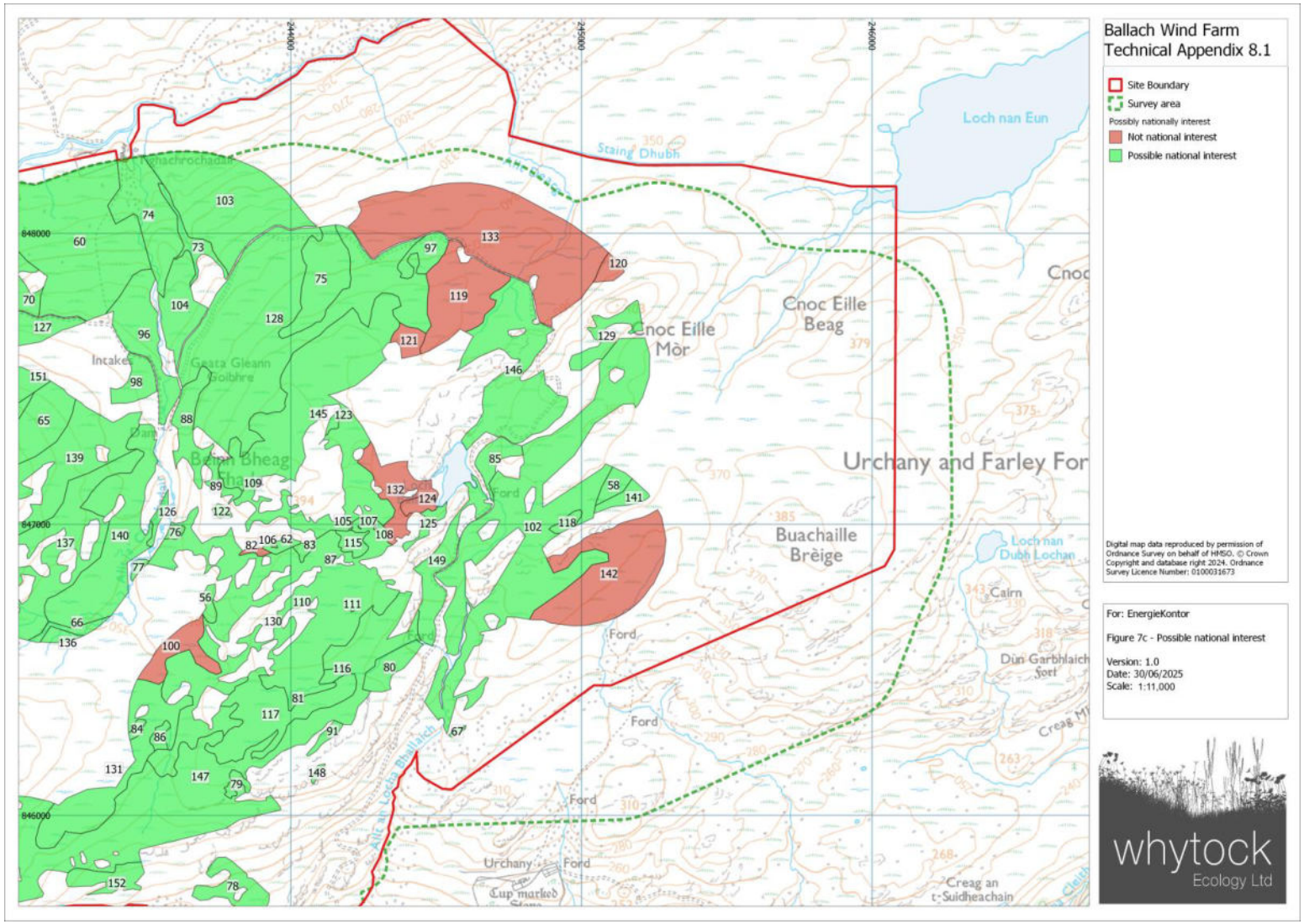


Figure 7c: Possible national interest condition assessment categories

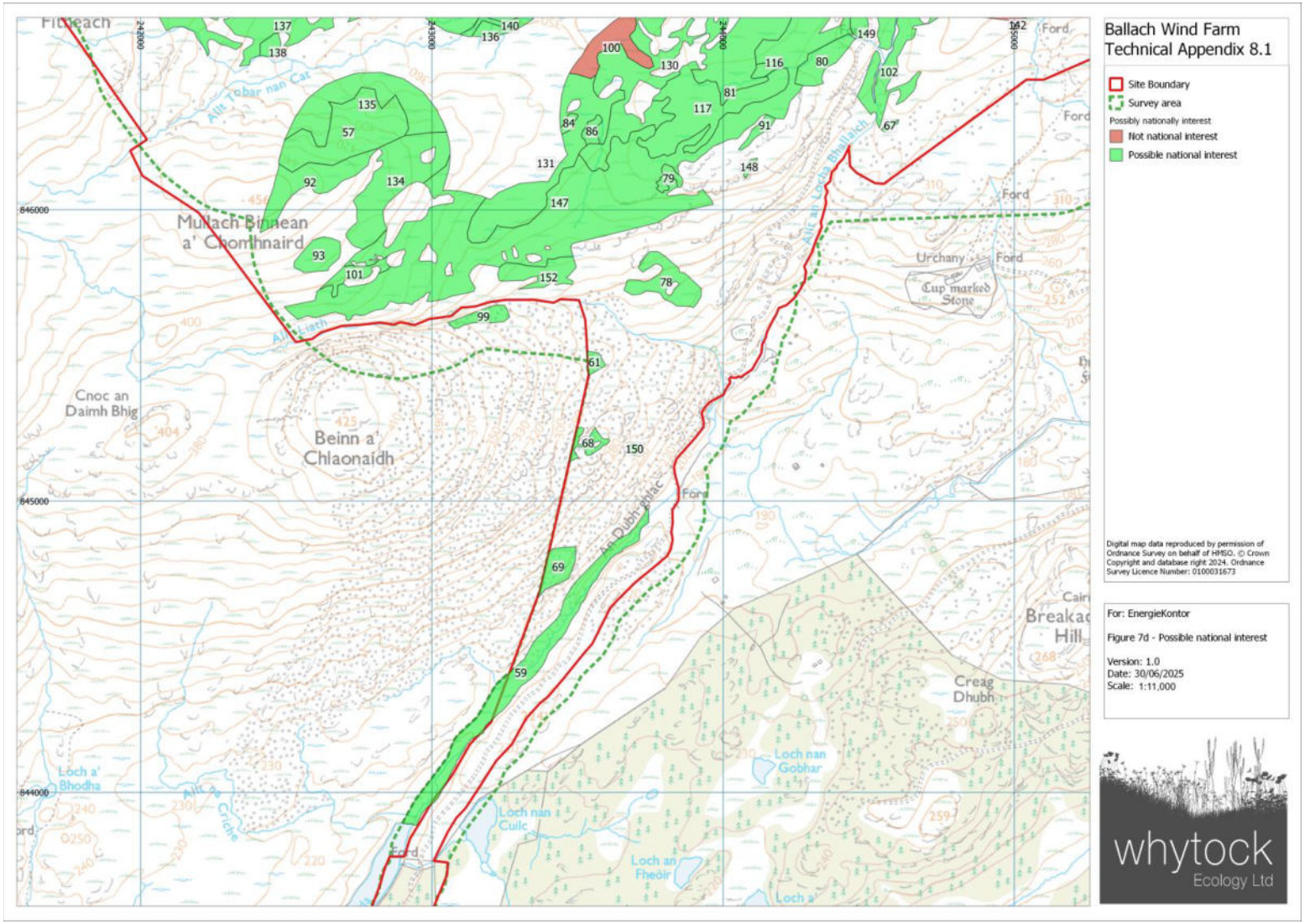


Figure 7d: Possible national interest condition assessment categories

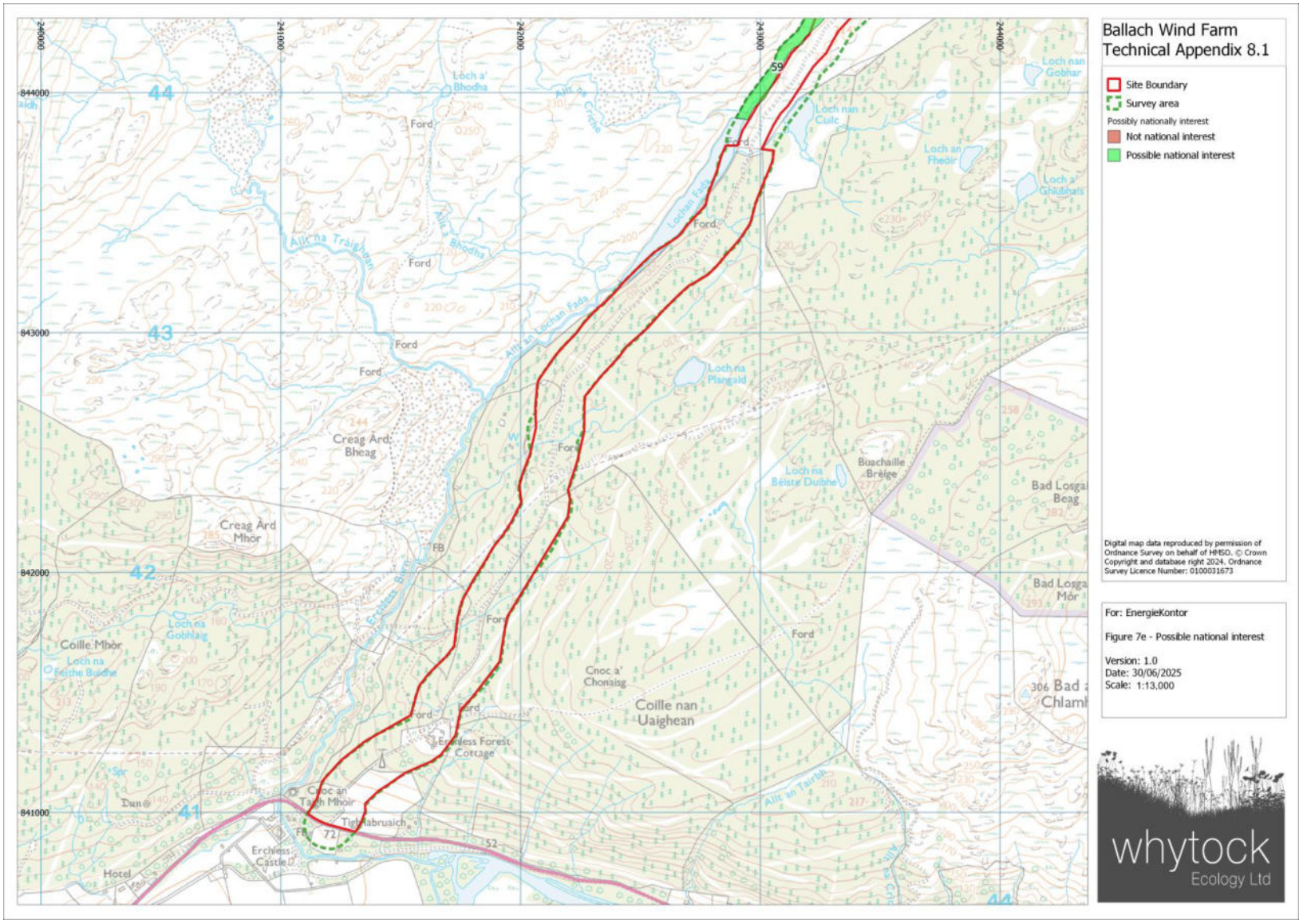


Figure 7e: Possible national interest condition assessment categories

Appendix D – Target Notes

TN ID	BNG	X	Y	Comment
1	NH4071247440	240712	847440	Springhead into M32
2	NH4066447281	240664	847281	M6a
3	NH4064747227	240647	847227	Springhead into M32
4	NH4067947233	240679	847233	Springhead into small M32
5	NH4069947418	240699	847418	Lycopodium annotinum on U5a
6	NH4084647630	240846	847630	Springhead into M10
7	NH4026547636	240265	847636	Pleurozia purpurea
8	NH4017147662	240171	847662	M3 bog pool
9	NH4010547711	240105	847711	Splachnum sphaericum
10	NH4009047778	240090	847778	Heavy trampling drom red deer
11	NH4106547688	241065	847688	Lycopodium annotinum
12	NH4116547006	241165	847006	Springhead into M6a
13	NH4135147439	241351	847439	M10 springhead
14	NH4367845773	243678	845773	Antennaria dioica
15	NH4412846854	244128	846854	Badly eroded M17 mire
16	NH4372346284	243723	846284	Carex pauciflora
17	NH4362747573	243627	847573	Pleurozia purpurea
18	NH4401946397	244019	846397	Sphagnum fuscum
19	NH4384745604	243847	845604	U20b with some thyme on thinner soil

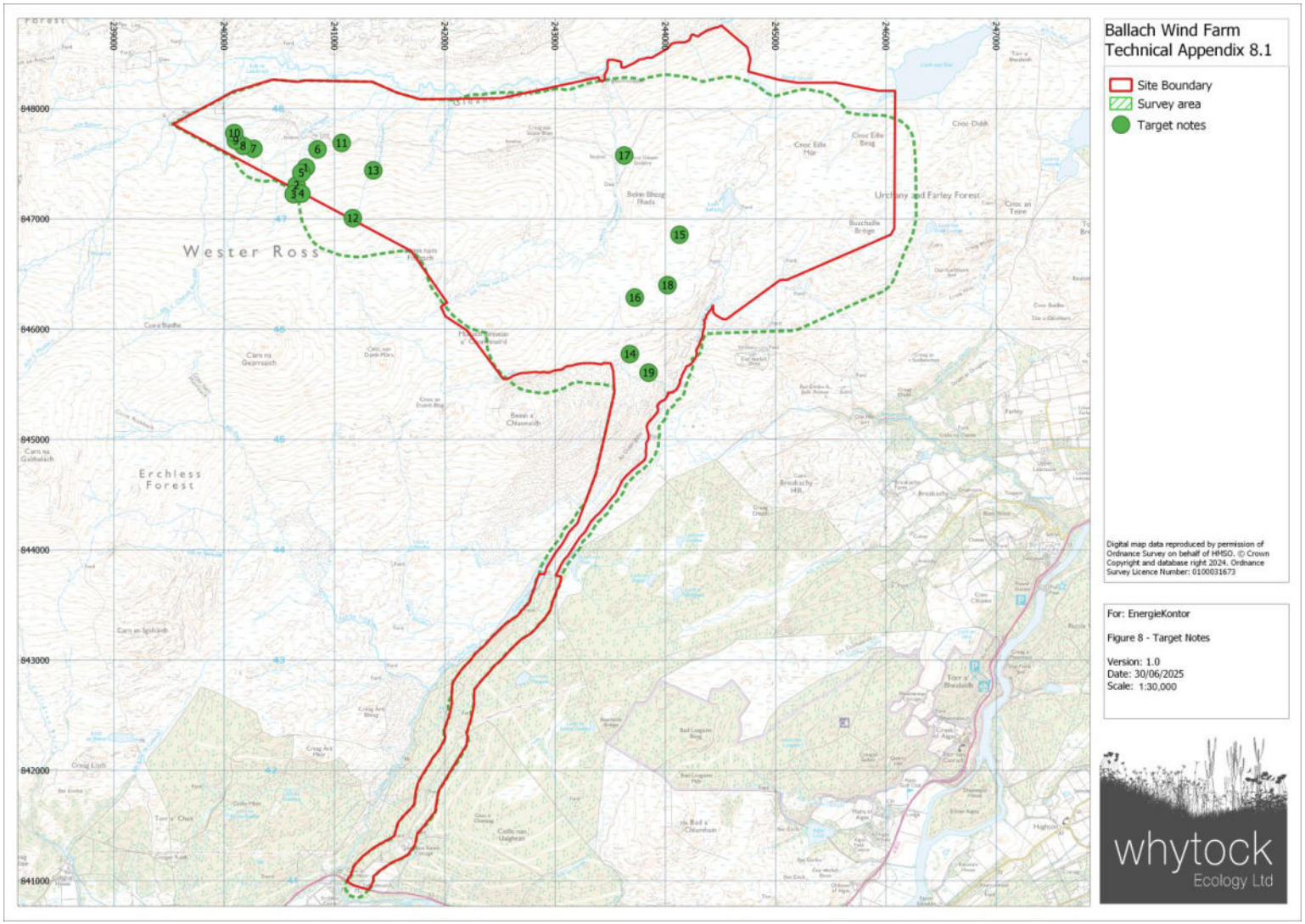


Figure 8: Target note map showing locations of each. Some points have been moved for greater clarity on the map. Exact locations are provided in the table above.

Appendix E – Photos



Figure 9: Complex mosaic of peat hags extensive throughout most M17 communities



Figure 10: Complex mosaic of erosion channels extensive throughout most M17 communities. Note the high frequency of poaching from red deer, evident in the areas of bare peat.

WLC 23055 Ballach Wind Farm

Technical Appendix 8.2: Fish Habitat Survey Report

16/07/2025

Prepared By:

Wildlife Consulting Ltd | Ecology | Environmental Consultancy

Company Number: SC620396

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4 SUMMARY AND ENHANCEMENT OPPORTUNITIES **7**

1 Introduction

1.1 Background

This Technical Appendix has been prepared to accompany Chapter 8 'Ecology' of the Ballach Wind Farm Environmental Impact Assessment Report (EIAR). It presents detailed methodologies and results of desk studies and field surveys completed in 2025 to establish baseline conditions with regards to fisheries. In addition, opportunities for enhancements for fish fauna are also considered.

The following species of conservation significance are considered:

- European eel *Anguilla anguilla* - Council Regulation (EC) No 1100/ 2007) establishing measures for the recovery of the stock of European eel; listed by IUCN as Critically Endangered, Scottish Biodiversity List (SBL) (Watching Brief Only) and UK Biodiversity Action Plan (BAP) Priority Species;
- Atlantic salmon *Salmo salar* – Annex II of Habitats Directive, Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003, SBL (Conservation Action Needed & Avoid Negative Impacts) and UK BAP Priority Species;
- Brown trout/sea trout *Salmo trutta* - SBL (Conservation Action Needed) and UK BAP Priority Species;
- Freshwater pearl mussel *Margaritifera margaritifera* – Schedule 5 of the Wildlife and Countryside Act (1981) and Annex II of Habitats Directive SBL (Conservation Action Needed) and UK BAP Priority Species;
- River lamprey *Lampetra fluviatilis* - Annex II of Habitats Directive, SBL (Avoid Negative Impacts) and UK BAP Priority Species;
- Brook lamprey *Lampetra planeri* - Annex II of Habitats Directive, SBL (Avoid Negative Impacts); and,
- Sea lamprey *Petromyzon marinus* - Annex II of Habitats Directive, SBL (Avoid Negative Impacts) and UK BAP Priority Species.

1.2 Site Overview

The term 'site' in this report refers to the land within the developable area as illustrated on Figure 8.8. The fish habitat survey area encompassed all watercourses within 100m of the footprint of the development.

The proposed development lies within the administrative boundary of The Highland Council (THC) and is located The site lies on open hill ground to the south-east of Orin reservoir, it is approximately 8km to the west of Beauly and 22km to the west of Inverness.

The Erchless Burn forms the western site boundary of the access track, which tributes into the River Beauly, to the south and east of the development. The site watercourses largely comprise minor headwaters and are either part of the River Beauly catchment, or tributaries of the Allt Goibhre, which flows into the River Orrin catchment to the north of the site. The locations of all watercourses subject to fish habitat survey (FHS) are illustrated on Figure 8.8. There are three SEPA classified watercourses that lie partially within the survey area and further detail on these is provided in the desk study below.

2 DESK STUDY

2.1 Methodology

A desk study was undertaken in 2025 to identify any classified waterbodies and existing fisheries records within the site and surrounding area.

The following key sources were consulted:

- NatureScot's Site Link Website https://sitelink.nature.scot/site/8363;
- SEPA's River Basin Management Plan (https://www.sepa.org.uk/data-visualisation/water-environment-hub);
- JNCC's distribution of the Freshwater Pearl Mussel (https://sac.jncc.gov.uk/species/S1029/);
- Beauly District Salmon Fisheries Board (updated February, 2025). Beauly Catchment Fishery Management Plan 2023–2028; and
- Cromarty Firth District Salmon Fisheries Board (2023). Cromarty Fisheries Management Plan 2024-2028.

2.2 Results

The European Water Framework Directive (WFD) requires that surface waterbodies in member states are classified according to ecological status. SEPA's River Basin Management Plan website (https://www.sepa.org.uk/data-visualisation/water-environment-hub) confirms there are three classified watercourses within the survey area.

Allt Goibhre, which lies to the north of the site is classified by SEPA as having an overall condition of "poor" and "high" in terms of access for migratory fish.

Allt Laith, the main headwater of the Breakachy Burn, is included as part of the Breakachy Burn's SEPA classification and is classified as having an overall condition of "high" and "high" in terms of access for migratory fish.

The Erchless Burn, flows in a southerly direction, and is located east of the access track to the site. The Erchless Burn is also classified as having an overall condition of "high" and "high" in terms of access for migratory fish.

3 FIELD SURVEY

3.1 Methodology

A Fish Habitat Survey was completed on 4th – 6th February, 2025. The survey was undertaken by Colin Nisbet. Colin is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and is fully trained on Fish Habitat Survey as part of his Level 3 Management of Electrofishing Operations qualification as accredited by the Scottish Fisheries Coordination Centre (SFCC). He has been undertaking Fish Habitat Surveys for 19 years.

The survey aimed to identify any areas of critical fish habitat (i.e. spawning, nursery areas, juvenile and adult holding areas, juvenile lamprey Lampetra spp. Habitat and freshwater pearl mussel habitat).

All stretches of watercourses with a gradient of ≥6 % are considered to be unsuitable or non-productive fish habitat for Atlantic salmon and brown/sea trout. Mills (1973) found that gradients of <3 % were favourable for Atlantic salmon; whilst sea trout were found to spawn in streams with gradients up to 4 %. Most populations of lamprey occur where the average stream gradient is 1.9 – 5.7 m/km, being rarely found where gradients exceed 7.8 m/km or 0.78 % (Maitland and Campbell, 1992). However, lamprey are rare in the Scottish islands and on Skye are only known to be present on the River Broadford (Skye Rivers Trust, 2010). Whilst gradients of ≥6 % are considered to be typically unsuitable for fish fauna, it is recognised that small, isolated, populations of brown trout may occur in locally suitable habitat in stretches with steeper gradients.

The watercourses within the site were systematically walked (including in-stream inspections where required) and the habitats mapped according to the classifications presented in Table 3.1 below.

Specifically, the habitat survey focused on the identification of the following:

- Spawning habitat for salmonid and lamprey species;
- Nursery habitat for lamprey species;
- Areas of habitat important for juvenile salmonids (fry and parr);
- Areas of habitat important for adult holding areas; and
- Areas of suitable substrate and flow conditions for supporting freshwater pearl mussel.

The habitat classification used in this study is based on the Scottish Fisheries Co-ordination Centre's Habitat Surveys Training Course Manual (SFCC 2007), the Environment Agency's Restoration of Riverine Salmon Habitats Guidance Manual (Hendry & Cragg-Hine, 1997), a review of key habitat requirements for other species of conservation significance including lamprey, salmonids and freshwater pearl mussel (e.g. Maitland, 2003; Hendry & Cragg-Hine, 2003; Skinner et al. 2003).

Each watercourse within the survey area was visited. Detailed analysis was undertaken at sample points within any diverse geomorphological and hydrological conditions within each watercourse. Samples were taken at each of the representative sections of each watercourse. The following information was collected at each sample location: channel gradient; substrate composition (% bedrock, boulders >256 mm, cobbles 65-256 mm, pebbles 4-64 mm, gravel 2-4

mm, coarse sand 0.5-2 mm and fine sand/silt/peat <0.5 mm); average wetted channel width (m); average depth (m) and turbidity (1 [clear] – 3 [turbid]). Any potential barriers to fish movement within watercourses were also recorded. A photograph was taken at each watercourse.

Table 3-1: Fish River Habitat Classifications

Category	Habitat Type	Description	Species Suitability
1 1a 1b 1c	Unsuitable Steep > 10% gradient 6-10% gradient Other – ephemeral, shallow drains, dry beds	Usually 1st – 2nd order watercourses with steep gradient, >6% slopes (often substantially greater), abundant bedrock, lack of fixed substrates, high velocity (e.g. headwaters/rivulets). Also includes less steep ephemeral stretches (e.g. headwater sources), shallow drains and modified watercourses with dry beds.	No productive fish habitat, although some species may migrate through these areas (also refer to 7. Rapids) depending on whether they represent a migration barrier.
2 2a 2b	Spawning Habitat Salmonids Lamprey	Stable "gravels" of minimum 15-30 cm depth, optimal 20-30 mm, not compacted or with excessive silt/sands (<20% by weight) for salmonids. Lamprey spawning habitat where "gravels" include sands. Often at tail end of pools or upstream ends of riffle-runs ensuring oxygenated substrate. Can also be found at end of weir pools.	Spawning habitat - Atlantic salmon (c. 9 m^2 per pair) and sea/brown trout; lamprey.
3	Riffle	Shallow (< 20 cm) and fast flowing, with upstream-facing wavelets which are unbroken (although often some broken water), with substrate dominated by gravel and cobbles.	Fry (0+) habitat – Atlantic salmon/ brown trout/sea trout.
4 4a 4b	Run Shallow (< 0.5 m deep) Deep (>0.5 m deep)	Generally deeper (20-40 cm) and less steep bed compared to riffle, with substrate of boulders, cobbles and gravels. Usually disturbed, rippled surface. Often located immediately downstream of riffle.	Mixed salmonid juvenile habitat. Fry (0+) & Par (1+) habitat - Atlantic salmon/ brown trout/sea trout.
5 5a 5b	Glide Shallow (<0.5 m deep) Deep (> 0.5 m deep)	Shallow gradient stretches with smooth laminar flow with little surface turbulence and generally > 30 cm deep; water flow is silent. Often located below pool.	European eel; non-productive salmonid habitat, although may provide some shelter for adults.
6 6a 6b 6c	Pool Plunge/Scour pool Meander pool Weir/bridge pool	No perceptible flow, eddying and usually > 100 cm deep. Substrate with high proportion of sand and silts. Often located on the outside of meanders, but includes natural scour or plunge pools and artificial weir pools.	Adult refugia Atlantic salmon, sea/brown trout, European eel.
7 7a 7b 7c	Rapids Steep - >10% gradient Moderate - 6-10% gradient Low - <6% gradient	Sections of relatively steep gradient with fast currents and turbulence, with mixed flow types, including free-fall, chutes and broken, with obstructions such as large boulders, rock outcrops and falls.	Negative feature for migratory species and may pose a migratory barrier; elvers and eels limited to velocity of <0.5 m/sec and 2.0 m/sec respectively; lamprey to 2 m/sec.
8 8a 8b	Banks of fine sediment of silts and sands Optimal Sub-optimal	Limited flow (sometimes back-flow) allowing deposition of silts/sands, not anoxic, with/without riparian trees. Optimal habitat is stable fine sediment and sand >15 cm deep with some organic detritus. Sub-optimal habitat includes small areas of deposited silts/sands behind boulders.	Lamprey ammocoete nursery and adult refuge.
9 9a 9b 9c 9d 9e	Vegetation features Riparian trees (tunnel) Flow constriction Aquatic macrophytes Emergent macrophytes Large woody debris	Closed woodland canopy forming tunnel vegetation. In-stream emergent, boulders Stands of aquatic and floating vegetation Stands of emergent (usually marginal) vegetation. LWD forming dams, etc.	Tunnel riparian trees may be negative feature for salmonids, although tree roots and fallen trees may provide refugia for Atlantic salmon/ brown trout/sea trout and European eel. Aquatics/emergents provide cover for fish, particularly juveniles.

Category	Habitat Type	Description	Species Suitability
10	Obstructions to migration	Impassable waterfalls, rapids, flow constrictions, weirs, bridge sills, culverts, shallow braided river sections, pollution preventing upstream migration.	All migratory species; impassability varies between species. Leaping ability: <3.7 m Atlantic salmon; <1.81 m trout; European eel and lamprey none.
11 11a 11b 11c	Other features Side channel Backwater Artificial channel	Includes other channel features, with side channel (connected to main channel) and backwaters. Artificial channels may comprise either man-made banks and/or beds.	Side channel/backwater often important refugia for juveniles. Artificial channels have limited diversity and are often non-productive fish habitat.

3.2 Results

Fish suitability at each of the watercourses within the survey area is summarised below. Environmental data from watercourses including channel dimensions, gradient and substrate composition, are presented in Annex 1. Photographs from the watercourses are given in Annex 2.

3.2.1 W1, W3 and W14 – Tributaries of the Erchless Burn

Watercourses W1, W3 and W14 are all tributaries of the Erchless Burn. W1 lies on a moderately steep gradient and originates at Loch na Plangaid. It is a minor watercourse which contains a predominantly cobble substrate, with smaller proportions of boulder and pebble. It contains a run and riffle flow type, as well as some steeper rapid sections. It is of limited suitability for migratory fish fauna and lacks spawning habitat, but may support small numbers of non-migratory fish.

Watercourses W3 and W14 both lie on predominantly steep gradients (>10%) and are therefore of limited suitability for fish fauna.

3.2.2 W6 – Allt an Lochan Fada

Watercourse W6 is Allt an Lochan Fada. It is one of the more substantial watercourses within the survey area and joins with Allt na Traighean to form the Erchless Burn downstream of the confluence. W6 comprises a largely cobble substrate, but also comprises smaller proportions of boulder, pebble and gravel within the channel. It lies on a relatively shallow gradient and comprises run, riffle and glide flow types. It is considered to be suitable for supporting both migratory and non-migratory fish fauna, but spawning habitat is limited within the channel.

3.2.3 W4 and W5 – Tributaries of Lochan Fada

Watercourses W4 and W5 both tribute into Lochan Fada. They are very similar in nature in terms of being of a minor scale, having similar (moderate) gradients and similar riffle and rapid flow types. W4 however, has a predominantly pebble substrate and W5 is dominated by a combination of bedrock, boulder and cobble. Both are considered to be suitable for supporting small numbers of fish fauna.

3.2.4 W11 - W13 – Tributaries of the Breakachy Burn

Watercourses W11 – W13 are all tributaries of the Breakachy Burn. The section of W13 (Allt Liath) that lies within the survey area is part of the SEPA classified reach of the Breakachy Burn. W11 and W13 are very similar in nature having a range boulder, cobble pebble and gravel substrates within their channels, overrun by run, riffle and rapid flow conditions, both lie on steep gradients (>10%), which limits their suitability for migratory fish, but they may support small numbers of non-migratory fish fauna in shallower sections within their channels.

By contrast, watercourse W11 is a peaty headwater and likely to be ephemeral in nature. It is of negligible suitability for fish.

3.2.5 W2, W7 and W8 – W10 – Tributaries of Allt Goibhre

Watercourses W2, W7, W8, W9 and W10 are all tributaries of Allt Goibhre, which lies to the north of the site. Watercourses W2, W7 and W8 are all peaty headwaters, which are of negligible suitability for fish fauna.

Watercourses W9 and W10 are a little more substantial, but still minor watercourses. They comprise largely boulder and cobble substrate types, with small proportions of gravel also. They both lie on moderately steep gradients, overrun with riffle and rapid flow conditions and have limited suitability for fish, but might support very small numbers.

3.2.6 W15 - Allt Goibhre

Watercourse W15 is Allt Goibhre. It lies at the north of the development site and is classified by SEPA as having a poor overall status, but high access for migratory fish. It is one of the more substantial watercourses within the survey area and lies on a shallow gradient, with no barriers to fish apparent, although a review of the Ordnance Survey indicates there are waterfall sections several km downstream to the northeast of the survey area. The channel largely comprises a range of larger boulder, cobble and pebble substrates, with very small proportions of gravel (c. 5%) also present. Flow conditions largely comprise smooth glides, but areas of run and riffle were also present in the channel. This watercourse is considered to be suitable for supporting fish fauna, but there is a limited amount of suitability presence for spawning.

4 SUMMARY AND ENHANCEMENT OPPORTUNITIES

The watercourses within the survey area drain into the River Beauly and the River Orrin. None of the watercourses within the survey area are designated as Special Areas of Conservation (SACs), but there are SEPA classified watercourses within the survey area. Allt Goibhre, which lies to the north of the site is classified as having an overall condition of "poor" and "high" in terms of access for migratory fish. Allt Laith, the main headwater of the Breakachy Burn, is included as part of the Breakachy Burn's SEPA classification and is classified as having an overall condition of "high" and "high" in terms of access for migratory fish. The Erchless Burn, flows in a southerly direction, and is located east of the access track to the site. The Erchless Burn is also classified as having an overall condition of "high" and "high" in terms of access for migratory fish.

No freshwater pearl mussels were recorded during the survey and due to the lack of suitable habitat it is unlikely that this species is present in the survey area.

Among impacts to fish fauna identified in The Beauly and Cromarty Firth Fisheries Management Plans, those considered to be particularly relevant at the site level is riparian habitat management – bankside habitat is either bare, over comprised of commercial conifer forestry (on much of the access route) over almost the entire watercourse stretches within the survey area resulting a lack of cover for fish fauna, or overshading.

It is advised the Habitat Management Plan (HMP) for the project includes target areas for new riparian habitat management and consultation with the Beauly and Cromarty Firth District Salmon Fisheries Boards and landowner should also consider suitable locations for new riparian planting, to provide areas of bankside cover, but not overshading. This would be best provided by planting of local broadleaved species of local provenance, such as oak *Quercus spp*, alder *Alnus glutinosa* hazel, rowan *Sorbus aucuparia*, willow *Salix spp*. or birch *Betula spp*.

It is also advised that prior to any instream works a fish rescue exercise is undertaken, whereby the section of the watercourse is netted off and fish removed from the works area via an electrofishing exercise. Nets should then be left in situ and the watercourse over pumped with works then undertaken in a dry section of channel. Once instream works have been completed the nets should be removed immediately to allow the continuation of fish passage.

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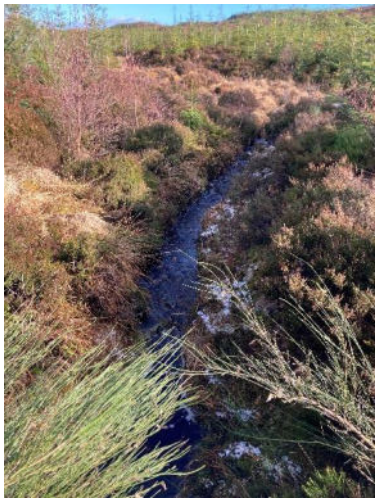
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Annex 1: Environmental Data

Location			Substrate Composition (%)							Channel Information				Habitat Type
Photo/ Sample No.	Easting	Northing	Bed-rock	Boulders >256 mm	Cobbles 65–256 mm	Pebbles 4 – 64 mm	Gravel 2 – 4 mm	Coarse sand 0.5 –2 mm	Peat/fine sand/silt <0.5 mm	Av. Wetted Width (m)	Av. Depth (m)	Turbidity (1 [clear]-3[turbid])	Channel Gradient (%)	
W1	242162	842545	0	10	70	20	0	0	0	0.6	0.3	1	5-10%	3, 4, 7
W2	242503	846505	0	0	0	0	0	0	100	0.5	0.4	1	2%	1a
W3	241799	841786	0	0	0	50	0	0	50	0.75	0.15	1	>10%	3, 4
W4	242767	843538	10	0	10	60	10	10	0	1	0.3	1	5%	3, 7
W5	242928	843758	35	20	25	15	5	0	0	0.9	0.2	1	5%	3, 7
W6	242411	843191	0	10	70	10	10	0	0	2.5	0.3	1	3-4%	3, 4, 5
W7	243562	847631	0	0	0	0	0	0	100	0.6	0.35	1	5%	1a
W8	241894	847609	0	0	0	0	0	0	100	0.4	0.15	1	5%	1a
W9	241398	847666	0	40	45	15	0	0	0	0.5	0.25	1	5-10%	3, 7
W10	240692	847715	0	45	50	5	0	0	0	1.2	0.1	1	5-10%	3, 7
W11	244297	845802	0	40	30	20	10	0	0	1.1	0.25	1	>10%	3, 4, 7
W12	243553	844724	0	0	0	0	0	0	100	0.5	0.1	1	1-2%	1a
W13	243818	845552	0	45	30	20	5	0	0	1.2	0.25	1	>10%	3, 4, 7
W14	241652	841416	0	10	70	10	10	0	0	1.3	0.15	1	>10%	3, 5, 7
W15	243433	848353	0	25	50	20	5	0	0	3	0.5	1	2%	3, 4, 5

Annex 2: Watercourse Photographs

W1



W2



W3



W4



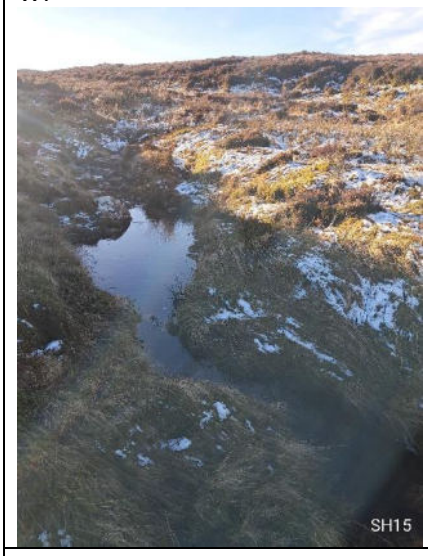
W5



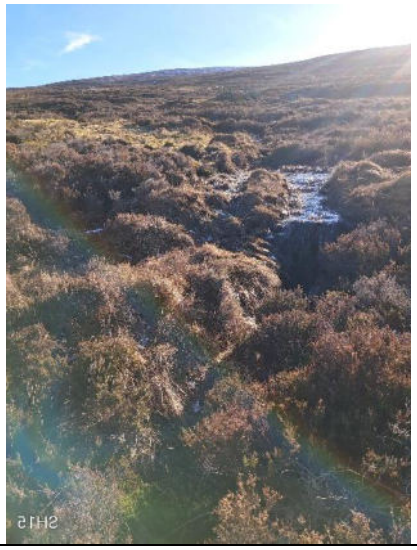
W6



W7



W8



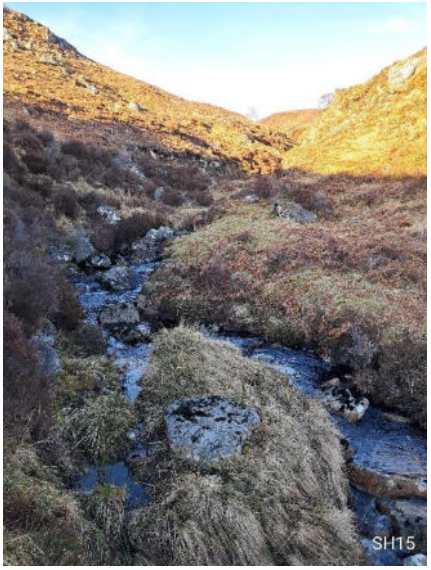
W9



W10

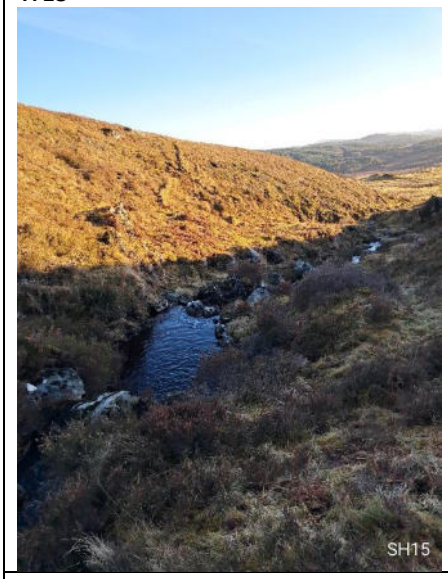


W11



W12



W13  	W14 
W15  	

Bat Survey Report

APPENDIX 8.3
BALLACH WIND FARM

Wildlife Consulting

cairn ECOLOGY

Version No	Author	Checker	Verifier	Date issued
1	LH	LH	LH	04.07.25

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1 INTRODUCTION

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1.1.1 Cairn Ecology Ltd was appointed by Wildlife Consulting to undertake ground-level automated static surveys for bats at a proposed windfarm site, Ballach (the Proposed Development) situated approximately 9.5 kilometres (km) west of Muir of Ord; Central Ordnance Survey Grid Reference: NH4343 4791 (hereafter referred to as 'the Site').

1.1.2 The Site is characterised by upland raised and blanket bog and scrub heathland. Several small burns and drainage ditches traverse the Site including small water bodies such as Loch Ballach.

1.1.3 The ground-level static surveys were undertaken with the following aims:

- Assess bat activity: Identify activity levels, including spatial and temporal variation species composition, and relative abundance across the Site.
- Understand habitat use: Determine how bats utilise the Site for foraging, commuting, and potential roosting purposes.
- Evaluate risk: Assess potential impacts of the Proposed Development on local bat populations.
- Inform mitigation: Provide data to guide mitigation strategies if required.
- Ensure compliance: Fulfil regulatory requirements and inform the planning processes.

1.1.4 The survey results aim to identify any constraints (if present) to, or potential impacts of, the Proposed Development, particularly concerning habitat disturbance or adverse impacts on bats such as changed in bat behaviour at sensitive times of the year or collision risk at particular turbine locations.

1.1.5 The data collected will be used to inform mitigation measures and if required species protection plan(s), which may be required to support a European Protected Species (EPS) derogation licence application.

1.1.6 This report outlines the methodologies employed to collect and analyse bat data collected at the Site and summarises the findings.

2 LEGISLATION

2.1.1 All bat species within the UK are fully protected by law. Within Scotland, bats are primarily protected under the conservation (Natural Habitat &c) Regulations 1994 (as amended) which transposes the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (The Habitats Directive) into domestic law. Together with the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004, it is an offence to intentionally and/or recklessly:

- Deliberately capture, injure or kill a wild bat;
- Harass a wild bat or group of wild bats;
- Disturb a wild bat in a roost (any structure or place it uses for shelter or protection);
- Disturb a wild bat while it is rearing or otherwise caring for its young (this would be a 'maternity' roost);
- obstruct access to a bat roost or to otherwise deny the animal use of the roost
- disturb such a wild bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of that species;
- to disturb a wild bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; and,
- possess, control, transport, exchange or sell a bat or parts of a bat, alive or dead.

3 METHODS

3.1 Automated Static Detector Surveys

3.1.1 Full spectrum automated bat static detectors were deployed at ground level across the Site to monitor bat activity.

3.1.2 In line with to NatureScot's guidelines for bat surveys on wind farms, (NatureScot *et al.*, 2021) a total of 16 static detectors were deployed, corresponding to the planned turbine locations (Figure 8.6). These locations were selected to align with the draft design of the wind farm, ensuring that the survey data is representative of the Proposed Development footprint.

3.1.3 Each of the 16 detectors (deployed at locations L1- L16, Figure 8.6) were mounted on a 1m wooden stake and securely placed within at least 50 m of each of the proposed turbine locations, as illustrated in the EIA. Detectors were left to record continuously for a minimum of 10 consecutive nights per survey period. Wildlife Acoustics Song Meter Minis (SMM) were primarily utilised for acoustic data collection. These devices were programmed to operate from 30 minutes before sunset until 30 minutes after sunrise to capture nocturnal bat activity.

3.1.4 Each location was selected to representatively capture bat activity relative to the turbine positions.

3.1.5 The surveys were conducted across three distinct seasonal periods (spring, summer, and autumn) to capture any potential seasonal variations in bat activity. Data was collected over 46 nights between 30/05/2025 and 07/10/2025.

Detector ID	No. of Nights
Location 1	20
Location 10	12
Location 11	16
Location 12	21
Location 13	29
Location 14	16
Location 15	14
Location 16	30
Location 2	17
Location 3	14
Location 4	16
Location 5	22
Location 6	19
Location 7	9
Location 8	21
Location 9	8

Diagram 1. The number of nights that bats were detected on each reorder. This is not the same as the number of nights that detectors were active if there were nights with no bats detected. Reproduced from Ecobats.

3.1.6 Historic weather data was gathered from a publicly available online resource[1] for the month of the deployment periods.

3.2 Data Analysis

3.2.1 Following collection of acoustic data, it was analysed by Suitably Qualified Ecologists (SQEs) using Wildlife Acoustics Kaleidoscope v.5.4.9. software package.

3.2.2 Where possible, bat calls were identified to species level using parameters set out in Russ (2013). However, species of the genus *Myotis* were unable to be identified to species level as their calls are similar in structure and have overlapping call parameters, making species identification problematic (Russ, 2013). For *Pipistrellus* species, the following criteria based on measurements of peak frequency were used to classify calls:

- Common pipistrelle (*Pipistrellus pipistrellus*) ≥ 42 and <50kHz;
- Soprano pipistrelle (*Pipistrellus pygmaeus*) ≥ 51kHz;
- Common / Nathusius' *Pipistrellus nathusii* pipistrelle ≥39 and <42kHz.

3.2.3 In addition, the following categories were used for calls which cannot be identified with confidence due to the overlap in call characteristics between species or species groups:

- *Myotis* species.

[1] www.weatherunderground.com

3.3 Ecobat

3.3.1 Ecobat is a free online tool that gives context to acoustic data recorded from bat surveys. Users upload their data and receive a report which gives a wide range of tables and graphs to explain more about the data they've collected compared to bat records already held in the Ecobat database.

3.4 Site Activity Level

3.4.1 Following the bat data analysis outlined above, the data was uploaded on to The Mammal Society Ecobat software[2] to give a measure of relative bat activity across the Site. Ecobat is an online tool that also compares bat data collected by automated static bat detectors across the same range for all time records.

3.4.2 Through generating a percentile rank for each night of bat activity recorded, the Ecobat tool can identify the number of nights in which the level of bat activity, as collected by an automated bat detector, could be considered to represent 'high', 'moderate/ high', 'low/moderate', or 'low' in the context of the geographical region, as shown in Table 1 (extracted from Section 6.1 Table 1 of NatureScot *et al*., 2021).

Table 1. Percentile score and categorised level of bat activity

Percentile score	Bat activity level
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

3.5 Potential Collision Risk Assessment

3.5.1 Vulnerability to collision is presumed to be dependent on the location of turbines in relation to species abundance, in addition to specific bat species and their behaviour, as predefined by Section 6.4, Table 2 of guidance (NatureScot *et al*., 2021). By looking at the potential vulnerability of species recorded on Site combined with relative bat activity recorded at the Site this can inform an assessment of potential collision risk. Table 2 of the guidance is reproduced for ease in Table 2 below.

Table 2. Level of potential vulnerability of populations of bat species in Scotland.

[2] https://mammal.org.uk/current-research/bat-recording-tools

Relative abundance	Low Collision risk	Medium Collision Risk	High Collision Risk
Common	n/a Low Popoulation Vulnerability	n/a Low Population Vulnerability	common pipistrelle soprano pipistrelle Medium Population Vulnerability
Rarer Species	Brown long-eared Daubenton's Natterer's Low Population Vulnerability	n/a Medium Population Vulnerability	n/a High Population vulnerability
Rarest Species	Whiskered Brandt's Medium Population Vulnerability	n/a High Population Vulnerability	Nathusius pipistrelle Noctule Leisler's High Population vulnerability

Stage 1 - Site-Level Risk

3.5.2 Bat activity on a site and the presence of species of a high population vulnerability are not the only factors when considering collision risk to bats at a wind farm site. The project size and habitats also play a big factor. Nature Scots guidance outlines a two-stage process for this (NatureScot *et al*, 2021). Using the outputs from Ecobat, the assessment of potential collision risk for bats has been carried out following the two-stage process) for all those species identified on the Development Site that are listed as 'high collision risk'.

3.5.3 Stage 1 - the 'Site-level' risk for the Proposed Development was determined by the project size and habitat characteristics, using the matrix outlined in Table 3 below, extracted from NatureScot's best practice guidelines (NatureScot *et al*., 2021). For full details on how habitat risk and project size is determined see Appendix A.

Table 3. Stage 1 – Initial Site risk assessment (reproduced from NatureScot *et al*, 2021).

Site risk level (1-5)	Project size			
Habitat risk	=	Small	Medium	Large
	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Stage 2 - Overall Risk Assessment

3.5.4 An overall risk assessment was then made by considering the initial Site risk assessment in relation to the bat activity output from Ecobat and taking onto account the population vulnerability of each species. The scores in the table are a product of multiplying 'Site Risk' level and the Ecobat activity category. In addition, the overall risk assessment is determined in conjunction with professional judgement of Cairn Ecology Ltd.

3.5.5 In summary Low = 0-4, Medium =5-12 and High = 12-25.

Table 4: Criteria for overall risk assessment. (reproduced from NatureScot *et al*, 2021).

Site Risk Level (1-5)	Project Size/Habitat					
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

3.6 Limitations

3.6.1 The primary objective of these surveys was to quantify bat activity levels across the Site, particularly at the proposed turbine locations. Where species-level identification was not feasible, data at the genus level still provided valuable insights and was not considered a significant limitation.

3.6.2 The Ecobat analysis tool provides a variety of outputs that are useful for interpreting the importance of the Site with respect to bat activity and distribution. However, it is important to note that these outputs are considered in the context of the wider data collection from third parties, and the accuracy of results requires a considerable number of records to be present. A reference range (i.e. the number of nights for each species that the data is compared to) of at least 200 is recommended to be confident in the relative activity level.

3.6.3 No weather data collection was possible at each detector location. No extreme weather events are known to have occurred in the deployment period or location that would have a significant impact on bat activity recorded.

3.6.4 The detector at location L9 was subject to interaction across several season and was entirely lost during the autumn period. This device was not found. Additionally during the autumn period a number of detectors were found on the ground this is assumed to have been due to deer.

4 RESULTS

4.1 Automated Static Detector Surveys

4.1.1 A total of 6920 bat passes were recorded over the entire monitoring period from four species and two genera over 30 monitoring nights.

4.1.2 The static detector location of with the highest mean bat pass rate per species were noted to be:

- Common pipistrelle -L14,15;
- Soprano pipistrelle - L14, 15;
- Brown longed-eared bat - L10, 11,15;
- Daubenton's bat - L15;
- Myotis sp. - L14; and
- Pipistrellus sp. - L14.

Commented [CP3]: The ecology chapter, para 8.67 says two genera, not one as per here

Commented [LH4R3]: Amended

4.2 Ecobat

4.2.1 Relevant details for the collision risk assessment of the Site have been extracted from the output results from Ecobat; provided below and in Appendix C.

4.2.2 Of the species recorded, the highest number of bat passes was attributed to by common pipistrelle (n=2557, 36.9% of total bat activity) followed by soprano pipistrelle (n=2329, 33.7% of total bat activity). *Myotis* sp. accounted for 26.4% of overall bat activity (n=1830) whilst brown long-eared bat made up less than 1.8% of bat activity (n=123).

Species Variation

4.2.3 Table 5 presents a summary of the Ecobat output representing the total number of bat passes recorded for each species across all locations, based on the total number of nights that activity was recorded. Overall, based on the median percentile all species bat activity was in the Low activity category.

Table 5. A summary of the Ecobat output representing the total number of bat passes recorded for each species across all locations.

Species	Median Percentile	95% CIs	Maximum Percentile	Nights Recorded
Common pipistrelle	0	4.5-4.5	6	182
Soprano pipistrelle	0	7-26.5	33	155
Myotis	1	9-27	65	164
Brown long-eared bat	1	2.5-4	16	66

Species	Median Percentile	95% CIs	Maximum Percentile	Nights Recorded
Daubenton's bat	5	0	5	1
Pipistrellus	0	9.5-9.5	17	24

Spatial and Temporal Variation

4.2.4 Figures reproduced from the Ecobat report (Appendix B) presents key spatial and temporal metrics for each species.

4.2.5 The static detector location of with the highest mean bat pass rate per species were noted to be:

- Common pipistrelle -L14,15;
- Soprano pipistrelle - L14, 15;
- Brown longed-eared bat - L10, 11,15;
- Daubenton's bat - L15;
- Myotis sp. - L14; and
- Pipistrellus sp. - L14.

Roost Proximity

4.2.6 The number of bat calls recorded at each automated detector location within the species-specific typical emergence times (outlined in Russ 2012), was plotted on graphs to illustrate potential proximity to roosts and is provided in Appendix B. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

4.2.7 Bat passes were recorded at before standard emergence time at L14 (common pipistrelle) and L8 (soprano pipistrelle). However, no structures or mature woodland are within the site these areas and as such it is assumed that any potential roost is located outside the site boundary.

4.3 Potential Collision Risk Assessment

Stage 1 - Site-Level Risk

4.3.1 The development comprises 20 turbines, classifying it as a 'medium-sized' project (NatureScot *et al*., 2021).

4.3.2 The Site is located within a typical upland landscape in northern Scotland, characterised by upland bog and upland heath communities.

4.3.3 Linear features, including small burns and drainage ditches, traverse the Site and may support foraging and commuting bats. a

4.3.4 There are no structures such within the Site, however a small structure and spare woodland are within in the surrounding area which may provide occasional roosting opportunities.

4.3.5 Using the matrix provided in NatureScot's best practice guidelines (NatureScot *et al*., 2021) provided in Appendix B, the medium project size combined with the habitat characteristics results in an overall site risk classification of Medium (3) (Table 6).

Table 6. Initial site risk assessment (reproduced from NatureScot *et al*, 2021).

Site risk level (1-5)	Project size	Project size	Project size	Project size
Habitat risk	=	Small	Medium	Large
Habitat risk	Low	1	2	3
Habitat risk	Moderate	2	**3**	4
Habitat risk	High	3	4	5

Key: 1-2=low site risk, 3=medium site risk, 4-5=high site risk.

Stage 2 - Overall Risk Assessment

4.3.6 Collision risk, relative abundance, and species-specific vulnerability were assessed using the NatureScot guidance matrix. This evaluation on overall risk to each species recorded on site considers species-specific collision for each species recorded within the Site, factoring in recorded activity levels, species-specific behavioural patterns, and habitat use across the Site. Findings are summarised in Table 7.

Table 7: Collision Risk and Vulnerability by Species

Bat species on Site	Relative abundance	Collision risk	Potential vulnerability	Activity on Site	Overall Risk
Soprano pipistrelle	Common	High	Medium	Low	Moderate
Common pipistrelle	Common	High	Medium	Low	Moderate
Myotis sp.	Rare	Low	Low	Low	Low
Daubenton's bat	Rare	Low	Low	Low	Low
Brown long-eared bat	Rare	Low	Low	Low	Low

REFERENCES

1. Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 4th edn. London: Bat Conservation Trust.

2. NatureScot, 2021. *Bats and onshore wind turbines: survey, assessment and mitigation*. [online] Available at: https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation

3. Russ, J. (2012*) British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.*

APPENDIX A: HABITAT SUITABILITY ASSESSMENT AND PROJECT SIZE

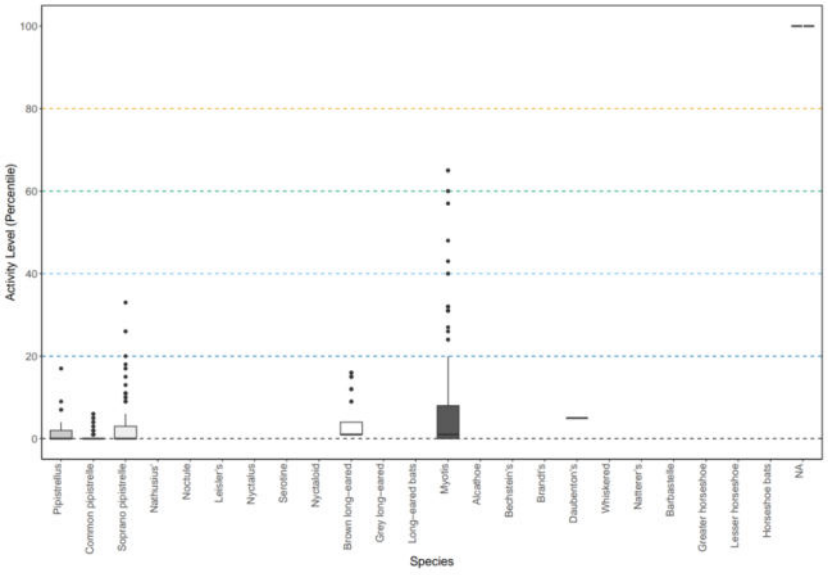
Habitat Assessment and Project Size was determined using the following criteria outlined in the tables below (as taken directly from NatureScot *et al*., 2021).

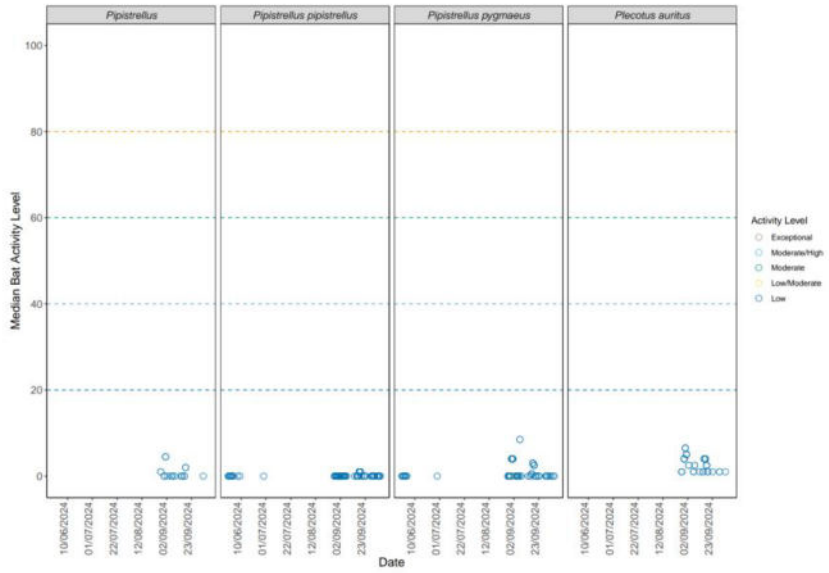
Habitat Description	Description
Low	Small number of potential roost features, of low quality. Low quality foraging that habitat could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams
High	Numerous suitable buildings, trees (articularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to ot o the site. Extensive and diverse habitat mosaic of high quality foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge pf range and/or on an important flyway. Close to key roost and/or swarming site.

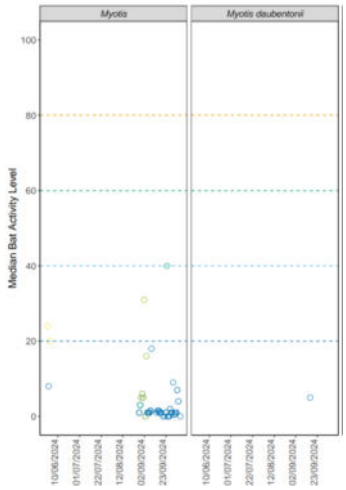
Project Size	Description
Small	Small scale development (≤ 10 turbines). No other wind energy developments within 10km. Comprising turbines ≤ 50 m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind development within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (≥ 40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

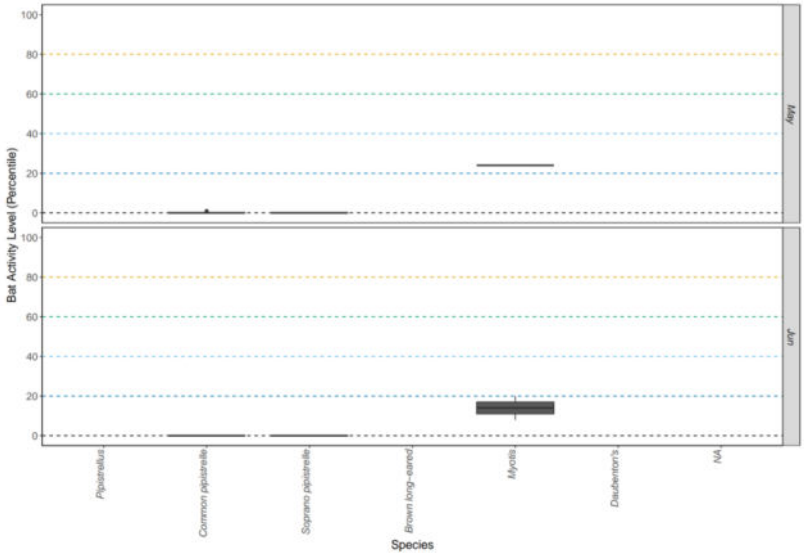
APPENDIX B: ECOBATS OUTPUT

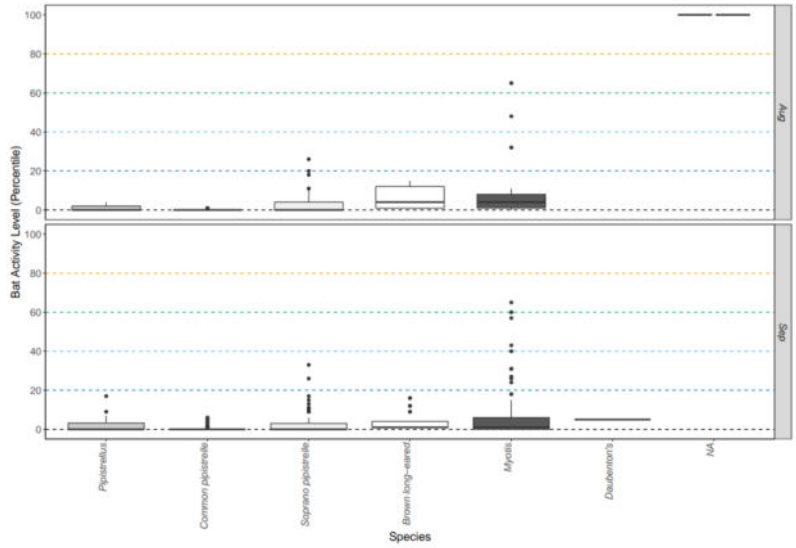
Table 11. Key metrics for each species recorded at each automated detector location.





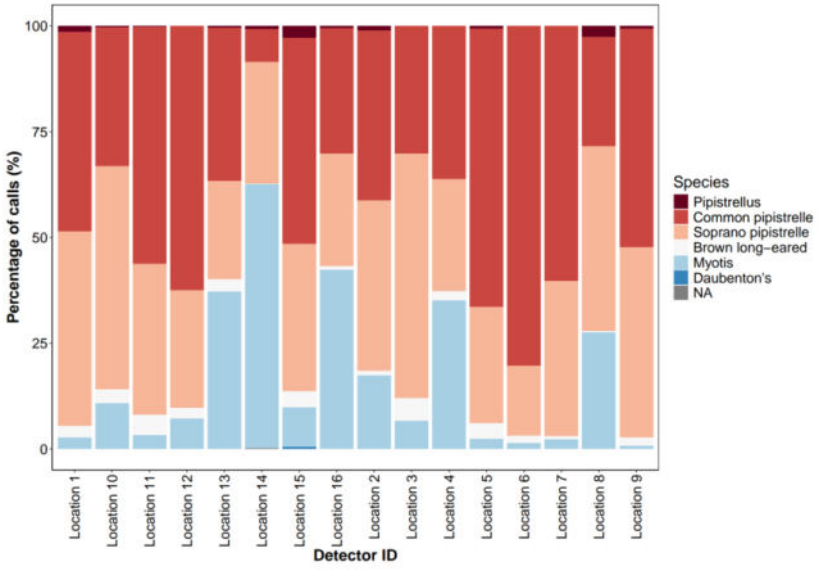

Myotis
Myotis daubentonii
Median Bat Activity Level
100
80
60
40
20
0
10/06/2024
01/07/2024
22/07/2024
12/08/2024
02/09/2024
23/09/2024

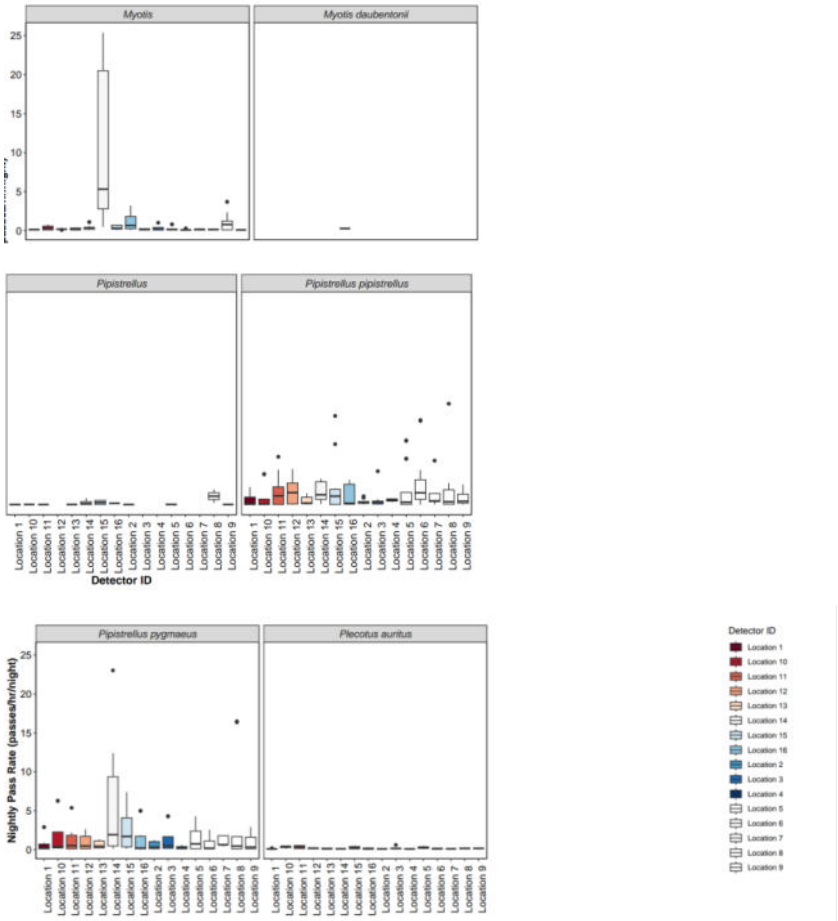

May
Jun
Bat Activity Level (Percentile)
100
80
60
40
20
0
Pipistrellus
Common pipistrelle
Soprano pipistrelle
Brown long-eared
Myotis
Daubenton's
NA
Species



Temporal Variation

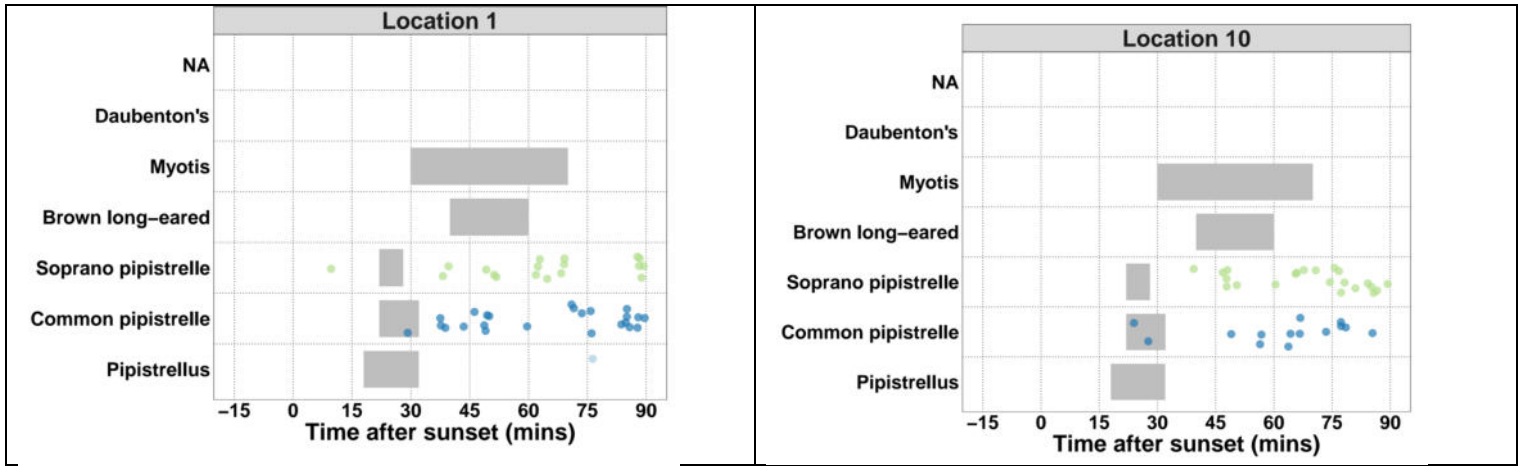
Table 12 shows metrics for each species recorded per month.

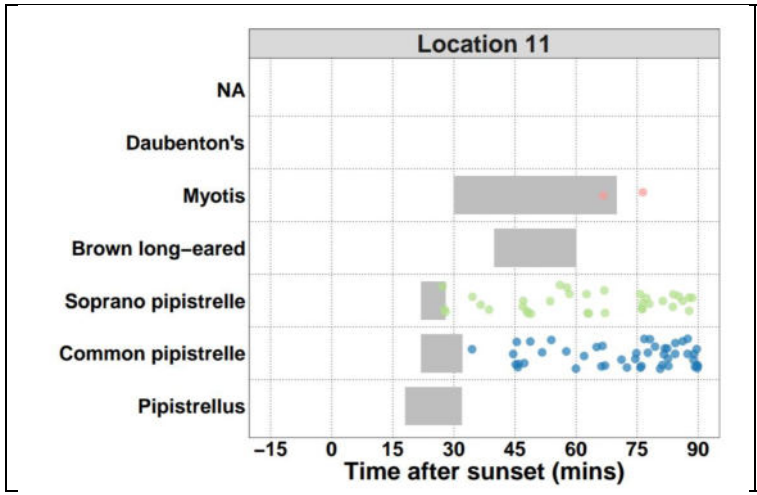


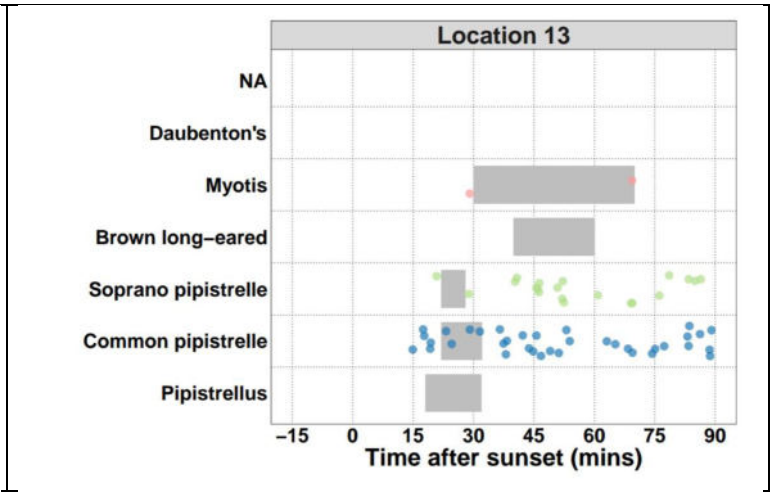

Myotis
Myotis daubentonii
Pipistrellus
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Nightly Pass Rate (passes/hr/night)
Detector ID
Location 1
Location 10
Location 11
Location 12
Location 13
Location 14
Location 15
Location 16
Location 2
Location 3
Location 4
Location 5
Location 6
Location 7
Location 8
Location 9

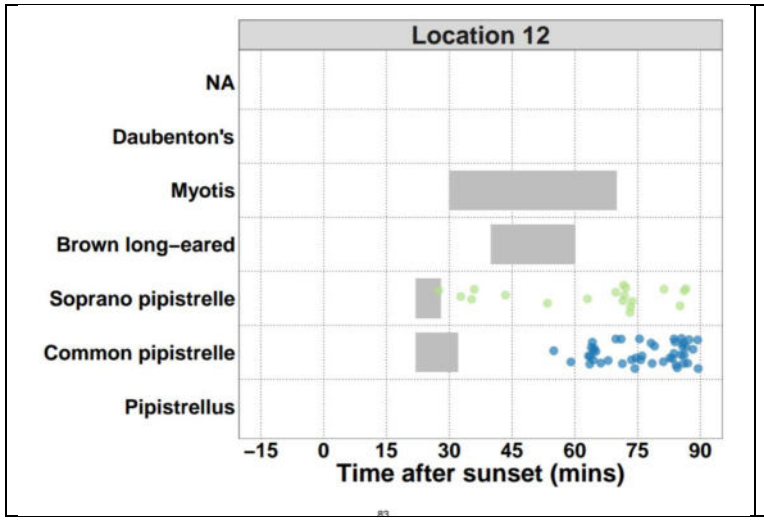
Potential Roosting

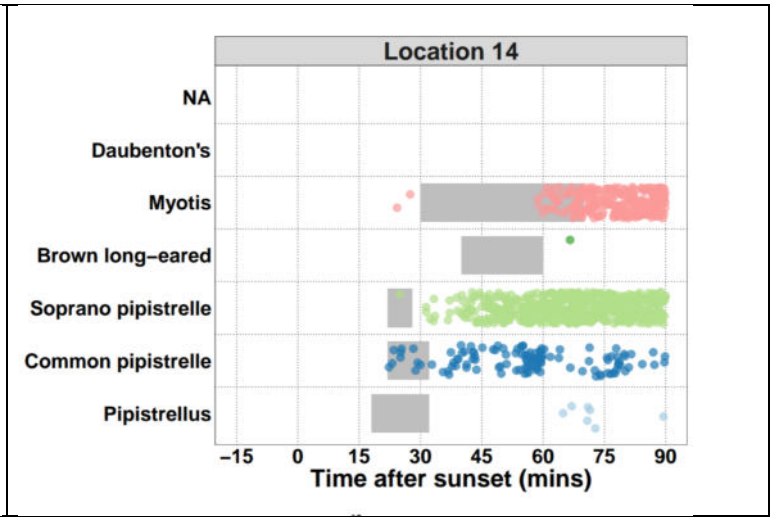
The tables below present the number of bat calls recorded at each automated detector location (Figure 8.6) within the species-specific typical emergence times (outlined in Russ 2012), suggesting proximity to a roost. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

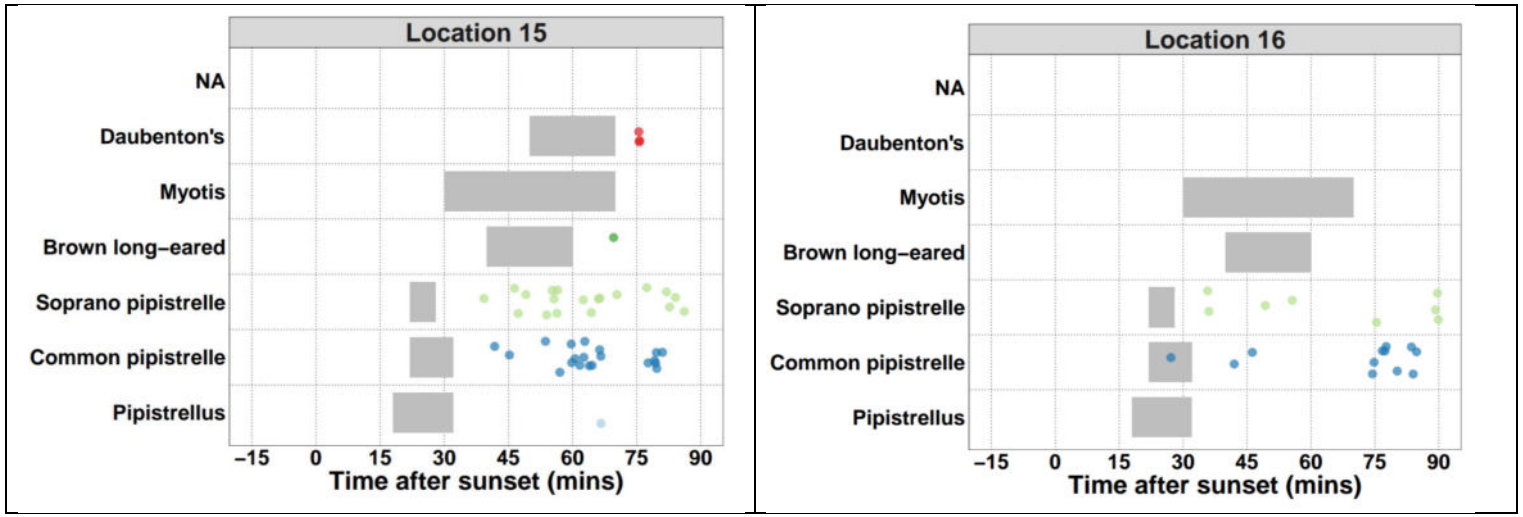


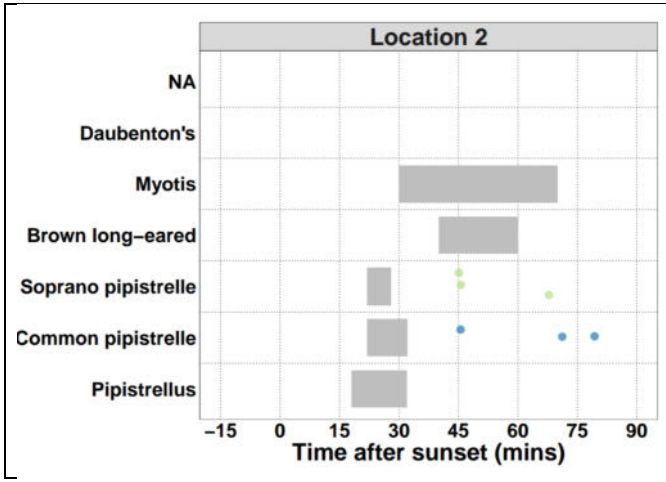

Location 11
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)

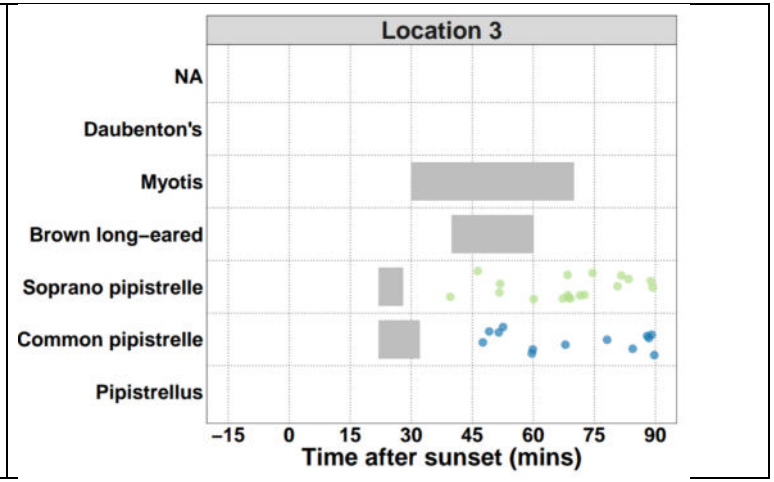

Location 13
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)

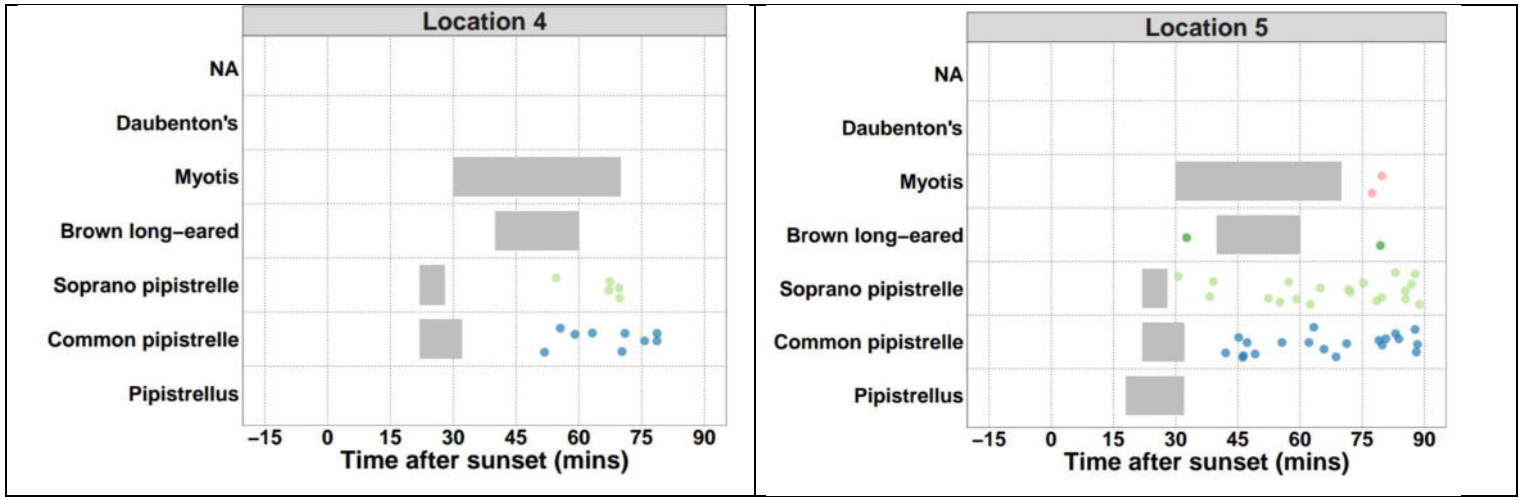

Location 12
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)

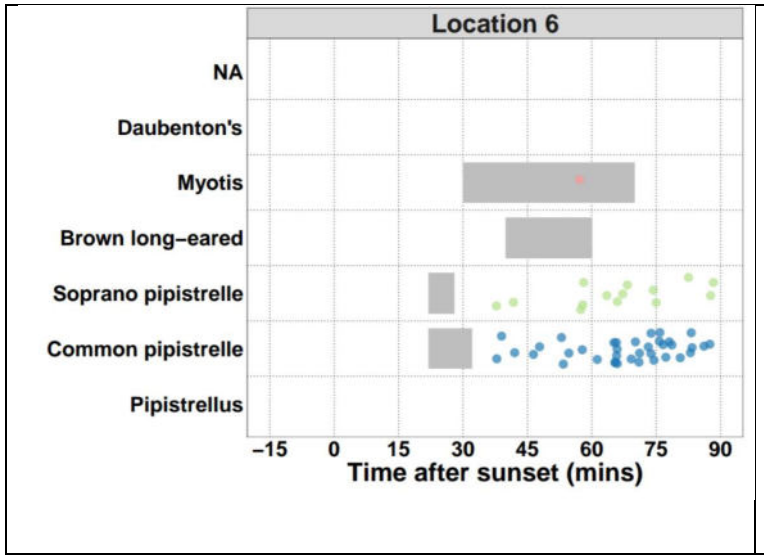

Location 14
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)

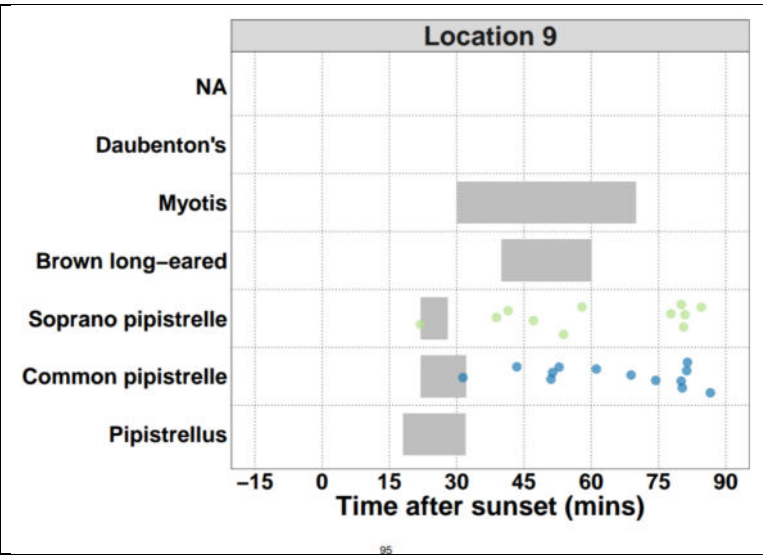

Location 15
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)
Location 16
NA
Daubenton's
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
−15
0
15
30
45
60
75
90
Time after sunset (mins)

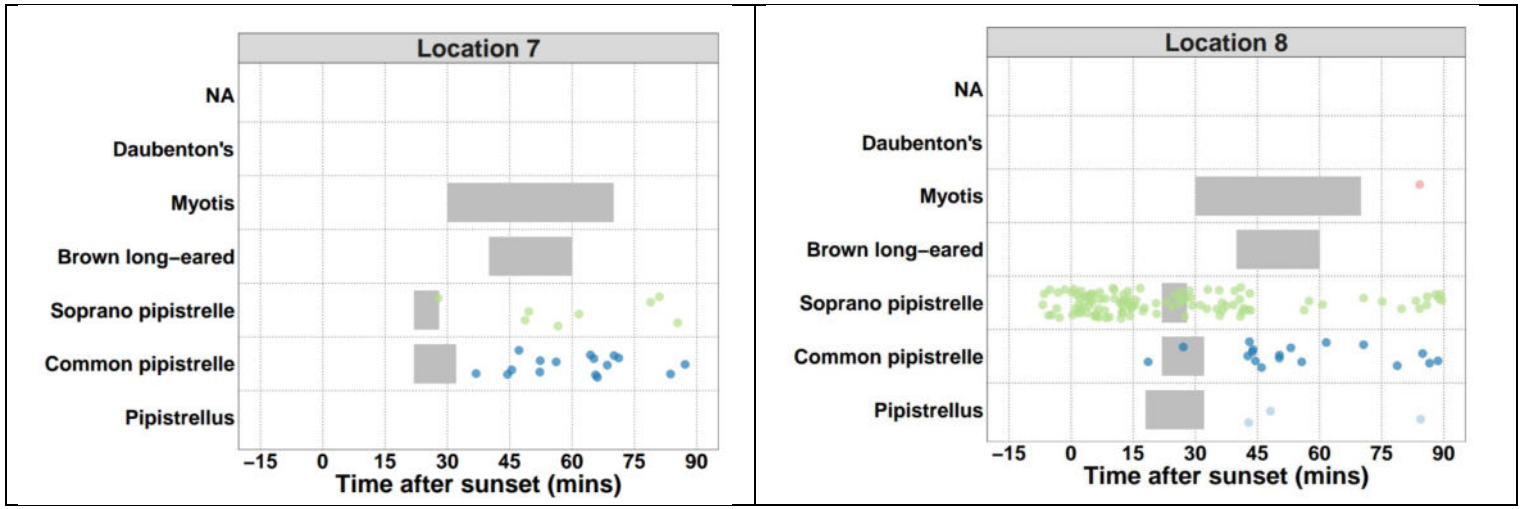

Location 2
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)


Location 3
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)


Location 4
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)
Location 5
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)


Location 6
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)


Location 9
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15
0
15
30
45
60
75
90
Time after sunset (mins)


Location 7
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15 0 15 30 45 60 75 90
Time after sunset (mins)
Location 8
NA
Daubenton's
Myotis
Brown long–eared
Soprano pipistrelle
Common pipistrelle
Pipistrellus
–15 0 15 30 45 60 75 90
Time after sunset (mins)

Ballach Wind Farm

Technical Appendix 8.4: Outline Habitat Management Plan

03/07/2025

Prepared By:

Wildlife Consulting Ltd | Ecology | Environmental Consultancy

Company Number: SC620396

1 Introduction and Purpose of the Plan 2
2 Development Site Context 3
3 Links with Other Plans 4
4 Key Ecological and Ornithological Receptors - Potential Mitigation and Enhancement Measures 5
5 Aims and Objectives 10
6 Duration of the OHMP and Monitoring 11
7 Habitat Management Group 12
8 Areas to be covered by the OHMP 13
9 Funding 14
10 Summary 15
11 Appendix A: Ballach Wind Farm - Draft Deer Management Plan 17
12 Appendix B - Figures ..... Error! Bookmark not defined.

1 Introduction and Purpose of the Plan

This Outline Habitat Management Plan (OHMP) has been prepared to present a strategy for the management of habitats within Ballach Wind Farm, with the aim of minimising adverse effects on key ecological and ornithological receptors, resulting from the implementation of the wind farm, and, where achievable, providing enhancements to further benefit these receptors at the site.

The OHMP will also work in tandem, where possible, with existing habitat management measures currently undertaken at the site to benefit ecology and ornithology for the 35-year lifetime of the wind farm.

2 Development Site Context

The site lies on hill ground to the south-east of Orin reservoir, it is approximately 8km to the west of Beauly and 22km to the west of Inverness.

The majority of the site is dominated by peatland communities with a variety of upland mire, heath and flush communities. Loch Ballach is located near the centre of the site. The peatland communities are highly degraded in nature throughout the site. Some near natural stands of blanket bog are also present, but they are rare and limited in extent.

3 Links with Other Plans

This plan has also been prepared with reference to the Highland Nature Biodiversity Action Plan 2021-2026[i]. At a habitat level this includes reference to the Local Biodiversity Action Plan (LBAP) actions for Upland Moorland, Peatland and Wetland, and Freshwater: rivers, burns and lochs habitats.

It is intended that this plan will contribute towards the aims of the LBAP for its respective habitat types and the diverse assemblage of native species they support.

This plan will also work in tandem with the existing management for the site. Following a consent, this document would also work with the Construction Environmental Management Plan (CEMP), Peat Management Plan (PMP) and Pollution Prevention Plan (PPP) for the project.

[i] https://www.highlandenvironmentforum.info/wp-content/uploads/2021/07/Highland-Nature-Biodiversity-Action-Plan-2021-2026-_compressed-.pdf

4 Key Ecological and Ornithological Receptors - Potential Mitigation and Enhancement Measures

The following key receptors have been recorded during the baseline surveys undertaken for the Ecological Impact Assessment (EcIA) and via consultation with project stakeholders. Mitigation measures outlined below are designed to safeguard key receptors from adverse effects and, where possible, enhance the habitats present within the site.

Divers. A pair of black-throated diver were recorded on a single occasion at Lochan Fada in April, but were not present on subsequent visits, and not considered to be breeding in 2024. Both black-throated and red-throated diver were recorded during the Atmos surveys undertaken between 2017-2019, but again no breeding was confirmed during this period.

Potential Mitigation: Pre-construction surveys: These will be required to ensure nesting birds are not subject to disturbance. Appropriate exclusion zones should be followed for the species if found to be nesting.

Enhancement: Installation of floating rafts for breeding divers would benefit breeding opportunities for these species. Red and black-throated divers typically nest on a small scrape at the edge of lochs. Due to their location, these nests can be susceptible to predation due, flooding and disturbance. The installation of rafts will greatly benefit the species as predation risks are lower due to mammalian species such as foxes unable or unwilling to access a floating raft. As the raft will float on the water surface, changes in water levels and flooding is no longer a risk. Disturbance events will also be reduced due to the accessibility of the raft.

Waders. Golden plover *Pluvialis apricaria*, greenshank *Tringa nebularia* and snipe *Gallinago gallinago* breed within the site and wider breeding bird survey area. While minimal wind farm infrastructure is proposed within areas of blanket bog where waders breed, peatland restoration proposals may result in disturbance and breeding failure.

Potential Mitigation: Mitigation in relation to construction activities should follow best practice guidelines including pre-construction surveys. Peatland restoration activities should avoid the breeding season (April – July) to avoid disturbance and potential breeding failure. Year-round collision monitoring, to determine whether actual bird collisions are in line with predicted values.

Enhancement: Peatland restoration measures will provide a benefit by increasing the condition of the habitats required for breeding wader species. Peatland restoration will either be undertaken outwith the breeding wader season, or, if this is not possible, first surveyed to ensure there are no waders within potential disturbance distances of peatland restoration works.

Enhancement: Wader scrapes are proposed to increase foraging opportunities for this group. Possible locations for wader scrapes are illustrated on Figure 2.

Black grouse. A small black grouse *Lyrurus tetrix* lek, comprising three lekking males was recorded in the black grouse survey area in 2024. There are also historical records of this species for the area provided by the RSPB.

Potential Mitigation: Pre-construction surveys Black grouse are typically a low flying species and, as such, less likely to collide with turbine blades. Nonetheless, there is the potential for this

species to collide with lower lying features, such as fence wires, or guy lines on met masts. Any new and existing fences should be fitted with markers to make the fence more visible. The greater visibility of the marked fences and met mast guy wires to help reduce the incidence of collisions. Pre-construction surveys to update the baseline with respect to lekking black grouse.

Enhancement: The creation of new riparian and native woodland areas (see Figure 2), will contains irregular, feathered edges to provide suitable nesting opportunities for grey hens while nesting.

Enhancement: The creation of wader scrapes discussed above, will also serve to increase invertebrates, which will also benefit juvenile black grouse during their insectivorous phase.

Raptors. Year-round collision monitoring, to determine whether actual bird collisions are in line with predicted values; and pre-construction surveys for Schedule 1 listed raptors, to determine the operational impacts on breeding success and inform required mitigation measures.

Fish fauna. There are a number of minor watercourses within the survey area, including headwaters that tribute offsite into the Erchless Burn and the Breakachy Burn, which have been identified by the Beauly District Salmon Fisheries Board as supporting migratory fish salmonids Atlantic salmon *Salmo salar* and sea trout *Salmo trutta*.

Potential Mitigation: The fish habitat survey (Technical Appendix 8.2) has identified potentially suitable watercourses for fish fauna. It is advised that, prior to any instream works in watercourses with potential to support fish fauna, a fish rescue exercise is undertaken, whereby the section of the watercourse is netted off and fish removed from the works area via an electrofishing exercise. Nets should then be left in situ and the watercourse over pumped with works then undertaken in a dry section of channel. Once instream works have been completed the nets should be removed immediately to allow the continuation of fish passage.

Enhancement: The creation of 7ha of new riparian woodland (see Figure 2), would serve to enhance bank habitat for fish, by providing areas of bankside cover, but not overshading. This would be best provided by planting of local broadleaved species of local provenance, such as oak *Quercus* spp, alder *Alnus glutinosa* hazel, rowan *Sorbus aucuparia*, willow *Salix* spp. or birch *Betula* spp.

Peatland and related habitats. The Developable Area is dominated by a range of peatland habits including blanket bog, wet modified bog, wet heath and dry heath. The highest quality peatlands have been minimised through the design process by avoiding areas with near natural conditions and siting infrastructure to limit degradation to areas containing deep peat.

Mitigation required: Post consent a PMP will be implemented in agreement with SEPA and NatureScot to protect peatland resources and habitats at the site. Measures to offset the loss of blanket bog and wet modified bog habitat via the restoration of a larger area of degraded bog within the site boundary will involve a reduction of herbivore impacts, preventing further erosion and drainage of bog habitats and increasing active sphagnum forming bog habitat. Ditch/gully blocking will also be carried out to raise the water table, decrease runoff and reduce oxidisation of bare peat.

The peat condition assessment has used to provide detail on the status of peatland areas and select suitable areas for peatland restoration, the potential restoration area is illustrated in Figure 2.

The recently published NatureScot guidance "*Advising on peatland, carbon-rich soils and priority peatland habitats in development management*"[ii] advises a 1:10 ratio in terms of the area bog habitat restoration required plus an additional 10% from the baseline assessment for priority peatlands, to compensate for the loss of bog habitats.

A combined total 69.82**Ha** of blanket bog and wet modified bog within a 30m zone of influence from all infrastructure will be either directly or indirectly impacted. This OHMP proposes peatland restoration measures of approximately 552Ha of blanket bog within the Developable Area. The proposed peatland restoration area is at a ratio of approximately 1:7. The amount of restoration is limited by the availability of suitable restoration options within the Developable area.

Despite the peatland restoration proposals falling below NatureScot's recommended 1:10 ratio, considering the baseline conditions relating to the severity of degradation (Full details are provided in the EIAR Technical Appendix 8.1) and the target improved condition of these communities resulting from the OHMP proposals, an overall benefit is expected.

Areas of degradation such as erosion features, gullies, ditches and hags have been identified during field surveys.

A map showing the degraded features and proposed restoration area of 552Ha can be found in Appendix B, Figures 2a-e.

In total, the features identified for peatland restoration amounts to:

- 34.32km of drains
- 18.36km of gullies
- 3.75km of peat hags
- 127.78Ha of erosion

Summary of peatland restoration options:

- Gullies to be re-profiled and surface runoff slowed through bunding/blocking. The type of blocking (i.e. peat dams, wave damming, plastic piling or similar) will be determined upon a full assessment of ground conditions.

[ii] https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management

- Drains will be blocked with wave dams (where appropriate). Dam spacing and type will be determined upon a full assessment of ground conditions and be specific to the features of the drainage system.
- Peat hags will be re-profiled.
- Areas of erosion can be bunded or the gullies blocked and re-profiled. Specific restoration measures will be tailored to each area. Techniques will likely involve either gully blocking or bunding to slow water runoff and decrease oxidisation and further drying and degradation of the peat, and;
- Mulch or turves (vegetated sections of peat) can be applied to areas with bare peat to stabilise these areas and allow natural or native seeded vegetation to colonise providing long-term stability.

All works and specifications will be carried out in accordance with NatureScot Peatland Action Guidance (NatureScot, 2024b). Restoration will be undertaken outside of the bird breeding season (April - July) to avoid adverse impacts upon breeding bird species, particularly waders, within the proposed restoration area.

In addition to the peatland restoration in existing areas of degraded and drained peatland, surplus excavated peat from the development will be relocated within the site. As above, highlighted volumes of peat requiring relocation are quantified in a PMP. Relocated peat is also to be placed in locations where there is no risk of it running into watercourses or waterbodies. Excavated peat must be kept wet and relocated as soon as possible. The final locations of relocated peat to be determined in agreement with NatureScot and SEPA following a consent.

A range of native woodland creation measures have also been set out to increase biodiversity within the site boundary and connectivity opportunities within the local area for a wide range of species. Woodland creation proposals are as follows:

- 39Ha of native woodland creation, and;
- 7Ha of riparian woodland creation.

The aim of woodland creation is to provide enhancements to biodiversity within the site boundaries. While this is not a like for like replacement for blanket bog, it does represent an opportunity to significantly enhance biodiversity within the survey area given the available habitats.

Protected mammal species. Evidence of otter, red squirrel, water vole and badger were recorded within the survey area, but no resting places identified within potential disturbance distances from works associated with the development. Common reptile species, such as adder, slow worm and common lizard are also present within the site.

Potential Mitigation: Pre-construction surveys for protected species will be undertaken to update the baseline and inform the need for any micro-siting or derogation licenses from NatureScot should any such species colonise nearer to the development layout.

Enhancement: The creation of new areas of woodland will provide additional cover and foraging opportunities for protected mammal species, such as pine marten and badger.

Deer. Red deer control measures will be crucial to habitat improvement at the site. A Deer Management Plan (DMP) will be developed, which will provide data relating to local deer populations and identify control measures to safeguard the bog habitats within site boundary.

General mitigation measures, such as covering deep excavations and adherence to SEPA GPPs will also help safeguard the deer themselves. The DMP will be developed in consultation with the Glenstrathfarrar Deer Management Group and NatureScot, to help maintain a sustainable red deer population within the site.

5 Aims and Objectives

The one overall aim is to improve biodiversity within the wider site to offset any losses resulting from the construction process.

The following objectives have been designed to achieve the aim of the OHMP:

- Improve the quality of blanket bog habitat;
- Develop a Deer Management Plan to safeguard blanket bog within the site boundary
- Safeguarding protected mammal species.

These objectives will be achieved by a number of measures including:

- Targeted gully blocking and bunding to raise water table, re-wetting areas of bog and reducing erosion;
- Reprofiling of peat hags;
- Production of a Deer Management Plan including analysis of deer numbers, with a view to understanding herbivore impact on bog habitats (trampling and browsing) and inform measures for future deer management.
- Improving bog habitats will also benefit wading birds such as dunlin and greenshank;

In addition to the habitat management objectives of the OHMP, there will be a series of monitoring objectives to evaluate the effectiveness of the habitat management measures and also to evaluate the effects of the wind farm on key receptors.

6 Duration of the OHMP and Monitoring

This OHMP will be implemented prior to any site clearance activities for the duration of the lifetime of the wind farm (35 years from commissioning). It is proposed that the majority of active restoration measures will be implemented during and shortly after infrastructure construction.

Monitoring of the effectiveness of mitigation measures will be undertaken during years 1, 2, 3, 5 and 10 of the operational phase of the development.

7 Habitat Management Group

It is envisioned a Habitat Management Group (HMG) will be set up to oversee the execution of the OHMP. The group will meet on an annual basis for years 1 to 5 and review the effectiveness of the prescriptions set out in the Final OHMP in terms of meeting its agreed aim and objectives. Following on from year 5, the HMG would meet in year 10, 15, 20, 25 and 30 to review site progress and make necessary adjustments in line with recommendations from the Habitat Management Board.

For avoidance of doubt, the HMG members will all be asked to comment on the content of and agree to the final objectives and prescriptions of this OHMP before it is finalised.

The Habitat Management Group will include representatives from the following organisations.

- Energiekontor;
- The Landowners;
- NatureScot, and;
- RSPB.

8 Areas to be covered by the OHMP

The area to be covered by the general objectives of the OHMP lies entirely within the site boundary (See Figure 1 in Appendix A). All areas covered by the plan are located within the landholding. Target areas include the Development footprint, and areas for habitat restoration/enhancement. These defined areas will be the subject of physical works to deliver habitat management objectives.

9 Funding

Energiekontor UK Ltd will have overall responsibility for implementation of the OHMP including associated costs.

10 Summary

This OHMP has been developed to provide measures to mitigation and enhancement proposals for Ballach Wind Farm. Table 1 below sets out the key ecological and ornithological receptors and proposed mitigation or enhancement.

Table 1: Summary of Mitigation and Enhancement measures

Key receptor	Mitigation	Enhancement
Red and black-throated diver	Pre-construction surveys to identify the presence of any breeding divers. Exclusion zone buffers should adhere to current guidelines[iii], which at the time of writing is 500-750m for breeding locations.	Installation of floating raft to enhance breeding opportunities on Lochan Fada.
Waders	Pre-construction surveys should record breeding wader territories. Exclusion zone buffers should adhere to current guidelines for each species. Peatland restoration works will avoid breeding season	Peatland restoration measures will improve habitat condition for waders
Black grouse	Pre-construction surveys should identify black grouse and their leks. Exclusion zone buffers should adhere to current guidelines[iv], which at the time of writing is 100-150m for nesting females and 500-750m for lekking males.	Install markers for new and existing fences. Met mast guy wires will also be marked. Habitat improvements from peatland restoration
Protected mammals	Pre-construction surveys should identify places of rest for protected mammals and bats. Appropriate buffer zones (distances specific to the individual species) shall be applied. NatureScot derogation license will be required where disturbance of a species or it's place of rest is unavoidable.	New woodland and riparian planting
Fish	Pollution Prevention Plan Fish rescue service for any instream works	Riparian planting

[iii]NatureScot (2022) Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance. Accessed at: https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance

[iv]NatureScot (2022) Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance. Accessed at: https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance

Key receptor	Mitigation	Enhancement
Peatland and related habitats	Peatland Management Plan 552Ha of peatland restoration	Adherence to the Deer Management Plan will reduce grazing pressure upon peatlands and improve condition 39Ha of native woodland creation 7Ha of riparian woodland creation
Deer	Covering deep excavations and adherence to SEPAs GPP	

Figures 2a-e set out the locations of the mitigation and restoration proposals for the site. Locations for re-throated diver rafts have not been illustrated in the Figures as these will need to be agreed upon following a ground-truthing exercise.

While a range of mitigation measures are in place for key receptors, a range of enhancements are also to be implemented. The restoration of blanket bog not only acts as an offsetting measure for peatland lost from the proposed development but also intrinsically provides a suite of enhancements for key ecological receptors such as wading bird species. The restoration of peatland will also increase invertebrate species, foraging habitat and the availability of suitable breeding locations for a variety of wader species.

The development of the Deer Management Plan to reduce grazing impact upon the peatland will not only help the habitat to recover quickly post restoration but will also serve to prevent or minimise further erosion in the future.

Biodiversity within the site will also be significantly enhanced by the creation of native woodland communities. Overall, considering the proposed mitigation and enhancement measures, the habitats and biodiversity within the site will be left in significantly and demonstrably better condition and quality than the do nothing scenario.

11 Appendix A: Ballach Wind Farm - Draft Deer Management Plan

Introduction

This Deer Management Plan (DMP) includes measures to mitigate adverse impacts of herbivore activity upon the bog communities within the site boundary. This also aims to take into account deer management on neighbouring land to ensure objectives are complimentary, particularly with the Glenstrathfarrar Deer Management Plan (GDMP[v]).

The boundaries of the group are readily defined as follows:

- Bounded in the south by Loch Mullardoch
- Along the River Cannich in the east of the area, then along the River Glass above the A831 road
- In the north, the boundary follows the line of the old county boundary between Inverness-shire and Ross-shire

The purpose of the GDMP is to:

- Provide a strategic overview of the management of wild deer within the group boundaries as far as members can influence, whilst providing a platform for more detailed discussion and planning within the GDMG on an annual basis for the effective delivery of both the management of the wild deer herd for the benefit of the members, the natural environment and the wider public interest and safety.
- Embrace and endeavour to operate with a collaborative and sustainable approach to the management of wild deer within the group geographic boundaries.
- To ensure that full engagement and interaction takes place wherever necessary between the DMG and communities, businesses, organisations and individuals who reside in and are active within the group geographical area.

The Ballach Wind Farm site is located in the Erchless management area of the larger Glenstrathfarrar Deer management group area. Construction of the Proposed Development is expected to last 18 months.

[v] https://glenstrathfarrardmg.deer-management.co.uk/deer-management-plan/

Objectives

This deer management plan has been completed following best practice guidance from NatureScot.

The purpose of the plan is:

- To summarise the potential impacts upon the site.
- To outline the mitigation measures proposed to manage the potential adverse impacts of herbivores on the blanket bog within the site boundary
- Maintain open moorland and blanket bog in good condition.

Deer Numbers

A helicopter count undertaken in 2012 for Glenstrathfarrar by NatureScot counted 6040 red deer. Using population modelling data and counts from the 2012 survey the population is estimated to be around 5659 deer in the management area, giving a density of c. 13.0 deer per km^2. However, the Working Plan which will detail the most up to date information regarding deer counts and estimates was not available at the time of writing. Therefore, this figure may not represent the most current information or estimates. However, the deer population per km^2 likely remains high as do their relative impacts upon blanket bog vegetation and peat.

Smaller numbers of sika and roe deer are present within the Deer management group area. However, numbers for each of these species are considered to be at low density. Accurate counts for each species are required for this area.

Potential Impacts

Habitat Degradation

The dominant habitats within the site are blanket bog and wet heath. These areas may be susceptible to damage by trampling and grazing. Proposed peatland restoration measures will be greatly enhanced through the reduction of herbivore impacts. It is considered that current deer population levels may undermine restoration proposals due to trampling pressure.

Mitigation and Enhancement Measures

Deer counts should be undertaken during and following the construction phase to record deer numbers in the site. Count methods may involve either indirect Herbivore Impact Assessment (HIA) plots, or direct counts, and the methods will be agreed between EnergieKontor and the Glenstrathfarrar Deer Management Group prior to being carried out. The results of this monitoring will then be used to help inform future deer management and to reduce grazing pressure on blanket bog vegetation.

Measures to reduce the disturbance and potential mortality of deer would be undertaken during construction of the Proposed Development. These measures would occur during the summer,

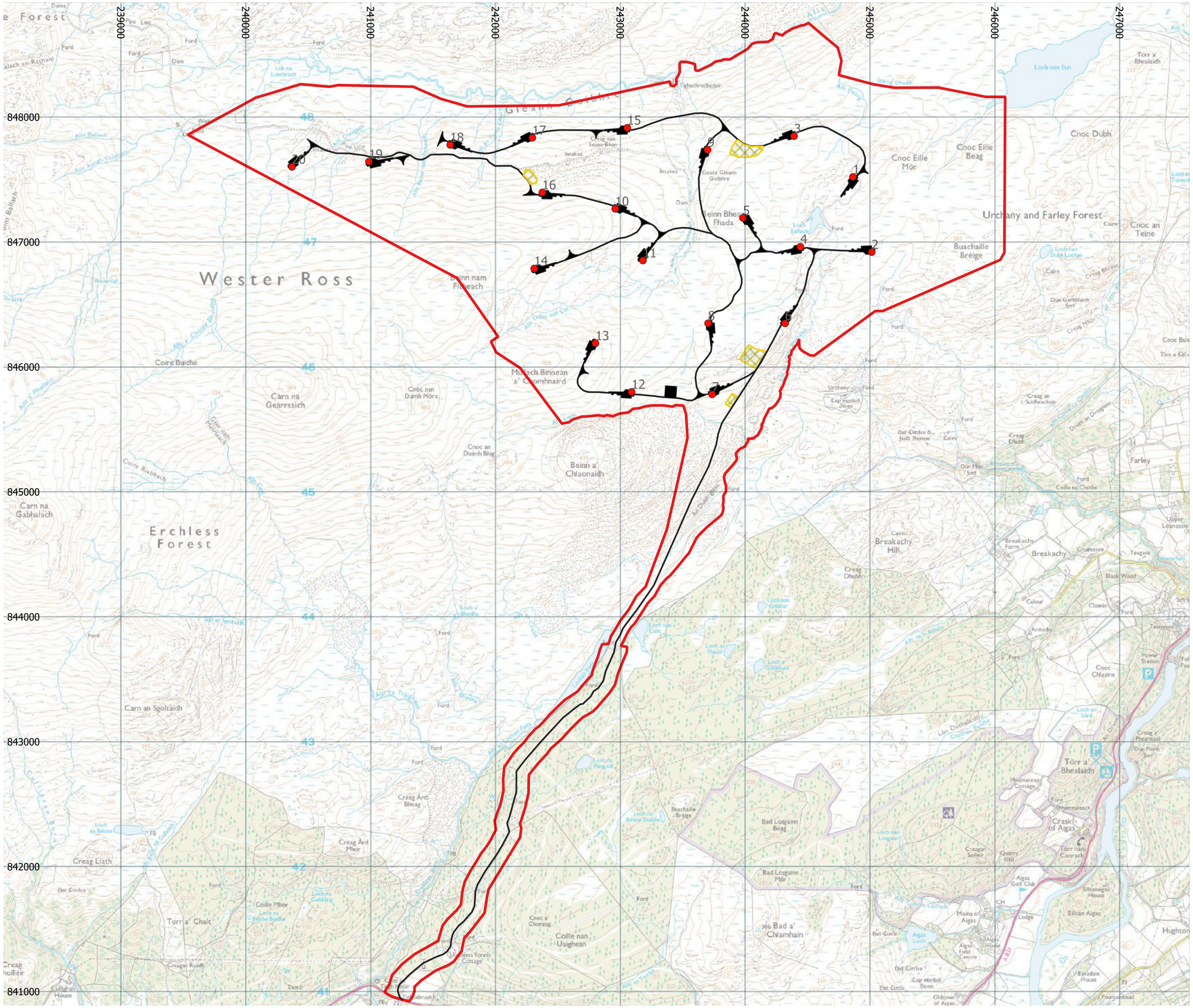
when deer are more likely to be present on higher ground and are, therefore, more likely to be disturbed during construction of the Proposed Development.

The following measures are proposed:

- Follow the general guidance set out by the Glenstrathfarrar Deer Management Plan;
- Restrict construction traffic to the Site boundary; and
- Minimise deer vehicle collisions and disturbance by restricting speed limits to 15 mph within the Proposed Development.

Cull Plan

Annual cull targets set out by GDMG should be extended to include the area of the Ballach Wind Farm site. Final cull targets for the Proposed Development would be in line with GDMG Management Plan and agreed with relevant stakeholders.



Site Boundary

Infrastructure

Permanent

Temporary

Turbines

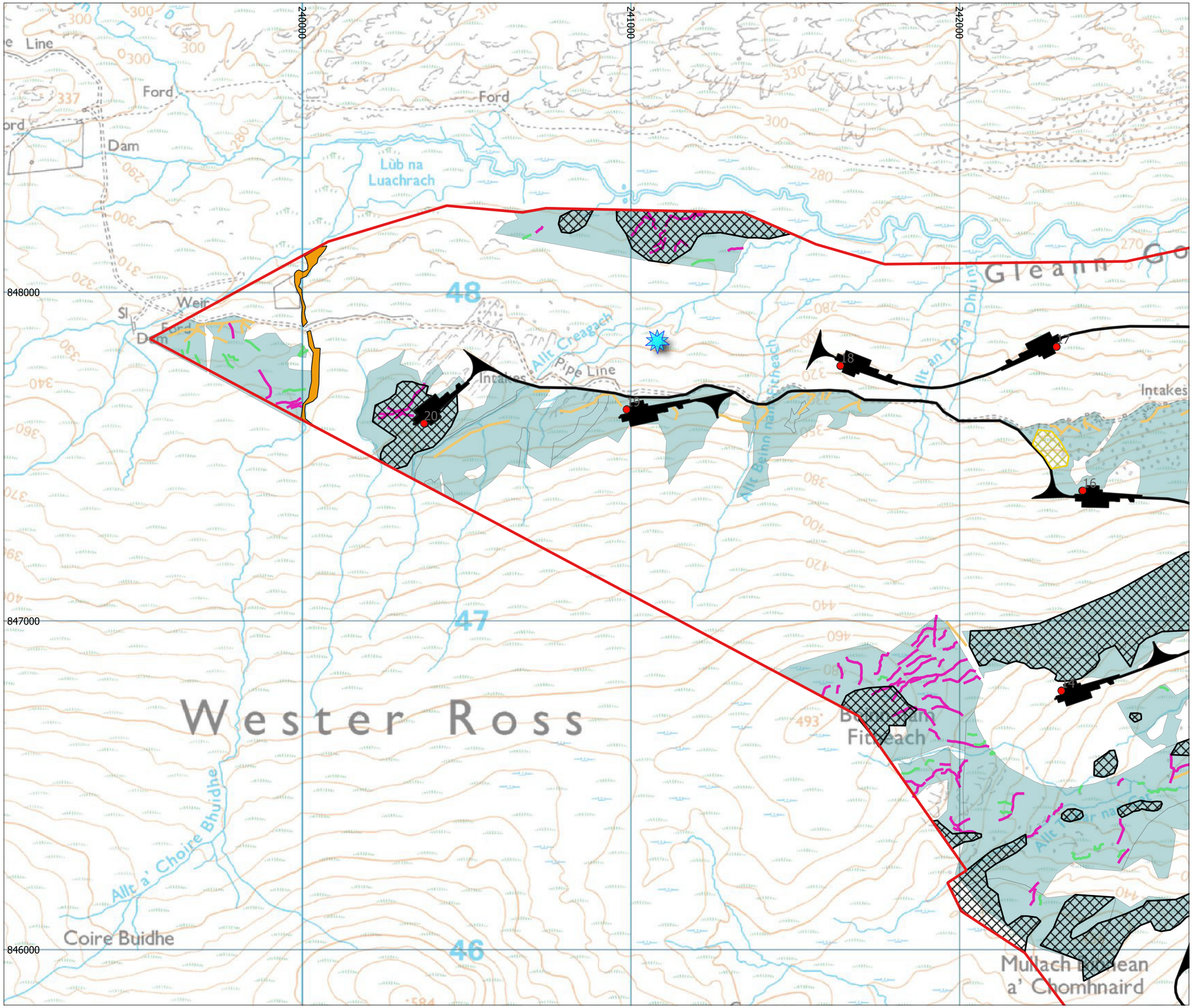
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Figure 1 - Site boundary

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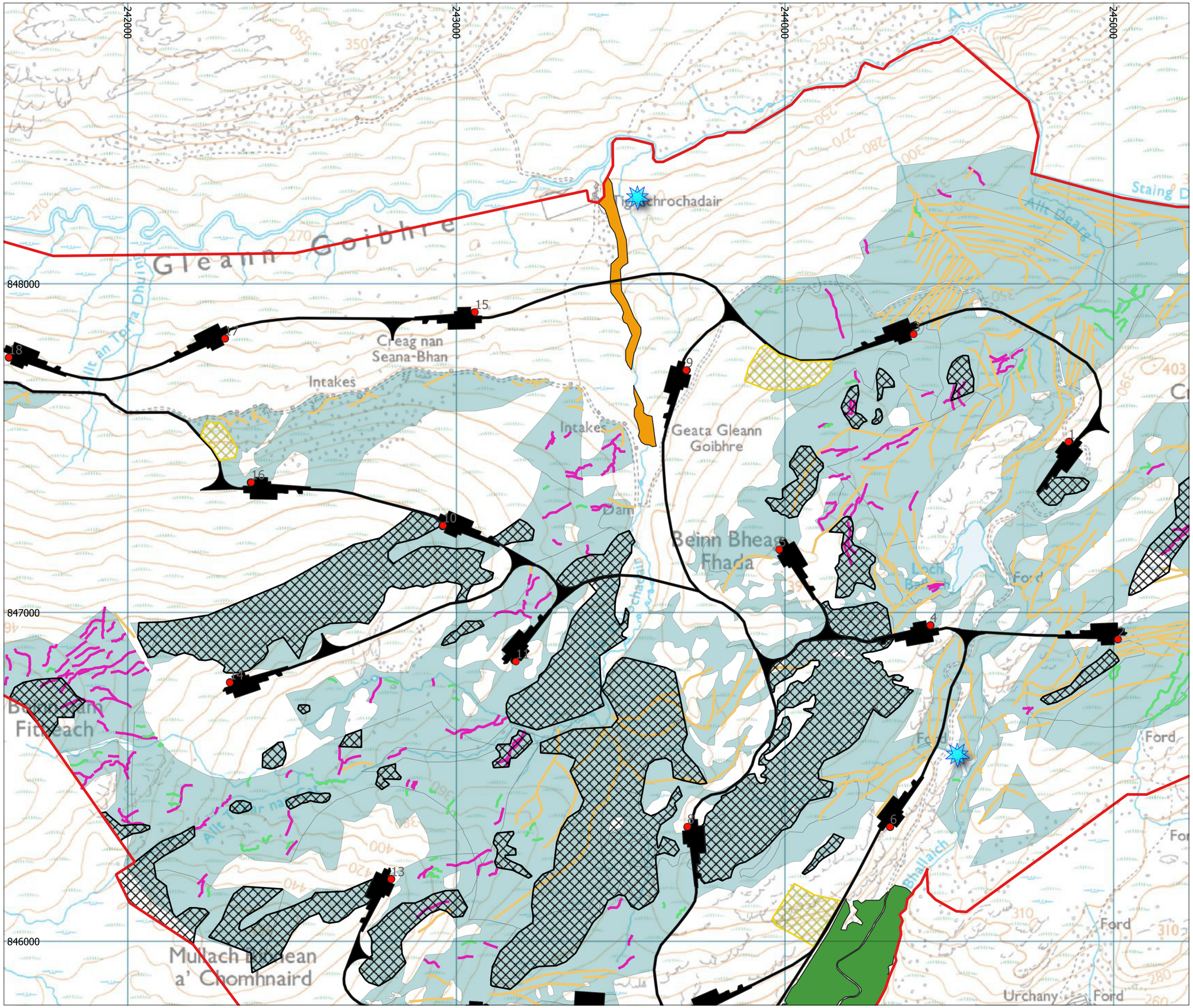
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Figure 2a - OHMP Proposals

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Date: 21/07/2025
Scale: 1:10,700



Site Boundary

Infrastructure

- Permanent
- Temporary

Peatland restoration areas

Peatland restoration line features

- Drain
- Gully
- Hag

Peatland restoration erosion areas

Turbines

Native woodland proposals

- Broadleaf native woodland
- Riparian woodland

Proposed wader scrape locations

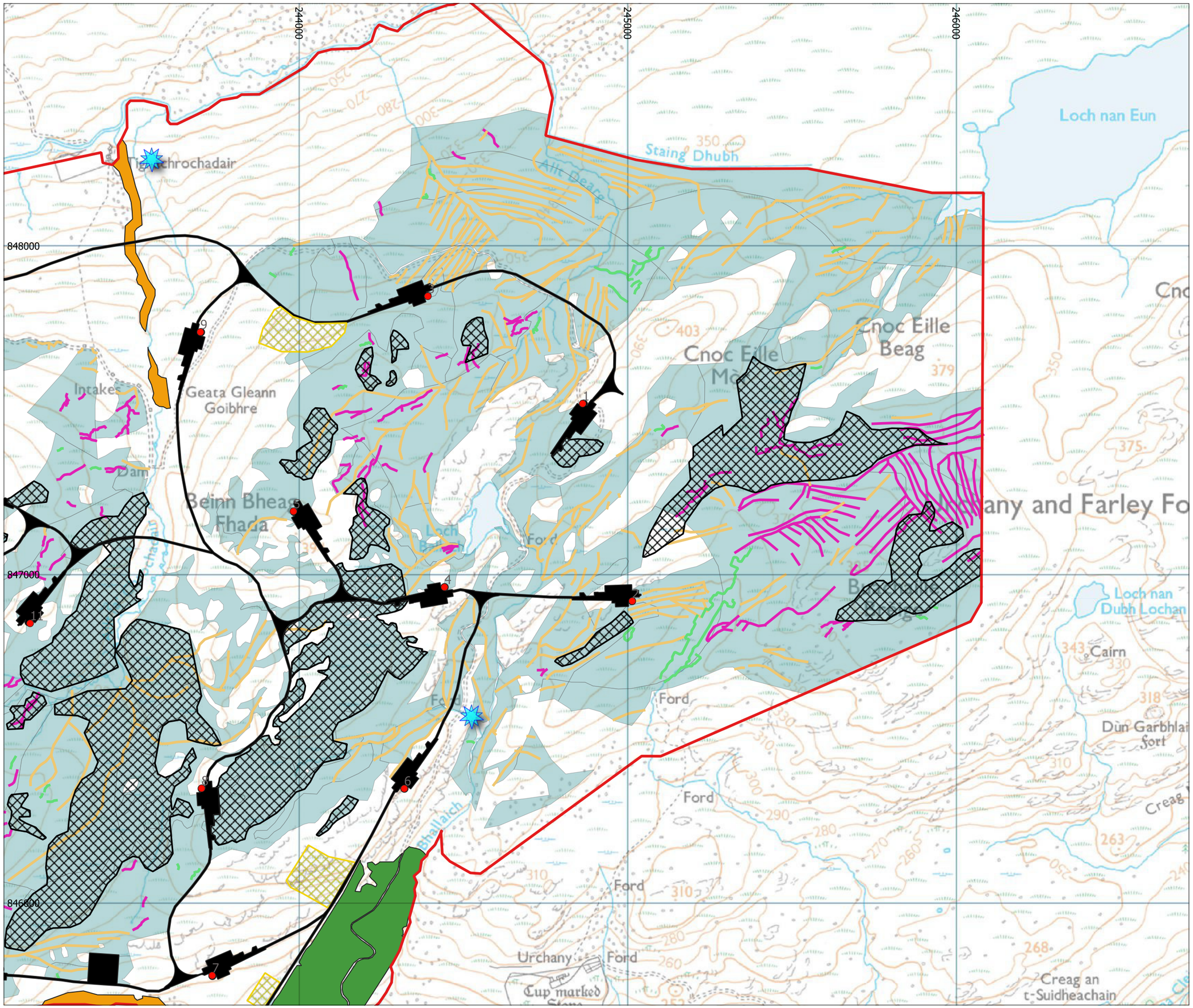
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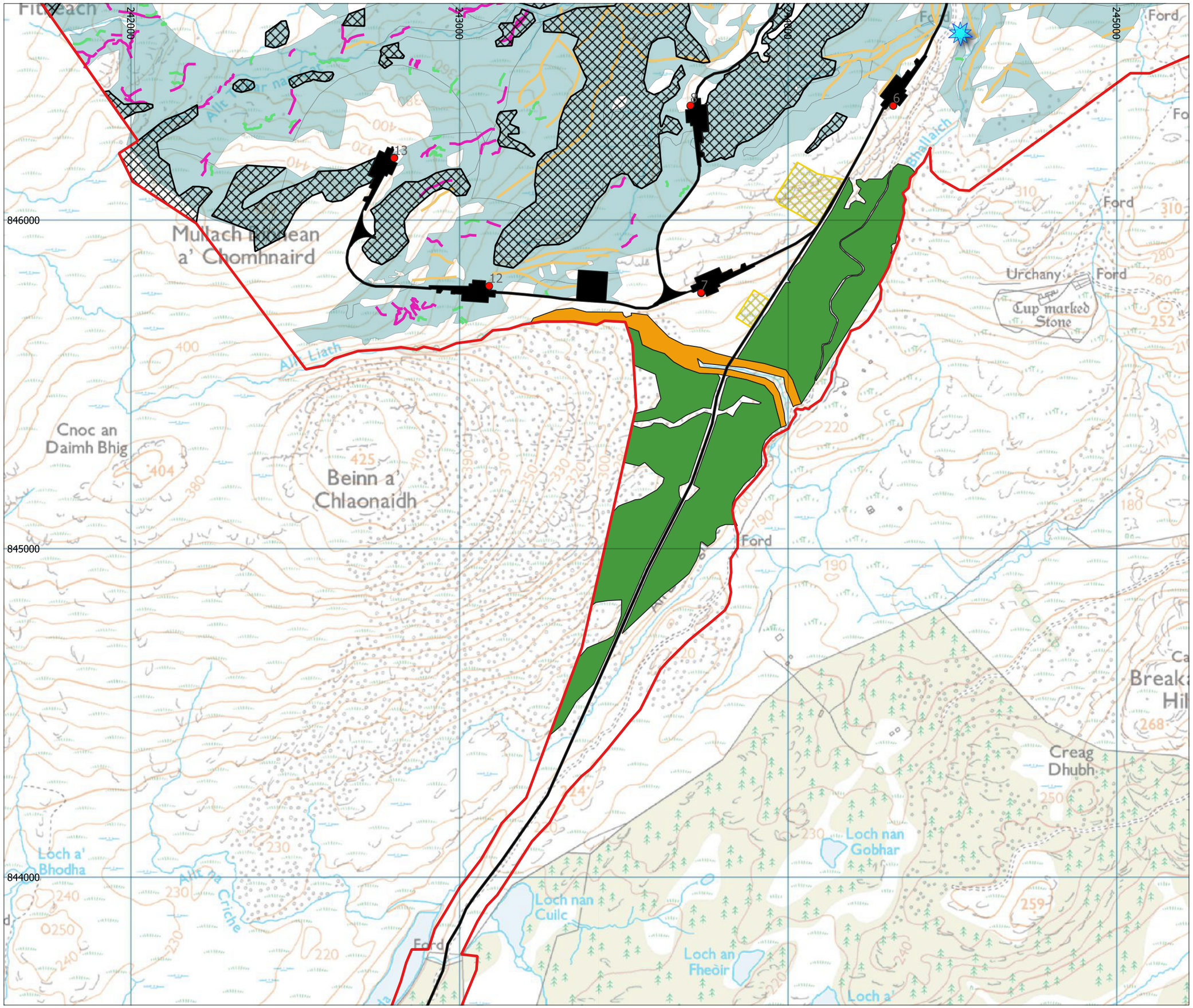
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Figure 2b - OHMP Proposals

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Site Boundary
Infrastructure
Permanent
Temporary
Peatland restoration areas
Peatland restoration line features
Drain
Gully
Hag
Peatland restoration erosion areas
Turbines
Native woodland proposals
Broadleaf native woodland
Riparian woodland
Proposed wader scrape locations
Loch nan Eun
Staing Dhubh
Allt Geare
Cnoc Eille Beag
Cnoc Eille Mà
Geata Gleann Goibhre
Intake
Dam
Beinn Bheag Fhada
Loch nan Dubh Lochan
Cairn
Dùn Garbhlaig fort
Ford
Urchany
Cup marked Stone
Creag an t-Suidheachain
Creag
Shallaich
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Figure 2c - OHMP Proposals
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- Site Boundary

Infrastructure
- Permanent
- Temporary
- Peatland restoration areas

Peatland restoration line features
- Drain
- Gully
- Hag
- Peatland restoration erosion areas
- Turbines

Native woodland proposals
- Broadleaf native woodland
- Riparian woodland
- Proposed wader scrape locations

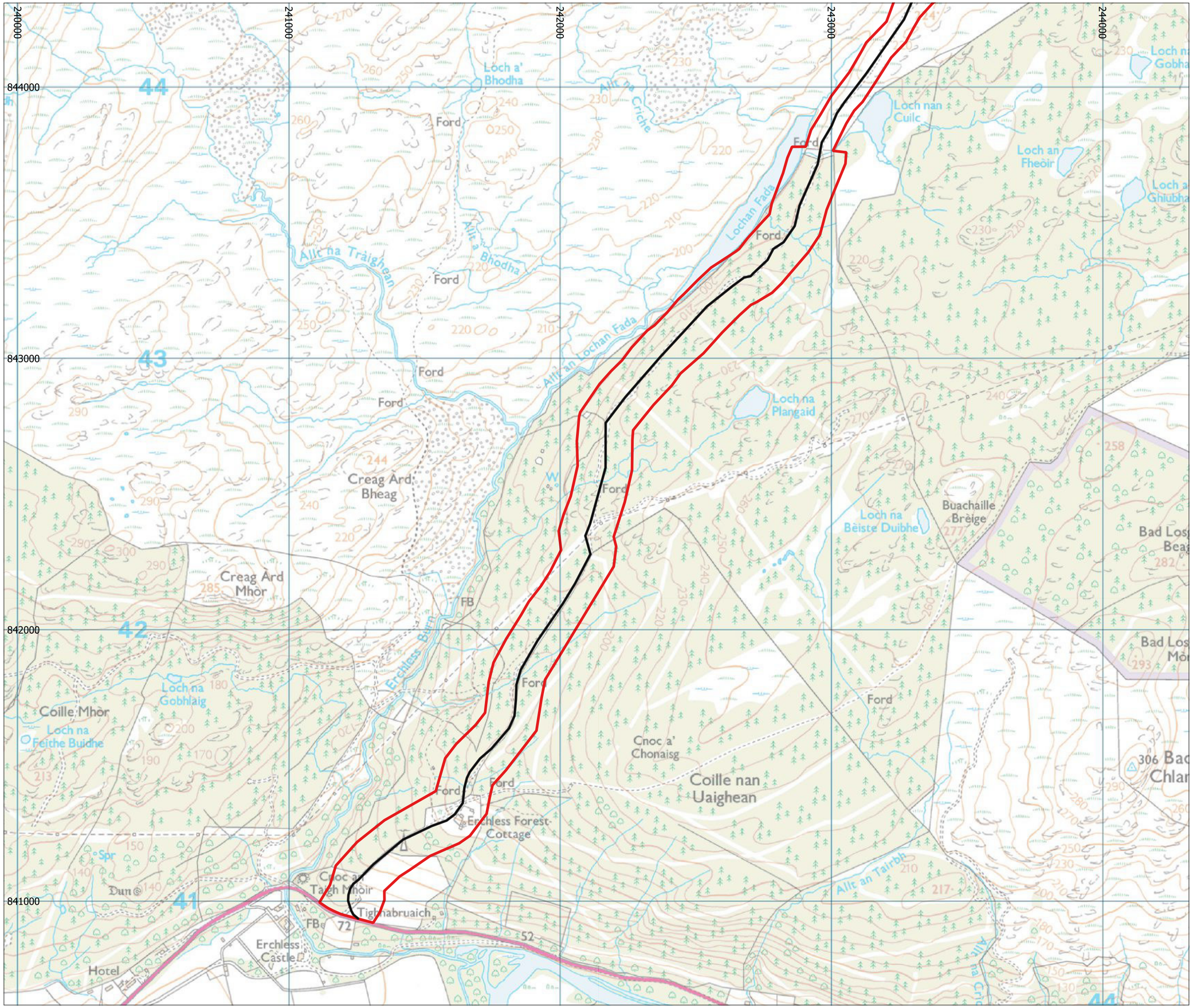
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Figure 2d - OHMP Proposals

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Figure 2e - OHMP Proposals

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WLC 23055 Ballach Ornithology Technical Appendix 9.1

16/06/2025

Prepared By:

Wildlife Consulting Ltd | Ecology | Environmental Consultancy

Company Number: SC620396

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1 Introduction

This Technical Appendix of the Environmental Impact Assessment Report (EIAR) presents the full ornithology survey timings and weather conditions at Ballach Wind Farm. It also includes full details of the target species flights recorded during the flight activity (VP) surveys, which are summarised in Chapter 9: Ornithology of the EIAR. Collision risk for species with sufficient flight activity to warrant collision modelling is presented in Appendix 9.2.

The results of the standard (Brown and Shepherd) breeding bird surveys are presented in full in Chapter 9, with breeding locations of Schedule 1 listed species and black grouse restricted to the Ballach Wind Farm Confidential Ornithology Report (Appendix 9.3).

2 Survey Timings and Weather Conditions

2.1 Flight Activity (VP) Survey

Table 1 summarises the number of hours of viewing for each of the three vantage points (VPs) over each of the three non-breeding and breeding seasons.

For the flight activity survey, the windows for each of the non-breeding seasons are defined as September to March inclusive, while the breeding seasons are defined as April to August inclusive.

Table 2-1: Flight Activity Survey – Summary of Viewing Hours per VP

VP	Non-Breeding Season 2017/18	Breeding Season 2018	Non-Breeding Season 2018/19	Breeding Season 2019	Non-Breeding Season 2023/24	Breeding Season 2024
VP1	45	33	42	27	36	36
VP2	45	30	42	42	36	36
VP3	48	30	42	30	36	36

Hourly timings and weather conditions for each of the three vantage points (VPs) used for the 2023-2024 flight activity surveys are presented in Table 2-2Table 2-2 below. The 2017-2019 third party survey effort is illustrated on Table 3.

Table 2-2: Flight Activity Survey - Timings and Weather Conditions

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
12/10/23	1	09:50	12:50	1	2	WSW	0	7	2	2	0	0
	1			2	3	SW	0	7	2	2	0	0
	1			3	3	SW	1	8	2	2	0	0
12/10/23	1	13:20	16:20	1	3	SW	1	8	2	2	0	0
	1			2	4	SW	0	7	2	2	0	0
	1			3	4	SW	0	7	2	2	0	0
30/10/23	2	10:00	13:00	1	3	E	2	6	2	2	0	0
	2			2	3	E	2	6	2	2	0	0
	2			3	4	ENE	1	6	2	2	0	0
30/10/23	2	13:30	16:30	1	4	ENE	1	6	2	2	0	0
	2			2	3	E	1	6	2	2	0	0
	2			3	3	E	0	5	2	2	0	0
13/10/23	3	07:20	10:20	1	3	WSW	0	8	2	2	0	0
	3			2	3	SW	0	8	2	2	0	0
	3			3	3	SW	0	8	2	2	0	0
13/10/23	3	11:10	14:10	1	4	WSW	0	1	2	2	0	0

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
	3			2	5	WSW	0	4	2	2	0	0
	3			3	5	WSW	0	5	2	2	0	0
22/11/23	1	12:20	15:20	1	4	W	0	7	2	2	0	0
	1			2	4	W	0	7	2	2	0	0
	1			3	5	W	0	7	1	1	0	0
28/11/23	1	12:15	15:15	1	1	NW	0	8	2	2	0	0
	1			2	2	NW	0	6	2	2	0	0
	1			3	2	NW	0	2	2	2	0	0
22/11/23	2	12:15	15:15	1	1	SE	0	1	2	2	1	0
	2			2	1	SE	0	1	2	2	0	0
	2			3	0	-	0	1	2	2	0	0
28/11/23	2	12:20	15:20	1	0	NW	0	2	2	2	0	0
	2			2	1	W	0	2	2	2	0	0
	2			3	1	NW	0	2	2	2	0	0
22/11/23	3	12:00	15:00	1	3	NW	0	6	2	2	0	0
	3			2	3	NW	2	7	2	2	0	0
	3			3	3	NW	2	8	1	1	0	0
28/11/23	3	12:20	15:20	1	3	NW	0	4	2	2	0	2
	3			2	3	NW	0	6	2	1	0	2
	3			3	3	NW	0	6	1	2	0	2
13/12/23	1	10:45	13:45	1	2	SE	0	6	2	2	0	0
	1			2	1	SSE	0	4	2	2	0	0
	1			3	1	S	0	2	2	2	0	0
19/12/23	1	09:00	12:00	1	4	W	0	3	2	2	0	0
	1			2	5	W	2	4	2	2	0	0
	1			3	5	W	2	6	2	2	0	0
13/12/23	2	10:50	13:50	1	2	SSW	0	6	1	2	0	0
	2			2	3	SSW	0	3	1	2	0	0
	2			3	3	SW	0	3	1	2	0	0
19/12/23	2	10:50	13:50	1	4	WSW	2	6	2	2	0	0
	2			2	4	WSW	0	5	2	2	0	0
	2			3	4	WSW	0	4	2	2	0	0
13/12/23	3	10:30	13:30	1	1	E	0	4	1	1	1	0
	3			2	2	E	0	3	1	2	0	0
	3			3	2	ESE	0	2	2	2	0	0
19/12/23	3	10:50	13:50	1	3	WSW	1	6	2	2	0	0
	3			2	3	WSW	2	5	2	2	0	0
	3			3	4	WSW	2	5	2	2	0	0
23/01/24	2	13:50	16:50	1	4	SW	0	8	2	2	0	1
	2			2	5	SW	0	8	2	2	0	1

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
	2			3	4	SW	2	8	2	2	0	1
23/01/24	3	13:40	16:40	1	4	SE	0	8	2	2	0	1
	3			2	4	SE	0	8	2	2	0	1
	3			3	4	SE	2	8	2	2	0	1
20/02/24	1	13:15	16:15	1	4	SW	2	2	2	2	0	0
	1			2	4	SW	0	3	2	2	0	0
	1			3	4	SW	2	6	2	2	0	0
21/02/24	1	12:15	15:15	1	3	SSW	2	6	2	2	0	0
	1			2	4	WSW	1	5	2	2	0	0
	1			3	4	W	0	3	2	2	0	0
22/02/24	1	11:30	14:30	1	3	SW	0	8	2	2	0	1
	1			2	3	SW	0	6	2	2	0	1
	1			3	3	SW	0	7	2	2	0	1
23/02/24	1	09:25	12:25	1	2	WSW	0	7	2	2	2	1
	1			2	3	WSW	0	6	2	2	2	1
	1			3	3	WSW	0	7	2	2	2	1
20/02/24	2	13:05	16:05	1	5	SW	0	3	2	2	0	0
	2			2	5	SW	0	6	2	2	0	0
	2			3	5	SW	0	4	2	2	0	0
21/02/24	2	12:00	15:00	1	3	SSW	2	6	1	2	0	0
	2			2	4	WSW	1	5	2	2	0	0
	2			3	4	W	0	3	2	2	0	0
22/02/24	2	11:30	14:30	1	3	SW	2	6	1	2	0	1
	2			2	4	SW	1	6	1	2	0	1
	2			3	3	SW	1	5	1	2	0	1
23/02/24	2	09:30	12:30	1	2	WSW	0	5	2	2	0	1
	2			2	3	SW	0	7	2	2	0	1
	2			3	3	SW	0	7	2	2	0	1
20/02/24	3	12:50	15:50	1	4	SW	0	7	2	2	0	0
	3			2	5	SW	0	7	2	2	0	0
	3			3	5	SW	0	6	2	2	0	0
22/02/24	3	11:20	14:20	1	2	WSW	2	2	2	2	0	0
	3			2	4	SW	2	5	2	2	0	0
	3			3	4	WSW	2	6	2	2	0	0
23/02/24	3	09:00	12:00	1	3	SW	0	7	2	2	0	2
	3			2	3	WSW	0	6	2	2	0	2
	3			3	3	WSW	0	6	2	2	0	2
05/03/24	1	09:50	12:50	1	3	S	0	7	2	2	0	0
	1			2	3	S	0	6	2	2	0	0
	1			3	3	S	0	6	2	2	0	0

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
05/03/24	1	13:20	16:20	1	3	S	0	7	2	2	0	0
	1			2	3	S	0	7	2	2	0	0
	1			3	3	S	0	6	2	2	0	0
05/03/24	2	13:20	16:20	1	3	S	0	6	2	2	0	0
	2			2	4	S	0	7	2	2	0	0
	2			3	4	SSW	0	7	2	2	0	0
05/03/24	3	13:20	16:20	1	3	SE	0	5	2	2	0	0
	3			2	4	ESE	0	7	2	2	0	0
	3			3	4	SE	0	7	2	2	0	0
28/03/24	3	12:55	15:55	1	4	NE	0	8	2	2	0	1
	3			2	4	NE	0	8	2	2	0	1
	3			3	4	NE	0	8	2	2	0	1
23/04/24	1	13:45	16:45	1	3	N	2	6	2	2	0	0
	1			2	3	NNE	2	5	2	2	0	0
	1			3	3	NNE	0	6	2	2	0	0
23/04/24	1	17:15	20:15	1	3	NNE	0	6	2	2	0	0
	1			2	3	NE	0	5	2	2	0	0
	1			3	3	NE	0	5	2	2	0	0
09/04/24	2	13:45	16:45	1	5	WNW	2	8	2	2	0	0
	2			2	5	WNW	0	8	2	2	0	0
	2			3	5	WNW	2	8	2	2	0	0
09/04/24	2	17:15	20:15	1	5	WNW	0	8	2	2	0	0
	2			2	4	W	0	8	2	2	0	0
	2			3	4	W	2	6	2	2	0	0
12/04/24	3	07:20	10:20	1	2	WSW	0	1	2	2	0	0
	3			2	3	WSW	0	1	2	2	0	0
	3			3	3	WSW	0	1	2	2	0	0
12/04/24	3	10:50	13:50	1	3	WSW	0	0	2	2	0	0
	3			2	3	WSW	0	0	2	2	0	0
	3			3	3	WSW	0	0	2	2	0	0
10/05/24	1	07:30	10:30	1	2	SSE	0	8	2	2	0	0
	1			2	2	SSE	0	8	2	2	0	0
	1			3	1	SSE	0	8	2	2	0	0
27/05/24	2	15:15	15:15	1	2	W	0	6	2	2	0	0
	2			2	2	W	2	7	2	2	0	0
	2			3	2	W	2	7	1	2	0	0
06/05/24	3	13:45	16:45	1	2	NW	0	8	1	2	0	0
	3			2	3	NNW	0	7	2	2	0	0
	3			3	3	NNW	0	7	2	2	0	0
13/05/24	3	14:45	17:45	1	2	NNE	0	6	2	2	0	0

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
	3			2	3	NE	0	7	2	2	0	0
	3			3	2	NE	0	8	2	2	0	0
27/06/24	1	10:00	13:00	1	3	S	0	4	2	2	0	0
	1			2	4	S	0	6	2	2	0	0
	1			3	4	S	2	7	2	2	0	0
27/06/24	1	13:30	16:30	1	4	S	2	7	2	2	0	0
	1			2	3	S	2	7	2	2	0	0
	1			3	3	S	0	6	2	2	0	0
28/06/24	1	09:30	12:30	1	4	S	0	7	2	2	0	0
	1			2	4	SW	0	6	2	2	0	0
	1			3	4	W	0	6	2	2	0	0
28/06/24	2	09:30	12:30	1	4	NW	1	8	2	2	0	0
	2			2	4	NW	1	8	2	2	0	0
	2			3	4	NW	0	8	2	2	0	0
28/06/24	2	13:00	16:00	1	4	NW	2	7	2	2	0	0
	2			2	4	NW	0	8	2	2	0	0
	2			3	4	NW	2	7	2	2	0	0
26/06/24	3	11:30	14:30	1	2	SE	0	8	1	1	0	0
	3			2	2	SE	1	8	1	2	0	0
	3			3	3	SE	0	8	2	2	0	0
26/06/24	3	15:00	18:00	1	3	SE	0	7	2	2	0	0
	3			2	3	SE	0	8	2	2	0	0
	3			3	3	SE	0	8	2	2	0	0
18/07/24	1	12:30	15:30	1	3	S	0	6	2	2	0	0
	1			2	4	S	0	7	2	2	0	0
	1			3	4	S	2	7	2	2	0	0
18/07/24	1	16:00	19:00	1	4	SW	0	7	2	2	0	0
	1			2	4	SW	2	7	2	2	0	0
	1			3	4	SW	0	7	2	2	0	0
16/07/24	2	14:30	17:30	1	2	W	0	3	2	2	0	0
	2			2	3	W	0	4	2	2	0	0
	2			3	3	W	0	4	2	2	0	0
18/07/24	2	10:00	13:00	1	3	S	0	7	2	2	0	0
	2			2	3	S	0	8	2	2	0	0
	2			3	3	S	0	8	2	2	0	0
18/07/24	2	13:30	16:30	1	3	S	0	8	2	2	0	0
	2			2	4	S	0	7	2	2	0	0
	2			3	4	S	1	8	2	2	0	0
19/07/24	3	09:00	12:00	1	4	S	0	8	1	1	0	0
	3			2	4	S	0	7	1	1	0	0

Date	VP	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
	3			3	4	S	0	7	2	2	0	0
19/07/24	3	12:30	15:30	1	4	SSW	0	8	2	2	0	0
	3			2	4	SSW	0	8	2	2	0	0
	3			3	4	SSW	0	8	2	2	0	0
21/08/24	1	12:10	15:10	1	5	SW	2	8	2	2	0	0
	1			2	5	SW	0	8	2	2	0	0
	1			3	5	SW	1	8	2	2	0	0
21/08/24	1	05:30	08:30	1	5	SW	1	8	2	2	0	0
	1			2	6	SW	1	8	2	2	0	0
	1			3	5	SW	0	8	2	2	0	0
22/08/24	1	09:00	12:00	1	5	SW	0	5	2	2	0	0
	1			2	4	SW	0	6	2	2	0	0
	1			3	4	SW	2	7	2	2	0	0
22/08/24	1	12:30	15:30	1	5	SW	0	7	2	2	0	0
	1			2	4	SW	1	6	2	2	0	0
	1			3	4	SW	2	5	2	2	0	0
21/08/24	2	11:45	14:45	1	5	SSW	2	8	2	2	0	0
	2			2	5	SSW	0	8	2	2	0	0
	2			3	5	SSW	1	8	2	2	0	0
21/08/24	2	15:15	18:15	1	5	SSW	1	8	2	2	0	0
	2			2	5	SSW	1	8	2	2	0	0
	2			3	5	SSW	0	8	1	2	0	0
22/08/24	2	08:30	11:30	1	4	SW	0	5	2	2	0	0
	2			2	4	SW	0	6	2	2	0	0
	2			3	4	SW	0	7	2	2	0	0
22/08/24	2	12:00	15:00	1	4	SW	0	7	2	2	0	0
	2			2	4	SW	0	7	2	2	0	0
	2			3	4	SW	2	6	2	2	0	0
21/08/24	3	11:50	14:50	1	4	SSW	2	8	2	2	0	0
	3			2	3	SSW	1	8	2	2	0	0
	3			3	4	SSW	0	8	2	2	0	0
21/08/24	3	15:20	18:20	1	3	SSW	1	8	2	2	0	0
	3			2	4	SSW	0	8	2	2	0	0
	3			3	3	SSW	0	8	2	2	0	0
22/08/24	3	08:25	11:25	1	3	WSW	0	5	2	2	0	0
	3			2	4	WSW	0	6	2	2	0	0
	3			3	4	WSW	0	7	2	2	0	0
22/08/24	3	11:55	14:55	1	5	WSW	0	7	2	2	0	0
	3			2	5	WSW	0	7	2	2	0	0
	3			3	5	WSW	2	6	2	2	0	0

Wind speed: according to Beaufort Scale
Wind direction: according to 16-point compass
Cloud cover: in eights of sky (oktas)
Cloud height: 0 = <150m; 1 = 150-500m; 2 = >500m
Visibility: 0 = Poor (<1km); 1 = Moderate (1-2km); 2 = Good (>2km)
Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Heavy rain
Frost: 0 = None; 1 = Ground; 2 = All day
Snow: 0 = None; 1 = On site; 2 = High ground

Table 2-3: 2017-2019 Vantage Point Survey Effort

VP Number	Survey Date	Start Time	Finish Time
3	17/10/2017	11:40:00	14:40:00
2	18/10/2017	11:30:00	14:30:00
3	19/10/2017	10:00:00	13:00:00
3	19/10/2017	13:30:00	16:30:00
2	20/10/2017	10:10:00	13:10:00
2	23/10/2017	11:10:00	14:10:00
1	24/10/2017	11:45:00	14:45:00
2	25/10/2017	12:30:00	15:30:00
3	26/10/2017	09:45:00	12:45:00
3	26/10/2017	13:15:00	16:15:00
2	27/10/2017	10:15:00	13:15:00
2	30/10/2017	11:00:00	14:00:00
2	31/10/2017	12:05:00	15:05:00
3	01/11/2017	09:15:00	12:15:00
3	01/11/2017	12:45:00	15:45:00
1	03/11/2017	10:00:00	13:00:00
1	08/11/2017	12:00:00	15:00:00
1	09/11/2017	10:30:00	13:30:00
3	10/11/2017	10:20:00	13:20:00
1	28/11/2017	11:30:00	14:30:00
1	29/11/2017	09:30:00	12:30:00
1	10/12/2017	13:10:00	15:10:00
1	16/12/2017	10:30:00	13:30:00
3	21/12/2017	09:30:00	12:30:00
2	24/12/2017	12:20:00	15:20:00
3	27/12/2017	12:10:00	15:10:00
2	28/12/2017	09:25:00	12:25:00
1	28/12/2017	13:30:00	14:30:00
2	11/01/2018	10:45:00	13:45:00
1	26/01/2018	09:35:00	12:35:00
1	26/01/2018	13:45:00	16:45:00
3	27/01/2018	10:15:00	13:15:00
2	28/01/2018	09:40:00	12:40:00
3	19/02/2018	09:00:00	12:00:00
3	19/02/2018	12:30:00	15:30:00
1	25/02/2018	09:25:00	12:25:00
2	26/02/2018	09:10:00	12:10:00
2	26/02/2018	12:40:00	15:40:00

VP Number	Survey Date	Start Time	Finish Time
3	27/02/2018	13:05:00	16:05:00
1	01/03/2018	13:30:00	16:30:00
1	17/03/2018	09:20:00	12:20:00
1	17/03/2018	12:50:00	15:50:00
3	23/03/2018	08:50:00	11:50:00
3	23/03/2018	12:20:00	15:20:00
2	27/03/2018	09:45:00	12:45:00
2	27/03/2018	13:15:00	16:15:00
1	17/04/2018	08:55:00	11:55:00
3	17/04/2018	12:35:00	15:35:00
3	18/04/2018	07:45:00	10:45:00
2	18/04/2018	12:10:00	15:10:00
2	19/04/2018	08:00:00	11:00:00
1	19/04/2018	11:35:00	14:35:00
1	04/06/2018	08:10:00	11:10:00
3	04/06/2018	12:50:00	15:50:00
3	05/06/2018	09:10:00	12:10:00
2	05/06/2018	13:00:00	16:00:00
1	06/06/2018	07:30:00	10:30:00
2	07/06/2018	09:20:00	12:20:00
1	07/06/2018	13:00:00	16:00:00
2	12/06/2018	08:15:00	11:15:00
1	12/06/2018	12:20:00	15:20:00
3	13/06/2018	07:40:00	10:40:00
2	13/06/2018	11:50:00	14:50:00
1	15/06/2018	07:30:00	10:30:00
3	15/06/2018	11:15:00	14:15:00
2	24/07/2018	08:15:00	11:15:00
1	24/07/2018	12:30:00	15:30:00
1	25/07/2018	08:00:00	11:00:00
3	25/07/2018	11:40:00	14:40:00
3	26/07/2018	07:30:00	10:30:00
2	26/07/2018	11:40:00	14:40:00
1	15/08/2018	08:05:00	11:05:00
3	15/08/2018	11:45:00	14:45:00
2	16/08/2018	07:45:00	10:45:00
1	16/08/2018	11:45:00	14:45:00
3	28/08/2018	07:45:00	10:45:00
2	28/08/2018	11:45:00	14:45:00
1	18/09/2018	09:50:00	12:50:00
1	18/09/2018	14:00:00	17:00:00
3	24/09/2018	09:45:00	12:45:00
3	24/09/2018	13:15:00	16:15:00
2	25/09/2018	08:15:00	11:15:00
2	25/09/2018	11:45:00	14:45:00
3	17/10/2018	08:50:00	11:50:00
1	17/10/2018	12:20:00	15:20:00

VP Number	Survey Date	Start Time	Finish Time
1	18/10/2018	08:50:00	11:50:00
2	18/10/2018	12:30:00	15:30:00
2	28/10/2018	09:15:00	12:15:00
3	28/10/2018	13:10:00	16:10:00
2	06/11/2018	08:25:00	11:25:00
1	06/11/2018	12:15:00	15:15:00
3	07/11/2018	08:10:00	11:10:00
2	07/11/2018	12:15:00	15:15:00
1	08/11/2018	08:15:00	11:15:00
3	08/11/2018	11:50:00	14:50:00
1	01/12/2018	09:35:00	12:35:00
1	01/12/2018	13:05:00	16:05:00
3	03/12/2018	08:15:00	11:15:00
3	03/12/2018	11:45:00	14:45:00
2	04/12/2018	09:05:00	12:05:00
2	04/12/2018	12:35:00	15:35:00
1	15/01/2019	09:15:00	12:15:00
1	15/01/2019	12:45:00	15:45:00
3	16/01/2019	08:30:00	11:30:00
3	16/01/2019	12:00:00	15:00:00
2	17/01/2019	08:20:00	11:20:00
2	17/01/2019	11:50:00	14:50:00
1	10/02/2019	10:15:00	13:15:00
1	10/02/2019	13:45:00	16:45:00
3	12/02/2019	10:25:00	13:25:00
3	12/02/2019	13:55:00	16:55:00
2	16/02/2019	10:00:00	13:00:00
2	16/02/2019	13:30:00	16:30:00
1	04/03/2019	08:50:00	11:50:00
1	04/03/2019	12:20:00	15:20:00
3	07/03/2019	08:35:00	11:35:00
2	07/03/2019	12:20:00	15:20:00
2	19/03/2019	08:50:00	11:50:00
3	19/03/2019	12:30:00	15:30:00
2	10/04/2019	09:00:00	09:10:00
3	10/04/2019	12:10:00	15:10:00
2	30/04/2019	09:45:00	12:45:00
1	09/05/2019	09:15:00	12:15:00
1	09/05/2019	12:30:00	15:30:00
3	10/05/2019	08:30:00	11:30:00
2	10/05/2019	12:15:00	15:15:00
3	28/05/2019	10:30:00	13:30:00
3	28/05/2019	13:30:00	16:30:00
1	30/05/2019	08:00:00	11:00:00
2	30/05/2019	12:15:00	13:00:00
2	06/06/2019	07:50:00	10:50:00
2	06/06/2019	13:30:00	16:30:00

VP Number	Survey Date	Start Time	Finish Time
1	20/06/2019	10:30:00	13:30:00
3	20/06/2019	13:45:00	16:45:00
3	24/06/2019	10:00:00	13:00:00
2	28/06/2019	08:15:00	11:15:00
2	28/06/2019	11:45:00	14:45:00
2	01/07/2019	10:45:00	13:45:00
1	01/07/2019	14:30:00	17:30:00
1	05/07/2019	08:45:00	11:45:00
3	05/07/2019	12:00:00	15:00:00
3	30/07/2019	10:00:00	13:00:00
1	30/07/2019	13:10:00	16:10:00
3	31/07/2019	11:00:00	14:00:00
2	31/07/2019	14:20:00	17:20:00
2	20/08/2019	08:00:00	11:00:00
2	20/08/2019	11:30:00	14:30:00
3	21/08/2019	08:00:00	11:00:00
1	21/08/2019	11:30:00	14:30:00
1	22/08/2019	08:00:00	11:00:00
3	20/09/2019	09:45:00	12:45:00
3	20/09/2019	09:45:00	12:45:00
3	20/09/2019	13:15:00	16:15:00
2	21/09/2019	06:45:00	09:45:00
2	21/09/2019	10:15:00	13:15:00

2.2 Flight Activity Survey Target Species Results

Table 2-4: Flight Activity Survey – Target Species Results

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
GP	17/10/2017	11:45	1	N	9	3	61
GP	17/10/2017	11:45	2	Y	9	3	146
GP	17/10/2017	11:58	3	N	5	3	53
GP	17/10/2017	11:58	4	Y	5	3	101
GP	17/10/2017	12:17	5	Y	6	3	131
WE	17/10/2017	13:20	6	Y	1	3	247
WE	17/10/2017	13:20	7	Y	1	3	324
WE	17/10/2017	13:20	8	Y	1	3	135
HH	17/10/2017	13:23	9	Y	1	3	190
WS	17/10/2017	14:24	10	Y	2	3	150

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
EA	18/10/2017	12:38	11	Y	1	2	540
EA	18/10/2017	12:38	12	Y	1	2	196
KT	18/10/2017	13:13	13	Y	1	2	134
KT	18/10/2017	13:13	14	Y	1	2	25
EA	18/10/2017	15:03	15	N	1	2	8
FF	19/10/2017	11:45	16	Y	30	3	46
FF	19/10/2017	11:59	17	Y	60	3	32
FF	19/10/2017	12:13	18	Y	30	3	27
KT	19/10/2017	13:23	19	Y	2	3	152
FF	19/10/2017	15:07	20	Y	30	3	33
EA	20/10/2017	11:07	21	Y	1	2	16
EA	20/10/2017	11:07	22	Y	1	2	400
EA	20/10/2017	11:07	23	Y	1	2	167
KT	23/10/2017	12:57	24	N	1	2	106
KT	23/10/2017	12:57	25	Y	1	2	59
KT	23/10/2017	12:57	26	Y	1	2	97
KT	23/10/2017	12:57	27	Y	1	2	420
KT	23/10/2017	12:57	28	Y	1	2	211
KT	23/10/2017	12:57	29	Y	1	2	180
GP	23/10/2017	13:17	30	Y	6	2	95
KT	23/10/2017	14:01	31	N	1	2	52
KT	23/10/2017	14:01	32	Y	1	2	175
GP	24/10/2017	15:30	33	Y	42	1	90
KT	26/10/2017	11:07	34	Y	3	3	506
KT	01/11/2017	11:24	35	N	1	3	78
KT	01/11/2017	11:24	36	Y	1	3	132
KT	03/11/2017	10:21	37	N	1	1	55
KT	03/11/2017	10:21	38	N	1	1	120
KT	03/11/2017	10:21	39	Y	1	1	138
KT	03/11/2017	10:21	40	Y	1	1	87
KT	03/11/2017	11:31	41	Y	1	1	258
KT	03/11/2017	11:31	42	Y	1	1	188
KT	03/11/2017	11:31	43	Y	1	1	126

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	03/11/2017	11:31	44	Y	1	1	66
KT	03/11/2017	11:33	45	Y	1	1	197
KT	03/11/2017	11:33	46	Y	1	1	200
KT	03/11/2017	11:33	47	Y	1	1	119
KT	03/11/2017	11:33	48	Y	1	1	115
EA	03/11/2017	12:30	49	Y	1	1	254
EA	03/11/2017	12:30	50	Y	1	1	252
EA	03/11/2017	12:30	51	N	1	1	110
EA	03/11/2017	12:30	52	N	1	1	106
KT	03/11/2017	12:51	53	Y	1	1	94
KT	08/11/2017	10:36	54	Y	1	1	167
EA	09/11/2017	11:58	55	Y	1	1	177
DN	10/11/2017	12:47	56	N	3	3	5
KT	29/11/2017	10:01	57	Y	1	1	196
KT	29/11/2017	10:13	58	N	1	1	53
KT	29/11/2017	10:13	59	Y	1	1	146
KT	29/11/2017	10:13	60	Y	1	1	60
KT	29/11/2017	12:04	61	Y	1	1	133
KT	16/12/2017	11:49	62	Y	1	1	186
EA	27/12/2017	12:24	63	Y	1	3	39
WE	26/01/2018	14:09	64	Y	1	1	347
EA	27/01/2018	10:17	65	Y	1	3	195
KT	19/02/2018	14:10	66	Y	1	3	72
KT	25/02/2018	11:05	67	Y	1	1	57
KT	25/02/2018	11:05	68	Y	1	1	149
KT	26/02/2018	10:31	69	Y	1	2	63
EA	26/02/2018	13:18	70	Y	1	2	213
EA	26/02/2018	13:18	71	Y	1	2	61
EA	26/02/2018	13:18	72	Y	1	2	47
KT	26/02/2018	15:19	73	N	1	2	128
KT	26/02/2018	15:19	74	Y	1	2	56
KT	26/02/2018	15:29	75	Y	1	2	173
WS	23/03/2018	10:40	76	N	7	3	36

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
WS	23/03/2018	10:40	77	Y	7	3	22
UL	27/03/2018	09:01	78	N	2	2	4
GP	27/03/2018	11:07	79	N	3	2	9
GP	27/03/2018	11:07	80	N	3	2	5
GP	27/03/2018	11:07	81	Y	3	2	6
CU	27/03/2018	11:36	82	N	1	2	18
GP	27/03/2018	13:32	83	N	2	2	13
KT	27/03/2018	14:02	84	N	1	2	28
KT	27/03/2018	14:02	85	N	1	2	14
KT	27/03/2018	14:02	86	Y	1	2	31
EA	27/03/2018	14:32	87	Y	1	2	193
HH	27/03/2018	16:53	88	N	1	2	36
KT	17/04/2018	07:28	89	N	1	1	30
EA	17/04/2018	15:19	90	N	1	3	153
CU	18/04/2018	08:59	91	N	1	3	46
KT	18/04/2018	10:34	92	N	1	3	12
EA	18/04/2018	12:33	93	N	1	2	253
EA	18/04/2018	13:06	94	N	1	2	303
EA	18/04/2018	13:10	95	Y	1	2	84
ML	18/04/2018	14:26	96	N	1	2	2
ML	18/04/2018	14:26	97	N	1	2	23
EA	19/04/2018	10:00	98	Y	1	2	10
KT	19/04/2018	11:14	99	N	2	2	36
CU	19/04/2018	11:32	100	N	1	2	6
KT	19/04/2018	14:56	101	N	1	1	18
KT	19/04/2018	14:56	102	Y	1	1	56
ML	04/06/2018	07:38	103	N	1	1	8
GP	04/06/2018	07:50	104	N	1	1	6
SN	04/06/2018	14:06	105	N	1	3	17
KT	04/06/2018	14:51	106	N	1	3	72
KT	04/06/2018	16:04	107	N	1	3	48
KT	04/06/2018	16:04	108	Y	1	3	68
KT	05/06/2018	08:21	109	N	1	3	78

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	05/06/2018	10:42	110	Y	1	3	12
KT	05/06/2018	10:42	111	Y	1	3	33
KT	05/06/2018	10:42	112	Y	1	3	42
KT	05/06/2018	11:13	113	Y	1	3	29
KT	05/06/2018	14:07	114	N	1	2	61
KT	05/06/2018	14:07	115	Y	1	2	73
KT	05/06/2018	14:36	116	N	1	2	92
KT	05/06/2018	14:36	117	Y	1	2	39
KT	05/06/2018	14:36	118	Y	1	2	40
EA	05/06/2018	15:02	119	N	1	2	131
EA	05/06/2018	15:02	120	N	1	2	274
KT	07/06/2018	08:40	121	N	1	2	63
KT	07/06/2018	12:05	122	Y	2	2	363
KT	07/06/2018	12:05	123	Y	1	2	363
KT	07/06/2018	12:05	124	Y	2	2	15
KT	07/06/2018	12:05	125	Y	2	2	23
KT	07/06/2018	12:05	126	Y	2	2	20
KT	07/06/2018	12:05	127	Y	2	2	43
KT	07/06/2018	12:05	128	Y	2	2	180
KT	07/06/2018	12:05	129	Y	1	2	180
KT	07/06/2018	12:07	130	Y	1	2	201
KT	07/06/2018	12:07	131	Y	1	2	73
GP	07/06/2018	13:00	132	N	1	1	20
GP	07/06/2018	13:00	133	N	1	1	16
GP	07/06/2018	13:00	134	N	1	1	21
GP	07/06/2018	13:00	135	N	1	1	13
KT	12/06/2018	09:02	136	N	1	2	63
KT	12/06/2018	09:02	137	Y	1	2	47
KT	12/06/2018	11:32	138	N	1	2	123
EA	12/06/2018	13:28	139	N	1	1	173
WS	13/06/2018	08:45	140	N	2	3	27
WS	13/06/2018	08:45	141	N	2	3	31
KT	13/06/2018	13:08	142	N	1	2	21

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	13/06/2018	14:23	143	N	1	2	34
GP	15/06/2018	11:26	144	N	2	3	7
KT	15/06/2018	12:17	145	Y	1	3	28
KT	15/06/2018	13:08	146	Y	1	3	73
ML	24/07/2018	10:08	147	N	1	2	13
EA	24/07/2018	12:03	148	N	1	2	83
KT	25/07/2018	13:24	149	Y	2	3	36
EA	26/07/2018	07:11	150	Y	1	3	318
KT	26/07/2018	09:31	151	Y	1	3	6
KT	26/07/2018	09:31	152	Y	1	3	23
KT	26/07/2018	09:31	153	Y	1	3	36
ML	26/07/2018	12:18	154	N	1	2	7
ML	26/07/2018	13:32	155	N	1	2	8
KT	15/08/2018	12:36	156	N	1	3	13
KT	15/08/2018	12:36	157	Y	1	3	38
ML	16/08/2018	09:02	158	N	1	2	26
ML	16/08/2018	09:02	159	N	1	2	13
ML	28/08/2018	12:07	160	N	1	2	14
EA	28/08/2018	12:41	161	N	1	2	163
KT	18/09/2018	15:08	162	N	1	1	41
KT	18/09/2018	15:08	163	Y	1	1	45
KT	18/09/2018	15:11	164	Y	1	1	137
GP	24/09/2018	10:31	165	Y	39	3	218
GP	24/09/2018	10:31	166	Y	39	3	77
KT	24/09/2018	10:32	167	N	1	3	25
EA	24/09/2018	11:38	168	Y	1	3	24
EA	24/09/2018	11:47	169	N	1	3	12
EA	24/09/2018	11:47	170	Y	1	3	20
EA	24/09/2018	11:47	171	Y	1	3	41
KT	24/09/2018	13:43	172	Y	1	3	166
PG	24/09/2018	15:32	173	N	30	3	211
EA	25/09/2018	09:14	174	N	1	2	22
EA	25/09/2018	09:14	175	Y	1	2	138

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
EA	25/09/2018	09:15	176	Y	1	2	70
KT	25/09/2018	13:13	177	Y	1	2	34
KT	25/09/2018	13:13	178	Y	1	2	39
KT	17/10/2018	10:41	179	N	1	3	126
ML	17/10/2018	10:50	180	N	1	3	101
ML	17/10/2018	11:11	181	N	1	3	51
KT	17/10/2018	11:21	182	N	1	3	131
KT	17/10/2018	11:21	183	Y	1	3	67
KT	17/10/2018	11:21	184	Y	1	3	34
ML	17/10/2018	12:41	185	N	1	1	53
KT	17/10/2018	13:05	186	Y	1	1	72
KT	17/10/2018	13:05	187	Y	1	1	23
KT	18/10/2018	12:25	188	Y	1	2	72
KT	28/10/2018	10:49	189	N	1	2	120
ML	06/11/2018	10:07	190	N	1	2	13
EA	06/11/2018	11:19	191	N	1	2	28
EA	06/11/2018	11:24	192	Y	1	2	54
RE	06/11/2018	11:31	193	N	18	2	19
KT	06/11/2018	11:49	194	N	1	1	17
KT	06/11/2018	11:49	195	N	2	1	26
KT	06/11/2018	11:49	196	N	3	1	31
KT	07/11/2018	10:48	197	Y	1	3	73
KT	07/11/2018	11:49	198	N	1	2	53
KT	07/11/2018	13:24	199	Y	1	2	18
KT	07/11/2018	13:24	200	Y	1	2	48
KT	08/11/2018	11:51	201	N	1	3	143
KT	08/11/2018	11:51	202	Y	1	3	53
KT	08/11/2018	11:51	203	Y	1	3	12
KT	08/11/2018	11:51	204	Y	1	3	33
KT	08/11/2018	11:51	205	Y	1	3	122
KT	08/11/2018	11:53	206	N	1	3	31
KT	08/11/2018	11:53	207	Y	1	3	71
EA	01/12/2018	13:46	208	Y	1	1	134

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	03/12/2018	10:13	209	N	1	3	55
KT	03/12/2018	10:13	210	Y	1	3	11
KT	03/12/2018	12:54	211	N	1	3	60
KT	03/12/2018	12:54	212	N	1	3	315
KT	03/12/2018	12:54	213	Y	1	3	77
KT	03/12/2018	12:54	214	Y	1	3	43
GP	03/12/2018	12:58	215	Y	3	3	37
EA	03/12/2018	13:49	216	Y	1	3	63
EA	03/12/2018	13:49	217	Y	1	3	60
DN	15/01/2019	09:12	218	N	1	1	10
GP	15/01/2019	12:31	219	N	7	1	15
WS	16/01/2019	08:32	220	N	2	3	27
KT	16/01/2019	11:52	221	N	1	3	203
KT	16/01/2019	14:51	222	N	1	3	27
EA	12/02/2019	14:06	223	Y	1	3	119
EA	12/02/2019	14:06	224	N	1	3	94
KT	16/02/2019	11:01	225	Y	1	2	205
EA	16/02/2019	11:39	226	N	1	2	118
ML	16/02/2019	11:56	227	Y	1	2	9
EA	04/03/2019	11:23	228	N	1	1	33
KT	07/03/2019	13:41	229	N	1	2	21
KT	07/03/2019	13:41	230	Y	1	2	81
SN	19/03/2019	12:10	231	N	1	2	30
SN	19/03/2019	12:10	232	Y	1	2	50
KT	19/03/2019	12:21	233	Y	1	2	30
UO	10/04/2019	12:38	234	Y	100	3	30
KT	10/04/2019	15:35	235	Y	1	3	90
ML	30/04/2019	09:53	236	N	1	2	11
ML	30/04/2019	09:53	237	N	1	2	12
ML	30/04/2019	09:53	238	N	1	2	10
GP	30/04/2019	10:57	239	N	2	2	27
EA	30/04/2019	11:43	240	N	1	2	131
UO	09/05/2019	09:30	241	N	30	1	300

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
EA	09/05/2019	13:23	242	Y	1	1	720
PE	10/05/2019	14:09	243	N	1	2	10
ML	28/05/2019	12:41	244	N	1	3	5
ML	28/05/2019	12:41	245	Y	1	3	30
ML	28/05/2019	12:41	246	Y	1	3	55
EA	28/05/2019	12:58	247	N	2	3	85
KT	28/05/2019	13:06	248	N	1	3	40
KT	28/05/2019	13:06	249	Y	1	3	10
KT	28/05/2019	13:06	250	Y	1	3	15
EA	28/05/2019	14:35	251	Y	1	3	180
EA	28/05/2019	14:35	252	Y	1	3	360
EA	28/05/2019	14:35	253	Y	1	3	180
EA	28/05/2019	14:35	254	Y	1	3	45
KT	28/05/2019	14:38	255	N	1	3	45
KT	28/05/2019	14:38	256	Y	1	3	120
KT	30/05/2019	11:28	257	N	1	2	46
KT	30/05/2019	11:28	258	Y	1	2	73
KT	30/05/2019	11:28	259	Y	1	2	31
CU	06/06/2019	14:33	260	Y	1	2	21
KT	06/06/2019	16:51	261	N	1	2	37
GP	20/06/2019	10:57	262	N	4	1	15
CU	20/06/2019	14:51	263	N	1	3	30
CU	20/06/2019	14:51	264	N	1	3	10
CU	20/06/2019	14:51	265	Y	1	3	5
KT	28/06/2019	12:11	266	Y	1	2	30
EA	01/07/2019	14:28	267	Y	1	1	55
KT	05/07/2019	11:19	268	Y	1	1	280
ML	21/08/2019	14:32	269	N	1	1	10
ML	21/08/2019	14:32	270	N	1	1	5
EA	20/09/2019	10:05	271	Y	1	3	45
KT	20/09/2019	13:37	272	Y	1	3	20
KT	20/09/2019	13:37	273	Y	1	3	190
KT	20/09/2019	13:39	274	Y	1	3	55

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	20/09/2019	14:19	275	Y	1	3	30
KT	20/09/2019	14:19	276	Y	1	3	168
KT	12/10/2023	10:49	277	N	1	1	229
KT	12/10/2023	11:36	278	Y	2	1	275
KT	12/10/2023	13:51	279	Y	1	1	78
ML	12/10/2023	13:52	280	Y	1	1	80
KT	12/10/2023	14:21	281	Y	1	1	116
KT	12/10/2023	15:02	282	Y	1	1	372
KT	12/10/2023	15:10	283	N	1	1	26
KT	12/10/2023	15:16	284	Y	2	1	74
GP	13/10/2023	11:29	285	Y	13	3	15
KT	13/10/2023	11:36	286	N	1	3	35
KT	13/10/2023	11:44	287	N	1	3	187
KT	13/10/2023	12:10	288	Y	1	3	176
KT	13/10/2023	12:11	289	N	1	3	111
HH	30/10/2023	11:37	290	Y	1	2	92
PE	30/10/2023	11:44	291	N	1	2	50
EA	30/10/2023	11:48	292	Y	1	2	157
EA	30/10/2023	11:49	293	Y	1	2	122
EA	30/10/2023	11:59	294	Y	1	2	232
EA	30/10/2023	14:40	295	Y	1	2	227
GP	30/10/2023	15:53	296	Y	24	2	76
KT	28/11/2023	13:45	297	Y	1	1	707
BK	28/11/2023	13:45	298	Y	1	1	17
KT	28/11/2023	13:47	299	Y	3	1	542
KT	19/12/2023	12:16	300	N	1	3	92
KT	19/12/2023	12:18	301	N	1	3	57
KT	19/12/2023	12:21	302	N	2	3	311
GP	19/12/2023	12:26	303	Y	27	3	332
GP	19/12/2023	12:33	304	N	27	2	15
KT	19/12/2023	12:37	305	N	1	3	150
KT	19/12/2023	12:40	306	N	1	3	112
KT	19/12/2023	13:01	307	N	1	3	402

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	19/12/2023	13:22	308	N	1	3	286
KT	19/12/2023	13:32	309	N	1	3	477
KT	20/02/2024	13:26	310	Y	1	2	223
KT	20/02/2024	13:48	311	Y	3	3	134
KT	20/02/2024	13:50	312	Y	1	3	102
KT	20/02/2024	14:02	313	N	1	1	98
KT	20/02/2024	14:04	314	Y	1	2	159
EA	20/02/2024	14:33	315	N	1	2	264
KT	20/02/2024	14:42	316	Y	1	3	122
KT	20/02/2024	14:50	317	N	1	3	118
KT	20/02/2024	14:56	318	Y	1	1	340
KT	20/02/2024	15:08	319	N	2	3	458
KT	20/02/2024	15:49	320	Y	1	3	49
ML	21/02/2024	12:18	321	N	1	1	22
KT	21/02/2024	13:45	322	Y	1	2	77
GP	22/02/2024	11:30	323	Y	23	2	124
GP	22/02/2024	11:32	324	Y	38	2	106
GP	22/02/2024	11:32	325	Y	15	2	15
GP	22/02/2024	11:33	326	Y	38	3	72
GP	22/02/2024	11:39	327	Y	1	2	42
GP	22/02/2024	13:07	328	Y	12	3	44
KT	22/02/2024	14:09	329	Y	2	1	190
KT	23/02/2024	10:12	330	Y	1	1	46
KT	23/02/2024	10:32	331	Y	1	1	257
KT	23/02/2024	10:32	332	Y	1	3	130
GP	23/02/2024	10:40	333	Y	24	3	85
KT	05/03/2024	13:46	334	Y	1	2	48
KT	05/03/2024	13:50	335	Y	1	3	133
EA	05/03/2024	16:15	336	Y	1	3	180
GP	28/03/2024	13:20	337	Y	10	3	100
KT	12/04/2024	09:46	338	Y	1	3	113
PE	12/04/2024	11:05	339	N	1	3	19
KT	12/04/2024	11:53	340	N	1	3	136

Target Species	Date	Time	Flight Number	PCH	No Of Birds	VP	Duration (seconds)
KT	12/04/2024	12:08	341	Y	1	3	288
KT	23/04/2024	17:23	342	Y	1	1	285
GP	06/05/2024	16:27	343	N	2	3	24
EA	27/05/2024	15:41	344	Y	1	2	251
KT	26/06/2024	15:43	345	Y	1	3	220
H.	26/06/2024	17:04	346	Y	1	3	65
KT	22/08/2024	13:26	347	N	1	3	186
EA	22/08/2024	15:17	348	Y	1	1	277

2.3 Black Grouse Survey

Timings and weather conditions during the black grouse surveys are presented in Table 2-5 below.

Table 2-5: Black Grouse Survey – Timings and Weather Conditions

Date	Visit	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
11/04/24	1	04:00	07:00	1	3	WSW	0	2	2	2	0	0
				2	3	WSW	0	1	2	2	0	0
				3	3	WSW	0	1	2	2	0	0
10/05/24	2	05:20	08:20	1	2	SSE	0	8	2	2	0	0
				2	2	SSE	0	8	2	2	0	0
				3	3	SSE	0	8	2	2	0	0

Wind speed: according to Beaufort Scale
Wind direction: according to 16-point compass
Cloud cover: in eights of sky (oktas)
Cloud height: 0 = <150m; 1 = 150-500m; 2 = >500m
Visibility: 0 = Poor (<1km); 1 = Moderate (1-2km); 2 = Good (>2km)
Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Heavy rain
Frost: 0 = None; 1 = Ground; 2 = All day
Snow: 0 = None; 1 = On site; 2 = High ground

2.4 Breeding Bird Survey

Timings and weather conditions during the 2024 Brown and Shepherd breeding bird surveys are presented in Table 2-6 below.

Table 2-6: Breeding Bird Survey – Timings and Weather Conditions

Date	Visit	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
23/04/24	1	08:30	13:00	1	3	N	0	6	2	2	0	0
				2	3	N	0	6	2	2	0	0
				3	3	N	0	6	2	2	0	0
				4	3	N	0	6	2	2	0	0
				5	3	N	0	6	2	2	0	0
24/04/24	1	08:30	15:15	1	1	NE	0	5	2	2	0	0
				2	2	NE	0	5	2	2	0	0
				3	3	NE	0	6	2	2	0	0
				4	3	NE	0	5	2	2	0	0
				5	3	NE	0	4	2	2	0	0
				6	2	NE	0	5	2	2	0	0
30/05/24	2	08:30	15:30	1	2	N	0	6	2	2	0	0
				2	3	N	0	7	1	2	0	0
				3	3	N	0	5	2	2	0	0
				4	4	NNW	0	6	2	2	0	0
				5	4	NNW	0	5	2	2	0	0
				6	3	NNW	0	5	2	2	0	0
29/06/24	3	08:30	14:30	1	3	SW	1	8	2	2	0	0
				2	3	SW	0	8	2	2	0	0
				3	3	SW	0	8	2	2	0	0
				4	3	SW	2	8	2	2	0	0
				5	3	SW	2	8	2	2	0	0
				6	3	SW	0	8	2	2	0	0
17/07/24	4	08:30	14:30	1	3	SW	0	2	2	2	0	0
				2	3	SW	0	2	2	2	0	0
				3	3	SW	0	3	2	2	0	0
				4	3	SW	0	7	2	2	0	0
				5	3	SW	0	7	2	2	0	0
				6	3	SW	0	8	2	2	0	0
18/07/24	4	08:30	11:30	1	2	SW	0	6	2	2	0	0
				2	3	SW	0	6	2	2	0	0
				3	3	SW	0	6	2	2	0	0

Wind speed: according to Beaufort Scale
Wind direction: according to 16-point compass
Cloud cover: in eights of sky (oktas)
Cloud height: 0 = <150m; 1 = 150-500m; 2 = >500m
Visibility: 0 = Poor (<1km); 1 = Moderate (1-2km); 2 = Good (>2km)
Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Heavy rain
Frost: 0 = None; 1 = Ground; 2 = All day
Snow: 0 = None; 1 = On site; 2 = High ground

2.5 Breeding Raptor Survey

Timings and weather conditions during the breeding raptor surveys are presented in Table 2-7 below.

Table 2-7: Breeding Raptor Survey – Timings and Weather Conditions

Date	Visit	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
09/04/24	1	10:30	13:30	1	5	WNW	0	8	2	2	0	0
				2	5	WNW	0	8	2	2	0	0
				3	5	WNW	0	8	2	2	0	0
11/04/24	1	08:20	14:35	1	4	WSW	0	1	2	2	0	0
				2	5	WSW	0	2	2	2	0	0
				3	5	WSW	0	2	2	2	0	0
				4	5	WSW	0	2	2	2	0	0
				5	5	WSW	0	2	2	2	0	0
				6	4	WSW	0	2	2	2	0	0
12/04/24	1	06:45	12:45	1	2	SW	0	3	2	2	0	0
				2	2	SW	0	3	2	2	0	0
				3	3	WSW	0	4	2	2	0	0
				4	3	W	0	5	2	2	0	0
				5	4	WSW	0	5	2	2	0	0
				6	5	W	0	5	2	2	0	0
06/05/24	2	13:00	16:00	1	3	WNW	0	8	2	2	0	0
				2	3	WNW	0	8	2	2	0	0
				3	4	WNW	0	8	2	2	0	0
10/05/24	2	07:10	10:00	1	2	SW	0	5	2	2	0	0
				2	2	SW	0	5	2	2	0	0
				3	3	SW	0	4	2	2	0	0
13/05/24	2	14:45	17:45	1	1	NE	0	8	2	2	0	0
				2	1	NE	0	8	2	2	0	0
				3	1	NE	0	8	2	2	0	0
27/05/24	2	15:00	18:00	1	3	W	0	8	2	2	0	0
				2	3	W	0	8	2	2	0	0
				3	3	W	0	8	2	2	0	0
27/06/24	3	17:00	20:00	1	4	S	0	8	2	2	0	0
				2	4	S	2	8	2	2	0	0
				3	4	S	0	7	2	2	0	0
28/06/24	3	13:00	16:00	1	4	SW	0	6	2	2	0	0
				2	4	SW	2	6	2	2	0	0
				3	4	SW	0	7	2	2	0	0

Date	Visit	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
16/07/24	4	15:00	18:00	1	3	SW	0	6	2	2	0	0
				2	3	SW	0	6	2	2	0	0
				3	3	SW	0	8	2	2	0	0
19/07/24	4	08:00	14:00	1	3	S	0	8	1	1	0	0
				2	3	S	0	8	1	2	0	0
				3	3	S	0	8	2	2	0	0
				4	3	S	0	7	2	2	0	0
				5	3	S	0	7	2	2	0	0
				6	3	S	0	7	2	2	0	0

Wind speed: according to Beaufort Scale
Wind direction: according to 16-point compass
Cloud cover: in eights of sky (oktas)
Cloud height: 0 = <150m; 1 = 150-500m; 2 = >500m
Visibility: 0 = Poor (<1km); 1 = Moderate (1-2km); 2 = Good (>2km)
Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Heavy rain
Frost: 0 = None; 1 = Ground; 2 = All day
Snow: 0 = None; 1 = On site; 2 = High ground

WLC 22047 Ballach Ornithology
Technical Appendix 9.2
Collision Risk Assessment

21/07/2025

Prepared By:

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1 Introduction

This Technical Appendix of the Environmental Impact Assessment Report (EIAR) presents the avian Collision Risk Assessment (CRA) for Ballach Wind Farm (the Development). The CRA is based on the flight activity data collected by the surveys described in Chapter 9: Ornithology and Technical Appendix 9.1 of the EIAR. The baseline flight activity surveys for birds were carried out between October 2023 and August 2024 and between September 2017 and September 2019.

The risk of birds colliding with the turbine rotors has been assessed using a model described in NatureScot (2024) and Band (2024), which estimates the frequency of bird collisions with the turbine rotors. The collision risk is expressed as the estimated number of bird collisions that might collide with the wind farm during a specified period.

Collision risk is calculated in five stages:

- Stage 1: Bird survey data are used to quantify flight activity at rotor-swept height (RSH) in the vicinity of the turbines (i.e. the flight activity potentially at risk);
- Stage 2: Estimation of the potential number of bird passages through the rotor swept airspace in the specified period (e.g., season) based on the flight activity at RSH;
- Stage 3: Calculation of the average probability of collision during a single bird rotor transit;
- Stage 4: Estimation of the potential collision rate for the specified period, assuming no change in behaviour, and allowing for turbine down-time when turbines are not operational; and
- Stage 5: Application of an avoidance factor.

Finally, consideration is given to uncertainty surrounding the collision risk estimates to account for both variability and uncertainty in the input parameters. These include the flight activity data, limitations of the mathematical modelling of risk, and physical parameters of the operational turbines.

2 Stage 1: Flight activity

Stage 1 quantifies the bird flight activity at risk within the wind farm, based on the field data from the flight activity surveys. The method for calculating Stage 1 varies depending on whether the species' flight activity follows a regular predictable pattern, such as commuting routes from one location to another or is random, such as hunting activity by raptors.

The method for foraging raptors and other species with irregular patterns of flight activity requires the calculation of the amount of time birds are observed flying per unit of area or volume of air surveyed within a defined zone around the wind farm (D_A: the aerial bird density) and the proportion of birds flying at risk height (Q_{2R}). This quantity of flight activity is then applied to subsequent stages of the model.

The modelling method for birds with predictable (directional) flight activity, such as divers travelling from breeding lochans to feed at sea or on other inland water bodies or osprey traversing from resting sites to waterbody foraging sites, requires the calculation of the number of birds flying through a 'risk window' occupied by the turbines within the specified period (bird flux, which is derived from the observed mean traffic rate (MTR)).

The frequency and distribution of activity of target species recorded during the baseline flight activity surveys were reviewed to identify the species present for which the level of risk has the potential to be important. CRA has therefore been undertaken for:

- Golden plover;
- Golden eagle;
- Red kite; and
- White-tailed eagle.

Eleven other target species were recorded during the flight activity surveys, but there was very low frequency of observed activity at RSH within or close to the turbine envelope, such that quantification of risk based on the observations would result in predictions of negligible risk:

- Pink-footed goose and unidentified grey goose: one flight of 30 pink-footed geese and a skein of 30 unidentified grey geese flew high across the site above RSH in November 2018 and May 2019 respectively; a skein of 100 unidentified grey geese flew at RSH over 2 km to the east of the site;
- Whooper swan: one flight of two birds crossing the site at RSH in February 2018 and a flight of seven birds crossing the site at RSH in October 2018; four other flights of two or seven birds commuting below RSH between lochans within and to the east of the site;
- Black grouse: a single bird flew briefly at RSH across part of the site in November 2023;
- Curlew: seven flights of single, locally breeding birds within the site in 2018 and 2019, only one of which was at RSH while the remaining flights were below RSH;
- Snipe: three short flights of locally breeding, single birds in 2018 and 2019, only one of which was at RSH.

- Dunlin: just three birds together foraging in a wetland area in the site in November 2017; another bird was flushed on the drive to the VP in January 2019;
- Diver species: an unidentified diver was observed distantly flying low across Loch Ballach in March 2018;
- Grey heron: a single heron flew across the north of the site at RSH in June 2024;
- Hen harrier: single birds recorded flying across the site at RSH in October 2017 and October 2023; another was observed flying low to the south of the site after the survey in March 2018;
- Merlin: frequently observed between May 2018 and August 2019 and on one occasion in each of October 2023 and February 2024, but only four short flights of single birds were recorded at RSH; and
- Peregrine: only three flights of single birds recorded within the site in 2019, 2023 and 2024, none of which were at RSH.

The non-directional flight model method has been applied to golden plover, golden eagle, red kite and white-tailed eagle collision risk calculations, because those species exhibited non-directional flight activity within the proposed wind farm and surrounding area.

There were no species observed with sufficient directional flight activity to warrant collision risk modelling by this method.

2.1 Bird density

For the non-directional flight model, a 'wind farm polygon' (WP) or 'flight risk area' was defined by a boundary encompassing all terrain within 500 m of the turbines. Vantage point (VP) watches were undertaken during two periods: one year between October 2023 and August 2024; and over two years between September 2017 and September 2019. Observations were made during all surveys from the same three VPs designed to cover as much as possible of the WP. VPs were located at (Easting, Northing, view bearing):

- VP1: 241657, 847798, viewing 175° south;
- VP2: 242519, 846034, viewing 40° north-east; and
- VP3: 245109, 847733, viewing 190° south.

Viewsheds from each VP were calculated in a Geographical Information System (GIS) as the area visible 20 m above ground level from each VP and were restricted to a 180° arc of observation in front of the observer and to a maximum distance of 2 km from the VP. It was also possible for observers to record birds seen beyond the WP and also beyond this theoretical zone of visibility of the viewsheds.

The WP had an area of 1109.4 hectares (ha). Using viewing arcs of 180° from each of the three VPs, their combined viewshed calculated from the terrain model had an area of 901.4 ha, of which 725.1 ha was within the WP. There was limited (c. 18%) overlap between viewsheds and there is no significant difference in habitat between the three vantage point areas, so no related corrections or weightings have been made in the model.

The visibility of the airspace at RSH above the site is more than estimated in the viewsheds, which were calculated using a clearance of 20 m above ground level, compared with a lowest rotor swept height of 37 m for the Nordex 163/6.x turbine with a minimum hub height of 118.5m. However, to maintain precaution in the model the theoretical areas of visibility derived from the viewsheds were used in the model.

During the flight activity surveys in 2023-24, surveyors recorded the location of target species as flight lines on a large-scale map and recorded their estimated height at each 15-second interval while the bird(s) was in view. Flight height was recorded in consecutive height bands of 15 m above ground level.

During the flight activity surveys in 2017-19, surveyors recorded the location of target species as flight lines on a large-scale map and recorded exactly the amount of time spent flying within each height band as follows:

- A: <30 m;
- B: 30 – 180 m; and
- C: >180 m

Although in the first two months of survey in October and November 2017, the upper height band was set at 150 m. However, an average height was also ascribed to each section of flightline, allowing flights or parts of flights to be assigned to RSH or not RSH. In order to identify flights within the RSH or not at RSH, each individual flight record was reviewed and subsequently included in the CRA or not as appropriate, according to the method described below.

Two different turbine hub heights are proposed for the Development: 118.5 m hub height and 148.5 m hub height, with a rotor diameter of 163 m. The turbines will therefore have a lowest rotor swept height of 37 m and a maximum tip height of 230 m. The CRA has been carried out based on a precautionary measure, such that all flights recorded in height bands between 30 – 240 m (i.e. from 7 m below the lowest sweep of the turbine to 10 m above the tip height of the turbine) are included in the model to make allowances for potential error in flight height recording.

Flights can therefore be characterised into three height zones relative to the rotor swept height (RSH) of the proposed turbines:

- 0 – 30 m: below RSH;
- 30 – 240 m: at RSH; and
- >240 m: above RSH.

To provide flight activity data from the most representative area of the habitat within the site, spatial analysis of the recorded flight lines has therefore been undertaken to quantify the activity within the WP, which has subsequently been used in the CRA, as described below.

Only flight lines that intersected with the WP were selected for inclusion in the model. Any flight lines not intersecting with the WP were discarded. The following steps were then taken to estimate the amount of time that birds were observed flying at risk height within the WP from each VP:

- Each flight line was associated with its VP-viewshed polygon according to the VP from which it was recorded during the surveys.
- The total length of each flight line (L_{total}) and the length of each flight line occurring within the WP (L_{WP}) were calculated in a GIS.
- For each flight line, the duration at risk height within the WP (b) was calculated by multiplying the proportion of the length of flight line within the WP (L_{WP}/L_{total}) by the duration of the flight line recorded at risk height (RSH).

The bird density from each VP is calculated from the observed flight activity using the formula:

$D_{AVP} = b / (t \times A)$ birds m^{-2}

where:

(b) is the number of flight seconds observed from a vantage point in the specified period;
(t) is the time (in seconds) that the vantage point is watched during the period;
(A) is the area of the vantage point viewshed (km^2).

The latest NatureScot (2024) guidance makes use of a bespoke Microsoft Excel spreadsheet to calculate the collision risk, based on mean monthly bird density (D_A). However, as reasoned in the worked example in NatureScot (2024), where the number of watches is too few to give reliable month-by-month times in flight, data can be aggregated into periods, such as the breeding and non-breeding seasons, with the seasonal mean density value applied to each relevant monthly cell in the spreadsheet.

The surveys were scheduled to achieve a minimum of 36 hours of observations from each VP in each of the breeding and non-breeding seasons, which were defined at the outset by the periods April to August and September to March, respectively. Due to the extended breeding season and consequently shorter non-breeding season for eagles, this resulted in more than 36 hours of observations in each of the eagle breeding seasons, but fewer than 36 hours during the eagle non-breeding seasons. In non-breeding season 2017-18, there were 30 to 33 hours achieved at each VP; in 2018-19, there were 30 hours achieved at each VP; in 2023-24, there were 18-21 hours achieved at each VP. The estimated average density of birds flying at risk height in 2023-24 was similar to that recorded across the two non-breeding seasons 2017-19 (0.00091 vs 0.00075 birds/km^2). The estimated collision risk is presented below for each season based on all the seasonal survey data combined from the three years of survey.

For each analysis described above, a mean and standard deviation were calculated for each period (breeding and non-breeding). The standard deviation is calculated based on nine measurements of bird density (three VPs, each for three years), which gives an indication of the variability in the survey data.

The CRA provides a guide to assess the potential impact of additional collision mortality in a population and is not intended to predict absolutely the number of collisions that might occur because of the operation of the wind farm.

2.1.1 Golden plover

The observed flight activity of golden plover is shown in Table 1 and Table 2. Only those flight lines that intersected with the WP are used to quantify risk flight activity and derive bird density in the CRM.

*Table 1: Observed golden plover flight activity 2017-19; each row may represent one complete flight line, or different parts of the same flight line that were recorded within/outwith the viewshed, or at different heights**

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP (%)	Total duration at RSH within WP (seconds) (*b*)
17/10/2017	11:45	3	9	60	146	100.0	1314
17/10/2017	11:45	3	9	20	61	100.0	0
17/10/2017	11:58	3	5	50	101	100.0	505
17/10/2017	11:58	3	5	15	53	100.0	0
17/10/2017	12:17	3	6	60	131	100.0	786
23/10/2017	13:17	2	6	100	95	100.0	570
24/10/2017	15:30	1	42	120	90	93.7	3540
27/03/2018	11:07	2	3	20	5	100.0	0
27/03/2018	11:07	2	3	30	6	100.0	18
27/03/2018	11:07	2	3	10	9	100.0	0
27/03/2018	13:32	2	2	15	13	100.0	0
04/06/2018	07:50	1	1	2	6	100.0	0
07/06/2018	13:00	1	1	5	13	100.0	0
07/06/2018	13:00	1	1	5	21	100.0	0
07/06/2018	13:00	1	1	5	20	100.0	0
07/06/2018	13:00	1	1	5	16	100.0	0
15/06/2018	11:26	3	2	3	7	53.5	0

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP (%)	Total duration at RSH within WP (seconds) (*b*)
24/09/2018	10:31	3	39	120	218	89.7	7624
24/09/2018	10:31	3	39	200	77	100.0	3003
03/12/2018	12:58	3	3	50	37	0.0	0
15/01/2019	12:31	1	7	5	15	100.0	0
30/04/2019	10:57	2	2	20	27	100.0	0
20/06/2019	10:57	1	4	6	15	100.0	0

** Flight lines from data collected in 2017-19 were digitised by a third party; different parts of the recorded flight were split up according to the flight height or location relative to the viewshed.*

Table 2: Observed golden plover flight activity 2023-24

Date	Time	VP	Number of birds	Duration (seconds)	Duration of flight at RSH (seconds)	% within WP (%)	Total duration at RSH within WP (seconds) (*b*)
13/10/23	11:29	3	13	15	15	97.2	190
30/10/23	15:53	2	24	76	45	100.0	1080
19/12/23	12:26	3	27	332	152	62.7	2574
19/12/23	12:33	2	27	15	0	100.0	0
22/02/24	11:30	2	23	124	124	100.0	2852
22/02/24	11:32	2	15	15	15	100.0	225
22/02/24	11:32	2	38	106	106	100.0	4028
22/02/24	11:33	3	38	72	72	100.0	2736
22/02/24	11:39	2	1	42	42	100.0	42
22/02/24	13:07	3	12	44	15	100.0	180
23/02/24	10:40	3	24	85	15	0.0	0
28/03/24	13:20	3	10	100	55	87.0	479
06/05/24	16:27	3	2	24	0	89.9	0

Table 3 and Table 4 show the calculation of golden plover density in the breeding and non-breeding seasons based on the observations between 2017-19 and 2023-24.

Table 3: Golden plover flight activity density in the breeding season (April to August) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018	1	2.20	30	108,000	0	0

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018	2	3.50	30	108,000	18	0.000048
2018	3	2.80	30	108,000	0	0
2019	1	2.20	27	97,200	0	0
2019	2	3.50	27:45	99,900	0	0
2019	3	2.80	27	97,200	0	0
2024	1	2.20	36	129,600	0	0
2024	2	3.50	36	129,600	0	0
2024	3	2.80	36	129,600	479	0.000884
					Mean bird density	0.000103
					SD	0.000276

Table 4: Golden plover flight activity density in the non-breeding season (September to March) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2017/18	1	2.20	42	151,200	3,541	0.010621
2017/18	2	3.50	45	162,000	570	0.001005
2017/18	3	2.80	48	172,800	2,605	0.005377
2018/19	1	2.20	42	151,200	0	0.000000
2018/19	2	3.50	42	151,200	0	0.000000
2018/19	3	2.80	42	151,200	10,627	0.025068
2023/24	1	2.20	36	129,600	0	0
2023/24	2	3.50	36	129,600	8,227	0.016944
2023/24	3	2.80	36	129,600	5,680	0.010487

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
					Mean bird density	0.007722
					SD	0.008376

2.1.2 Golden eagle

The observed flight activity of golden eagle is shown in Table 5 and Table 6. Only the flight durations that intersected with the WP are used to quantify risk flight activity and derive bird density for the CRM.

*Table 5: Observed golden eagle flight activity 2017-19; each row may represent one complete flight line, or different parts of the same flight line that were recorded within/outwith the viewshed, or at different heights**

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
18/10/2017	12:38	2	1	120	196	100.0	196
18/10/2017	12:38	2	1	90	540	2.4	13
18/10/2017	15:03	2	1	10	8	100.0	0
20/10/2017	11:07	2	1	180	167	3.3	5
20/10/2017	11:07	2	1	110	16	100.0	16
20/10/2017	11:07	2	1	110	400	100.0	400
03/11/2017	12:30	1	1	100	254	88.7	225
03/11/2017	12:30	1	1	250	110	100.0	0
03/11/2017	12:30	1	1	250	106	100.0	0
03/11/2017	12:30	1	1	100	252	89.8	226
09/11/2017	11:58	1	1	80	177	0.0	0
27/12/2017	12:24	3	1	60	39	100.0	39

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
27/01/2018	10:17	3	1	75	195	86.9	170
26/02/2018	13:18	2	1	150	61	5.2	3
26/02/2018	13:18	2	1	120	213	100.0	213
26/02/2018	13:18	2	1	200	47	0.0	0
27/03/2018	14:32	2	1	200	193	0.0	0
17/04/2018	15:19	3	1	500	153	0.0	0
18/04/2018	12:33	2	1	500	253	0.0	0
18/04/2018	13:06	2	1	500	303	0.0	0
18/04/2018	13:10	2	1	100	84	0.0	0
19/04/2018	10:00	2	1	150	10	0.0	0
05/06/2018	15:02	2	1	300	131	7.8	0
05/06/2018	15:02	2	1	300	274	100.0	0
12/06/2018	13:28	1	1	250	173	84.6	0
24/07/2018	12:03	2	1	20	83	100.0	0
26/07/2018	07:11	3	1	100	318	92.3	293
28/08/2018	12:41	2	1	300	163	0.0	0
24/09/2018	11:38	3	1	60	24	100.0	24
24/09/2018	11:47	3	1	20	12	100.0	0
24/09/2018	11:47	3	1	60	41	100.0	41
24/09/2018	11:47	3	1	60	20	100.0	20
25/09/2018	09:14	2	1	160	138	100.0	138
25/09/2018	09:14	2	1	20	22	87.9	0
25/09/2018	09:15	2	1	160	70	100.0	70

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
06/11/2018	11:19	2	1	25	28	100.0	0
06/11/2018	11:24	2	1	40	54	100.0	54
01/12/2018	13:46	1	1	120	134	20.0	27
03/12/2018	13:49	3	1	60	63	100.0	63
03/12/2018	13:49	3	1	180	60	56.0	34
12/02/2019	14:06	3	1	120	119	49.8	59
12/02/2019	14:06	3	1	250	94	0.0	0
16/02/2019	11:39	2	1	350	118	95.6	0
04/03/2019	11:23	1	1	250	33	0.0	0
30/04/2019	11:43	2	1	250	131	0.0	0
09/05/2019	13:23	1	1	200	720	100.0	720
28/05/2019	12:58	3	2	250	85	0.0	0
28/05/2019	14:35	3	1	200	360	0.0	0
28/05/2019	14:35	3	1	200	180	0.0	0
28/05/2019	14:35	3	1	150	180	0.0	0
28/05/2019	14:35	3	1	200	45	0.0	0
01/07/2019	14:28	1	1	200	55	0.0	0
20/09/2019	10:05	3	1	40	45	91.3	41

** Flight lines from data collected in 2017-19 were digitised by a third party; different parts of the recorded flight were split up according to the flight height or location relative to the viewshed.*

Table 6: Observed golden eagle flight activity 2023-24

Date	Time	VP	Number of birds	Duration (seconds)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
30/10/2023	11:48	2	1	157	75	100.0	75
30/10/2023	11:49	2	1	122	90	100.0	90
30/10/2023	11:59	2	1	232	202	100.0	202
30/10/2023	14:40	2	1	227	227	100.0	227
20/02/2024	14:33	2	1	264	0	99.5	0
05/03/2024	16:15	3	1	180	45	77.4	35
27/05/2024	15:41	2	1	251	251	100.0	251
22/08/2024	15:17	1	1	277	262	81.9	215

Table 7 and Table 8 show the calculation of golden eagle density in the breeding and non-breeding seasons based on the observations between 2017-19 and 2023-24.

Table 7: Golden eagle flight activity density in the breeding season (February to August) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018	1	2.20	42	151,200	0	0
2018	2	3.50	42	151,200	216	0.000408
2018	3	2.80	45	162,000	293	0.000646
2019	1	2.20	39	140,400	720	0.002326
2019	2	3.50	39:45	143,100	0	0
2019	3	2.80	39	140,400	59	0.000151
2024	1	2.20	54	194,400	215	0.000501
2024	2	3.50	51	183,600	251	0.000390
2024	3	2.80	51	183,600	35	0.000068
					Mean bird density	0.000499
					SD	0.000682

Table 8: Golden eagle flight activity density in the non-breeding season (September to January) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2017/18	1	2.20	30	108,000	451	0.001896
2017/18	2	3.50	33	118,800	631	0.001516
2017/18	3	2.80	33	118,800	209	0.000626
2018/19	1	2.20	30	108,000	27	0.000112
2018/19	2	3.50	30	108,000	262	0.000693

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018/19	3	2.80	30	108,000	182	0.000600
2023/24	1	2.20	18	64,800	0	0
2023/24	2	3.50	21	75,600	594	0.002244
2023/24	3	2.80	21	75,600	0	0
					Mean bird density	0.000854
					SD	0.000789

2.1.3 Red kite

The observed flight activity of red kite is shown in Table 9 and Table 10. Only the flight durations that intersected with the WP are used to quantify risk flight activity and derive bird density for the CRM.

*Table 9: Observed red kite flight activity 2017-19; each row may represent one complete flight line, or different parts of the same flight line that were recorded within/outwith the viewshed, or at different heights**

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
18/10/2017	13:13	2	1	120	134	100.0	134
18/10/2017	13:13	2	1	170	25	26.8	7
19/10/2017	13:23	3	2	130	152	100.0	304
23/10/2017	12:57	2	1	70	97	100.0	97
23/10/2017	12:57	2	1	40	59	100.0	59
23/10/2017	12:57	2	1	80	211	100.0	211
23/10/2017	12:57	2	1	180	180	100.0	180
23/10/2017	12:57	2	1	25	106	100.0	0
23/10/2017	12:57	2	1	80	420	100.0	420
23/10/2017	14:01	2	1	50	175	100.0	175
23/10/2017	14:01	2	1	20	52	100.0	0
26/10/2017	11:07	3	3	40	506	18.6	283
01/11/2017	11:24	3	1	50	132	95.8	126
01/11/2017	11:24	3	1	25	78	100.0	0
03/11/2017	10:21	1	1	20	120	100.0	0
03/11/2017	10:21	1	1	20	55	100.0	0
03/11/2017	10:21	1	1	60	87	100.0	87

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
03/11/2017	10:21	1	1	50	138	100.0	138
03/11/2017	11:31	1	1	90	258	26.5	68
03/11/2017	11:31	1	1	90	188	56.4	106
03/11/2017	11:31	1	1	200	66	0.0	0
03/11/2017	11:31	1	1	200	126	0.0	0
03/11/2017	11:33	1	1	70	197	46.6	92
03/11/2017	11:33	1	1	70	200	47.5	95
03/11/2017	11:33	1	1	180	119	0.0	0
03/11/2017	11:33	1	1	180	115	0.0	0
03/11/2017	12:51	1	1	40	94	69.3	65
08/11/2017	10:36	1	1	50	167	28.4	47
29/11/2017	10:01	1	1	40	196	100.0	196
29/11/2017	10:13	1	1	200	60	55.9	34
29/11/2017	10:13	1	1	60	146	89.0	130
29/11/2017	10:13	1	1	20	53	100.0	0
29/11/2017	12:04	1	1	50	133	100.0	133
16/12/2017	11:49	1	1	70	186	100.0	186
19/02/2018	14:10	3	1	100	72	0.0	0
25/02/2018	11:05	1	1	80	57	100.0	57
25/02/2018	11:05	1	1	80	149	64.0	95
26/02/2018	10:31	2	1	150	63	90.9	57
26/02/2018	15:19	2	1	15	128	100.0	0
26/02/2018	15:19	2	1	50	56	40.1	22

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
26/02/2018	15:29	2	1	50	173	85.8	148
27/03/2018	14:02	2	1	30	31	100.0	31
27/03/2018	14:02	2	1	20	28	95.4	0
27/03/2018	14:02	2	1	20	14	100.0	0
17/04/2018	07:28	1	1	20	30	0.0	0
18/04/2018	10:34	3	1	20	12	100.0	0
19/04/2018	11:14	2	2	15	36	75.4	0
19/04/2018	14:56	1	1	20	18	100.0	0
19/04/2018	14:56	1	1	40	56	100.0	56
04/06/2018	14:51	3	1	20	72	100.0	0
04/06/2018	16:04	3	1	20	48	100.0	0
04/06/2018	16:04	3	1	50	68	100.0	68
05/06/2018	08:21	3	1	10	78	100.0	0
05/06/2018	10:42	3	1	40	12	100.0	12
05/06/2018	10:42	3	1	70	42	74.3	31
05/06/2018	10:42	3	1	40	33	100.0	33
05/06/2018	11:13	3	1	50	29	0.0	0
05/06/2018	14:07	2	1	50	73	100.0	73
05/06/2018	14:07	2	1	10	61	100.0	0
05/06/2018	14:36	2	1	40	39	100.0	39
05/06/2018	14:36	2	1	10	92	100.0	0
05/06/2018	14:36	2	1	50	40	100.0	40
07/06/2018	08:40	2	1	20	63	100.0	0

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
07/06/2018	12:05	2	2	185	43	46.0	40
07/06/2018	12:05	2	2	60	15	100.0	30
07/06/2018	12:05	2	2	150	20	100.0	40
07/06/2018	12:05	2	2	40	363	100.0	726
07/06/2018	12:05	2	2	190	180	100.0	360
07/06/2018	12:05	2	1	40	363	100.0	363
07/06/2018	12:05	2	1	190	180	100.0	180
07/06/2018	12:05	2	2	60	23	100.0	46
07/06/2018	12:07	2	1	190	73	100.0	73
07/06/2018	12:07	2	1	40	201	100.0	201
12/06/2018	09:02	2	1	20	63	100.0	0
12/06/2018	09:02	2	1	60	47	100.0	47
18/10/2017	13:13	2	1	120	134	100.0	134
12/06/2018	11:32	2	1	10	123	100.0	0
13/06/2018	13:08	2	1	10	21	100.0	0
13/06/2018	14:23	2	1	10	34	100.0	0
15/06/2018	12:17	3	1	40	28	100.0	28
15/06/2018	13:08	3	1	60	73	0.0	0
25/07/2018	13:24	3	2	40	36	0.0	0
26/07/2018	09:31	3	1	40	36	100.0	36
26/07/2018	09:31	3	1	40	6	100.0	6
26/07/2018	09:31	3	1	40	23	100.0	23
15/08/2018	12:36	3	1	40	38	0.0	0

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
15/08/2018	12:36	3	1	20	13	0.0	0
18/09/2018	15:08	1	1	35	45	85.2	38
18/09/2018	15:08	1	1	8	41	100.0	0
18/09/2018	15:11	1	1	150	137	0.0	0
24/09/2018	10:32	3	1	28	25	100.0	0
24/09/2018	13:43	3	1	80	166	100.0	166
25/09/2018	13:13	2	1	200	39	100.0	39
25/09/2018	13:13	2	1	165	34	100.0	34
17/10/2018	10:41	3	1	15	126	94.3	0
17/10/2018	11:21	3	1	40	67	100.0	67
17/10/2018	11:21	3	1	10	131	77.0	0
17/10/2018	11:21	3	1	50	34	67.4	23
17/10/2018	13:05	1	1	60	23	100.0	23
17/10/2018	13:05	1	1	40	72	100.0	72
18/10/2018	12:25	2	1	40	72	100.0	72
28/10/2018	10:49	2	1	250	120	100.0	0
06/11/2018	11:49	1	3	20	31	100.0	0
06/11/2018	11:49	1	1	20	17	93.3	0
06/11/2018	11:49	1	2	20	26	100.0	0
07/11/2018	10:48	3	1	60	73	100.0	73
07/11/2018	11:49	2	1	20	53	100.0	0
07/11/2018	13:24	2	1	100	48	100.0	48
07/11/2018	13:24	2	1	30	18	100.0	18

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
08/11/2018	11:51	3	1	30	53	50.9	27
08/11/2018	11:51	3	1	60	33	49.9	16
08/11/2018	11:51	3	1	20	143	100.0	0
08/11/2018	11:51	3	1	60	122	0.0	0
08/11/2018	11:51	3	1	30	12	0.0	0
08/11/2018	11:53	3	1	20	31	0.0	0
08/11/2018	11:53	3	1	70	71	0.0	0
03/12/2018	10:13	3	1	20	55	100.0	0
03/12/2018	10:13	3	1	35	11	100.0	11
03/12/2018	12:54	3	1	40	43	26.1	11
03/12/2018	12:54	3	1	40	77	0.0	0
03/12/2018	12:54	3	1	20	315	0.0	0
03/12/2018	12:54	3	1	5	60	0.0	0
16/01/2019	11:52	3	1	10	203	100.0	0
16/01/2019	14:51	3	1	20	27	100.0	0
16/02/2019	11:01	2	1	70	205	92.1	189
07/03/2019	13:41	2	1	50	81	100.0	81
07/03/2019	13:41	2	1	20	21	100.0	0
19/03/2019	12:21	2	1	40	30	100.0	30
10/04/2019	15:35	3	1	200	90	0	0
28/05/2019	13:06	3	1	40	15	100.0	15
28/05/2019	13:06	3	1	35	10	100.0	10
28/05/2019	13:06	3	1	10	40	100.0	0

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
28/05/2019	14:38	3	1	25	45	9.7	0
28/05/2019	14:38	3	1	150	120	0.0	0
30/05/2019	11:28	2	1	40	31	100.0	31
30/05/2019	11:28	2	1	35	73	100.0	73
30/05/2019	11:28	2	1	10	46	100.0	0
06/06/2019	16:51	2	1	20	37	0.0	0
28/06/2019	12:11	2	1	120	30	100.0	30
05/07/2019	11:19	1	1	40	280	100.0	280
20/09/2019	13:37	3	1	180	20	100.0	20
20/09/2019	13:37	3	1	200	190	78.4	149
20/09/2019	13:39	3	1	200	55	0.0	0
20/09/2019	14:19	3	1	220	168	65.2	110
20/09/2019	14:19	3	1	100	30	16.0	5

** Flight lines from data collected in 2017-19 were digitised by a third party; different parts of the recorded flight were split up according to the flight height or location relative to the viewshed.*

Table 10: Observed red kite flight activity 2023-24

Date	Time	VP	Number of birds	Duration (seconds)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
12/10/23	10:49	1	1	229	0	100.0	0
12/10/23	11:36	1	2	275	275	100.0	550
12/10/23	13:51	1	1	78	78	100.0	78
12/10/23	14:21	1	1	116	116	100.0	116
12/10/23	15:02	1	1	372	117	100.0	117
12/10/23	15:10	1	1	26	0	100.0	0
12/10/23	15:16	1	2	74	74	100.0	148
13/10/23	11:36	3	1	35	0	100.0	0
13/10/23	11:44	3	1	187	0	100.0	0
13/10/23	12:10	3	1	176	60	100.0	60
13/10/23	12:11	3	1	111	0	100.0	0
28/11/23	13:45	1	1	707	45	100.0	45
28/11/23	13:47	1	3	542	90	100.0	270
19/12/23	12:16	3	1	92	0	100.0	0
19/12/23	12:18	3	1	57	0	100.0	0
19/12/23	12:21	3	2	311	0	100.0	0
19/12/23	12:37	3	1	150	0	100.0	0
19/12/23	12:40	3	1	112	0	100.0	0
19/12/23	13:01	3	1	402	0	100.0	0
19/12/23	13:22	3	1	286	0	100.0	0
19/12/23	13:32	3	1	477	0	100.0	0
20/02/24	13:26	2	1	223	223	100.0	223

Date	Time	VP	Number of birds	Duration (seconds)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
20/02/24	13:48	3	3	134	134	100.0	402
20/02/24	13:50	3	1	102	102	100.0	102
20/02/24	14:02	1	1	98	0	31.8	0
20/02/24	14:04	2	1	159	69	90.4	62
20/02/24	14:42	3	1	122	30	100.0	30
20/02/24	14:50	3	1	118	0	100.0	0
20/02/24	14:56	1	1	340	210	60.2	126
20/02/24	15:08	3	2	458	0	100.0	0
20/02/24	15:49	3	1	49	49	100.0	49
21/02/24	13:45	2	1	77	30	100.0	30
22/02/24	14:09	1	2	190	190	100.0	380
23/02/24	10:12	1	1	46	16	100.0	16
23/02/24	10:32	1	1	257	227	100.0	227
23/02/24	10:32	3	1	130	115	100.0	115
05/03/24	13:46	2	1	48	48	100.0	48
05/03/24	13:50	3	1	133	118	100.0	118
12/04/24	09:46	3	1	113	98	100.0	98
12/04/24	11:53	3	1	136	0	100.0	0
12/04/24	12:08	3	1	288	186	100.0	186
23/04/24	17:23	1	1	285	270	91.1	246
26/06/24	15:43	3	1	220	175	100.0	175
22/08/24	13:26	3	1	186	0	100.0	0

Table 11 and Table 12 show the calculation of red kite density in the breeding and non-breeding seasons based on the observations between 2017-19 and 2023-24.

Table 11: Red kite flight activity density in the breeding season (March to July) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018	1	2.20	30	108,000	56	0.000235
2018	2	3.50	30	108,000	2,289	0.006051
2018	3	2.80	30	108,000	237	0.000783
2019	1	2.20	27	97,200	280	0.001307
2019	2	3.50	27:30	99,900	245	0.000700
2019	3	2.80	30	108,000	25	0.000083
2024	1	2.20	30	108,000	246	0.000949
2024	2	3.50	27	97,200	48	0.000132
2024	3	2.80	30	108,000	577	0.001278
					Mean bird density	0.001280
					SD	0.001742

Table 12: Red kite flight activity density in the non-breeding season (August to February) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2017/18	1	2.20	36	129,600	1529	0.005352
2017/18	2	3.50	39	140,400	1511	0.003073
2017/18	3	2.80	42	151,200	713	0.001682
2018/19	1	2.20	42	151,200	133	0.000400
2018/19	2	3.50	42	151,200	400	0.000755

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018/19	3	2.80	42	151,200	395	0.000931
2023/24	1	2.20	30	108,000	2073	0.008001
2023/24	2	3.50	33	118,800	315	0.000709
2023/24	3	2.80	30	108,000	758	0.001679
					Mean bird density	0.002509
					SD	0.002431

2.1.4 White-tailed eagle

The observed flight activity of white-tailed eagle is shown in Table 13**Error! Reference source not found.**. There was no observed activity of white-tailed eagles during the surveys in 2023-24. Only the flight durations that intersected with the WP are used to quantify risk flight activity and derive bird density for the CRM.

*Table 13: Observed white-tailed eagle flight activity 2017-19; each row may represent one complete flight line, or different parts of the same flight line that were recorded within/outwith the viewshed, or at different heights**

Date	Time	VP	Number of birds	Average height a.g.l. (m)	Duration of flight at RSH (seconds)	% within WP/ viewshed (%)	Total duration at RSH within WP/viewshed (seconds) (*b*)
17/10/2017	13:20	3	1	100	247	247.0	0
17/10/2017	13:20	3	1	100	324	324.0	0
17/10/2017	13:20	3	1	180	135	75.0	0
26/01/2018	14:09	1	1	120	347	289.2	0

** Flight lines from data collected in 2017-19 were digitised by a third party; different parts of the recorded flight were split up according to the flight height or location relative to the viewshed.*

Table 14 and Table 15 show the calculation of white-tailed eagle density in the breeding and non-breeding seasons based on the observations between 2017-19 and 2023-24.

Table 14: White-tailed eagle flight activity density in the breeding season (February to August) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2018	1	2.20	42	151,200	0	0
2018	2	3.50	42	151,200	0	0
2018	3	2.80	45	162,000	0	0
2019	1	2.20	39	140,400	0	0

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2019	2	3.50	39:45	143,100	0	0
2019	3	2.80	39	140,400	0	0
2024	1	2.20	54	194,400	0	0
2024	2	3.50	51	183,600	0	0
2024	3	2.80	51	183,600	0	0
					Mean bird density	0
					SD	0

Table 15: White-tailed eagle flight activity density in the non-breeding season (September to January) based on observations between 2017-19 and 2023-24

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2017/18	1	2.20	30	108,000	310	0.001300
2017/18	2	3.50	33	118,800	0	0
2017/18	3	2.80	33	118,800	702	0.002108
2018/19	1	2.20	30	108,000	0	0
2018/19	2	3.50	30	108,000	0	0
2018/19	3	2.80	30	108,000	0	0
2023/24	1	2.20	18	64,800	0	0
2023/24	2	3.50	21	75,600	0	0

Year	VP	Viewshed area within WP (km^2) (*A*)	Watch duration (hours)	Watch duration (seconds) (*t*)	Duration in flight (bird-secs)	Density (birds/km^2) (D_A)
2023/24	3	2.80	21	75,600	0	0
					Mean bird density	0.000379
					SD	0.000734

2.2 Flight height

The model requires the input variable of bird density (D_A), which is a function of the observed bird flight activity, as described above. Some flight activity in the vicinity of the turbines (in this model, within the WP) will not be at risk because it occurs either above or below the RSH. The proportion of birds flying at risk height (Q_{2R}) is the proportion of birds within the RSH (between the lowest and highest points of a rotor), measured relative to the rotor base. Q_{2R} can be derived in two ways.

Firstly, it can be calculated as the proportion of total bird duration in flight (flight activity) that occurs at RSH, then Q_{2R} will be a value between 0 and 1, where 0 is no flight activity observed at RSH and 1 is all flight activity observed at RSH. Q_{2R} is then multiplied by the bird density derived from all flight activity (below, at and above RSH) in the model spreadsheet. The second method is to calculate the input variable of bird density (D_A) using only the duration of observed flight activity at RSH. For this method, Q_{2R} is set to a value of 1 (100%) in the spreadsheet. This second method has been used in this CRA for Ballach because the observed flight activity may be different within the wind farm area (WP) and outside it where the open moorland rises steeply in some places to small peaks. The model only includes those flight lines that intersect with the WP, so it is more appropriate to use the duration of observed flight activity at RSH directly in the bird density calculation.

2.3 Stage 1 CRM bird density

Table 16 and Table 17 show the monthly bird densities (D_A) for input to the model spreadsheet. As discussed above, Q_{2R} was set to 100%.

Table 16: Stage 1 data input to spreadsheet (January to June)

	Monthly bird density (bird-secs/km^2)					
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Golden plover	0.007722	0.007722	0.007722	0.000103	0.000103	0.000103
Golden eagle	0.000854	0.000499	0.000499	0.000499	0.000499	0.000499
Red kite	0.002509	0.002509	0.001280	0.001280	0.001280	0.001280
White-tailed eagle	0.000379	0	0	0	0	0

Table 17: Stage 1 data input to spreadsheet (July to December)

	Monthly bird density (bird-secs/km^2)					
Species	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Golden plover	0.000103	0.000103	0.007722	0.007722	0.007722	0.007722
Golden eagle	0.000499	0.000499	0.000854	0.000854	0.000854	0.000854
Red kite	0.001280	0.002509	0.002509	0.002509	0.002509	0.002509
White-tailed eagle	0	0	0.000379	0.000379	0.000379	0.000379

3 Stage 2 to Stage 5: Estimating the collision risk

The NatureScot spreadsheet (NatureScot, 2024) requires the input of a number of bird and wind farm parameters to estimate the risk of collision based on the bird density calculated in Stage 1. The input parameters used in Stage 2 to Stage 5 of the model are shown in Table 18 and Table 19.

3.1 Bird model parameters

Table 18: Model parameters for bird species

Parameter	Value: golden plover	Value: golden eagle	Value: red kite	Value: white-tailed eagle
Breeding season	Apr – Aug	Feb – Aug	Mar – Jul	Feb – Aug
Non-breeding season	Sep – Mar	Sep – Jan	Aug – Feb	Sep – Jan
Length (m)	0.28	0.815	0.63	0.80
Wingspan (m)	0.72	2.12	1.85	2.20
Flight speed (m/s)	17.9	15	11	12
Flight type	Flapping	Gliding	Gliding	Gliding
% of flights upwind/downwind (%)	50	50	50	50
Nocturnal activity factor	2 (25 %)	1 (0 %)	1 (0 %)	1 (0 %)
Avoidance rate (%)	98.0	99.0	99.0	95.0

Seasonality was defined with reference to the *Breeding Seasons for Scotland's Birds* spreadsheet published by SNH (now NatureScot) (2014). Potentially active daytime and night-time hours during each month were calculated by the NatureScot (2024) spreadsheet using the wind farm latitude.

Biological parameters (length, wingspan and flight speed) were obtained from Provan and Whitfield (2006). The flight type chosen for the model for eagles and red kite was gliding as they are most likely to be soaring with little use of flapping flight when roaming the wind farm area at potential risk height (>37 m). The flight type chosen for golden plover was flapping.

Golden eagle, red kite and white-tailed eagle are not expected to make nocturnal flights, so the nocturnal activity factor is set to 1 (0% flight activity at night). Golden plover are likely to fly at night, but to a limited extent relative to diurnal activity, so the nocturnal activity factor is set to 2 (25% extra activity at night).

Avoidance rates used were obtained from NatureScot (2025).

3.2 Wind farm model parameters

The CRM has been conducted using appropriate parameters for the wind farm and candidate turbine, Nordex N163/6.x. No large array correction was applied in the model.

Two of the turbine parameters used in the modelling process, the angle of pitch and rotational speed of the rotors, vary depending upon wind conditions. For the purposes of this assessment, a mean rotational speed has been used (8.2 rpm; 7.3 seconds per revolution) and a typical angle of pitch has been selected (15°).

Birds are extremely unlikely to be at risk from collision with a stationary turbine structure and a reduction factor is applied in the model to account for operational turbine down-time. The assumption has been made that turbines will be operational for 85% of the time (15% down-time) in all months. An alternative scenario based on WindPRO data has also been applied, with 40% operational time (60% down-time).

Table 19: Model parameters for the wind farm

Parameter	Value
Wind farm latitude (°)	57.49
Wind farm width (km)	4.4
Number of turbines	20
Rotor radius (m)	81.5
Number of rotor blades per turbine	3
Hub height (m)	118.5 and 149.5
Max blade width (m)	4.3
Blade pitch (°)	15
Rotation speed (rpm)	8.2

Parameter	Value
Risk height range (output) (m)	37-230
Operational down-time (%)	15% and 60%

4 CRM outputs

The details of the collision risk calculations for golden plover, golden eagle, red kite and white-tailed eagle are set out in Table 20: CRM spreadsheet for golden plover

COLLISION RISK MODEL		Required input data is in	orange	boxes													
		Calculated output is in	blue	boxes													
			green	boxes are for information only, to show variables used at each stage													
		Value	Units				Value	Units						Value	Units		
Bird data				**Windfarm data**					**Turbine data**								
Species name		**Golden Plover**		Site name			**Ballach**		Model		**Nordex N163/6.x**						
Bird length	L	0.28	m	Latitude			57.4863	degrees	Hub height		118.5	m					
Wingspan	W	0.72	m	No of turbines	T		20		Rotor radius	R	81.5	m					
Bird flight speed	v	17.9	m s^{-1}	Width of windfarm	w		4.4	km	No of blades	b	3						
Flight type, flapping or gliding		flapping							Rotation speed	Ω	8.2	rpm					
% of flights upwind/downwind		50%	50%						Max blade width	C	4.3	m					
Nocturnal activity ranking 1-5		2							Blade pitch	λ	15	degrees					
Nocturnal activity factor	f_{night}	25%							Risk height range		37-200	m					
normal approach		Set to 'normal approach' to use survey data on bird density															
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A															
Stage A					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2		0.007722	0.007722	0.007722	0.000103	0.000103	0.000103	0.000103	0.000103	0.007722	0.007722	0.007722	0.007722	0.0045
Proportion at rotor risk height	Q_{2R}	100.00%															
At latitude 57.5		Daylight hours per month			228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3
		Nighttime hours per month			515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7
Stage B																	
No of turbines	T	20															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		417345													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	17.9	m s^{-1}		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits			455.4	465.0	585.8	8.6	9.8	9.9	10.0	9.2	598.3	544.9	461.3	436.5	**3595**
Stage C																	
No of blades	b	3				Bird length	l	0.28	m								
Rotation speed	Ω	8.2	rpm			Wingspan	w	0.72	m								
Rotor radius	R	81.5	m			Bird flight speed	v	17.9	m s^{-1}								
Max blade width	C	4.3	m			Flight type		flapping									
Pitch	λ	15	degrees	% of flights upwind/downwind				50%	50%								
Blade profile		see Blade profile sheet															
		Single transit risk		upwind	5.41%												
				downwind	2.66%												
				weighted mean	**4.03%**												
Stage D					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}				85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
					Collision rates before avoidance												year total
					15.62	15.94	20.09	0.29	0.33	0.34	0.34	0.32	20.52	18.69	15.82	14.97	**123**
Stage E																	
Allow for large array correction?		No															
Width of windfarm	w	4.4	km														
			large array correction		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
					Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%		0.78	0.80	1.00	0.01	0.02	0.02	0.02	0.02	1.03	0.93	0.79	0.75	**6.16**
		98.00%	100.00%		0.31	0.32	0.40	0.01	0.01	0.01	0.01	0.01	0.41	0.37	0.32	0.30	**2.47**
		99.00%	100.00%		0.16	0.16	0.20	0.00	0.00	0.00	0.00	0.00	0.21	0.19	0.16	0.15	**1.23**
		99.50%	100.00%		0.08	0.08	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.09	0.08	0.07	**0.62**

Table 21,

Table 22: CRM spreadsheet for red kite

COLLISION RISK MODEL		Required input data is in	orange	boxes													
		Calculated output is in	blue	boxes													
			green	boxes are for information only, to show variables used at each stage													
		Value	Units					Value	Units					Value	Units		
Bird data				**Windfarm data**								**Turbine data**					
Species name		**Red Kite**		Site name				**Ballach**				Model		**Nordex N163/6.x**			
Bird length	L	0.63	m	Latitude				57.4863	degrees			Hub height		118.5	m		
Wingspan	W	1.85	m	No of turbines	T			20				Rotor radius	R	81.5	m		
Bird flight speed	v	11	m s^{-1}	Width of windfarm	w			4.4	km			No of blades	b	3			
Flight type, flapping or gliding		gliding										Rotation speed	Ω	8.2	rpm		
% of flights upwind/downwind		50%	50%									Max blade width	C	4.3	m		
Nocturnal activity ranking 1-5		1										Blade pitch	λ	15	degrees		
Nocturnal activity factor	f_{night}	0%										Risk height range		37-200	m		
normal approach		Set to 'normal approach' to use survey data on bird density															
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A															
Stage A					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2		0.002509	0.002509	0.00128	0.00128	0.00128	0.00128	0.00128	0.002509	0.002509	0.002509	0.002509	0.002509	0.0020
Proportion at rotor risk height	Q_{2R}	100.00%															
At latitude 57.5		Daylight hours per month			228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3
		Nighttime hours per month			515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7
Stage B																	
No of turbines	T	20															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		417345													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11	m s^{-1}		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits			58.1	66.8	47.4	55.6	66.6	69.7	69.7	120.6	98.2	82.0	61.7	53.1	**849**
Stage C																	
No of blades	b	3				Bird length	l	0.63	m								
Rotation speed	Ω	8.2	rpm			Wingspan	w	1.85	m								
Rotor radius	R	81.5	m			Bird flight speed	v	11	m s^{-1}								
Max blade width	C	4.3	m			Flight type		gliding									
Pitch	λ	15	degrees	% of flights upwind/downwind				50%	50%								
Blade profile		see Blade profile sheet															
		Single transit risk		upwind	8.18%												
				downwind	4.38%												
				weighted mean	**6.28%**												
Stage D					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}				85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
					Collision rates before avoidance												year total
					3.10	3.57	2.53	2.97	3.56	3.72	3.72	6.44	5.24	4.38	3.30	2.83	**45**
Stage E																	
Allow for large array correction?		No															
Width of windfarm	w	4.4	km														
			large array correction		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
					Collision rates allowing for avoidance												
Avoidance rates modelled		95.00%	100.00%		0.16	0.18	0.13	0.15	0.18	0.19	0.19	0.32	0.26	0.22	0.16	0.14	**2.27**
		98.00%	100.00%		0.06	0.07	0.05	0.06	0.07	0.07	0.07	0.13	0.10	0.09	0.07	0.06	**0.91**
		99.00%	100.00%		0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.06	0.05	0.04	0.03	0.03	**0.45**
		99.50%	100.00%		0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.01	**0.23**

Table 23, Table 22 and Table 23.

In summary, the estimated collision risk based on 15% operational down-time is:

- **Golden plover: 2.5 birds/year; 98.7% of which is in the non-breeding season.**
- **Golden eagle: 0.18 birds/year, or one golden eagle every 5.4 years; 43% is in the non-breeding season, 57% in the breeding season.**
- **Red kite: 0.43 birds/year, or one red kite every 2.3 years; 64% is in the non-breeding season, 36% in the breeding season.**
- **White-tailed eagle: 0.16 birds/year, or one white-tailed eagle every 6.4 years; all risk is in the non-breeding season.**

The estimated collision risk based on 60% operational down-time is:

- **Golden plover: 1.2 birds/year; 98.7% of which is in the non-breeding season.**
- **Golden eagle: 0.09 birds/year, or one golden eagle every 11.6 years; 43% is in the non-breeding season, 57% in the breeding season.**
- **Red kite: 0.20 birds/year, or one red kite every 5.0 years; 64% is in the non-breeding season, 36% in the breeding season.**
- **White-tailed eagle: 0.07 birds/year, or one white-tailed eagle every 13.7 years; all risk is in the non-breeding season.**

4.1 Uncertainty

There are a number of sources of variability and uncertainty in the estimation of collision risk using the method described above, as described in NatureScot (2024), including variation in the sample of flight activity survey data, biases in flight height estimation, limitations of the relatively simple modelling assumptions about bird behaviour, and variation in bird parameters and operational parameters of the turbines. Many of these variabilities and uncertainties are not quantifiable with current knowledge, therefore judgement is made qualitatively regarding a 'best estimate' of confidence around the collision risk estimate described above.

In this case the bird densities at risk height in each season from each VP are highly variable with several zero values, therefore as a qualitative estimate, we consider here that the bird density at risk height could vary by up to 100%. There is reasonable certainty that there will be no nocturnal activity. We also allow for 20% uncertainty due to simplifications in the model (as per NatureScot, 2024).

The collision risk estimates above may therefore be given a relative range of ± 1.2 (based on 15% operational down-time):

- Golden plover: 5.4 birds/year; 98.7% of which is in the non-breeding season.
- Golden eagle: 0.40 birds/year, or one golden eagle every 2.5 years; 43% is in the non-breeding season, 57% in the breeding season.
- Red kite: 0.94 birds/year, or one red kite every 1.1 years; 64% is in the non-breeding season, 36% in the breeding season.
- White-tailed eagle: 0.34 birds/year, or one white-tailed eagle every 2.9 years; all risk is in the non-breeding season.

Or (based on 60% operational down-time):

- Golden plover: 2.6 birds/year; 98.7% of which is in the non-breeding season.

- Golden eagle: 0.19 birds/year, or one golden eagle every 5.3 years; 43% is in the non-breeding season, 57% in the breeding season.
- Red kite: 0.44 birds/year, or one red kite every 2.3 years; 64% is in the non-breeding season, 36% in the breeding season.
- White-tailed eagle: 0.16 birds/year, or one white-tailed eagle every 6.2 years; all risk is in the non-breeding season.

Table 20: CRM spreadsheet for golden plover

COLLISION RISK MODEL		Required input data is in	orange	boxes																			
		Calculated output is in	blue	boxes																			
			green	boxes are for information only, to show variables used at each stage																			
		Value	Units					Value	Units								Value	Units					
Bird data				**Windfarm data**										**Turbine data**									
Species name		**Golden Plover**		Site name				**Ballach**						Model		**Nordex N163/6.x**							
Bird length	L	0.28	m	Latitude				57.4863	degrees					Hub height			118.5	m					
Wingspan	W	0.72	m	No of turbines	T			20						Rotor radius	R		81.5	m					
Bird flight speed	v	17.9	m s^{-1}	Width of windfarm	w			4.4	km					No of blades	b		3						
Flight type, flapping or gliding		flapping												Rotation speed	Ω		8.2	rpm					
% of flights upwind/downwind		50%	50%											Max blade width	C		4.3	m					
Nocturnal activity ranking 1-5		2												Blade pitch	λ		15	degrees					
Nocturnal activity factor	f_{night}	25%												Risk height range			37-200	m					
normal approach		Set to 'normal approach' to use survey data on bird density																					
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A																					
Stage A						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge					
Daytime bird density	D_A		birds/km^2			0.007722	0.007722	0.007722	0.000103	0.000103	0.000103	0.000103	0.000103	0.007722	0.007722	0.007722	0.007722	0.0045					
Proportion at rotor risk height	Q_{2R}	100.00%																					
At latitude 57.5		Daylight hours per month				228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3					
		Nighttime hours per month				515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7					
Stage B																							
No of turbines	T	20																					
Rotor radius	R	81.5	m																				
		Total rotor frontal area m^2		417345																			
Nocturnal activity factor	f_{night}	25%																					
Bird flight speed	v	17.9	m s^{-1}			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total					
		Projected number of rotor transits				455.4	465.0	585.8	8.6	9.8	9.9	10.0	9.2	598.3	544.9	461.3	436.5	**3595**					
Stage C																							
No of blades	b	3					Bird length	l	0.28	m													
Rotation speed	Ω	8.2	rpm				Wingspan	w	0.72	m													
Rotor radius	R	81.5	m				Bird flight speed	v	17.9	m s^{-1}													
Max blade width	C	4.3	m				Flight type		flapping														
Pitch	λ	15	degrees			% of flights upwind/downwind			50%	50%													
Blade profile		see Blade profile sheet																					
		Single transit risk		upwind	5.41%																		
				downwind	2.66%																		
				weighted mean	**4.03%**																		
Stage D						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge					
Proportion of time operational	Q_{op}					85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%					
						Collision rates before avoidance												year total					
						15.62	15.94	20.09	0.29	0.33	0.34	0.34	0.32	20.52	18.69	15.82	14.97	**123**					
Stage E																							
Allow for large array correction?		No																					
Width of windfarm	w	4.4	km																				
			large array correction			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year					
						Collision rates allowing for avoidance																	
Avoidance rates modelled		95.00%	100.00%			0.78	0.80	1.00	0.01	0.02	0.02	0.02	0.02	1.03	0.93	0.79	0.75	**6.16**					
		98.00%	100.00%			0.31	0.32	0.40	0.01	0.01	0.01	0.01	0.01	0.41	0.37	0.32	0.30	**2.47**					
		99.00%	100.00%			0.16	0.16	0.20	0.00	0.00	0.00	0.00	0.00	0.21	0.19	0.16	0.15	**1.23**					
		99.50%	100.00%			0.08	0.08	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.09	0.08	0.07	**0.62**					

Table 21: CRM spreadsheet for golden eagle

COLLISION RISK MODEL		Required input data is in		orange	boxes																			
		Calculated output is in		blue	boxes																			
				green	boxes are for information only, to show variables used at each stage																			
		Value	Units						Value	Units								Value	Units					
Bird data					**Windfarm data**												**Turbine data**							
Species name		**Golden Eagle**			Site name				**Ballach**								Model		**Nordex N163/6.x**					
Bird length	L	0.815	m		Latitude				57.4863	degrees							Hub height		118.5	m				
Wingspan	W	2.12	m		No of turbines	T			20								Rotor radius	R	81.5	m				
Bird flight speed	v	15	m s^{-1}		Width of windfarm	w			4.4	km							No of blades	b	3					
Flight type, flapping or gliding		gliding															Rotation speed	Ω	8.2	rpm				
% of flights upwind/downwind		50%	50%														Max blade width	C	4.3	m				
Nocturnal activity ranking 1-5		1															Blade pitch	λ	15	degrees				
Nocturnal activity factor	f_{night}	0%															Risk height range		37-200	m				
normal approach		Set to 'normal approach' to use survey data on bird density																						
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A																						
Stage A						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge						
Daytime bird density	D_A		birds/km^2			0.000854	0.000499	0.000499	0.000499	0.000499	0.000499	0.000499	0.000499	0.000854	0.000854	0.000854	0.000854	0.0006						
Proportion at rotor risk height	Q_{2R}	100.00%																						
At latitude 57.5		Daylight hours per month				228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3						
		Nighttime hours per month				515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7						
Stage B																								
No of turbines	T	20																						
Rotor radius	R	81.5	m																					
		Total rotor frontal area m^2		417345																				
Nocturnal activity factor	f_{night}	0%																						
Bird flight speed	v	15	m s^{-1}			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total						
		Projected number of rotor transits				27.0	18.1	25.2	29.5	35.4	37.0	37.0	32.7	45.6	38.0	28.7	24.6	**379**						
Stage C																								
No of blades	b	3					Bird length	l	0.815	m														
Rotation speed	Ω	8.2	rpm				Wingspan	w	2.12	m														
Rotor radius	R	81.5	m				Bird flight speed	v	15	m s^{-1}														
Max blade width	C	4.3	m				Flight type		gliding															
Pitch	λ	15	degrees		% of flights upwind/downwind				50%	50%														
Blade profile		see Blade profile sheet																						
		Single transit risk		upwind	7.31%																			
				downwind	4.09%																			
				weighted mean	**5.70%**																			
Stage D						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge						
Proportion of time operational	Q_{op}					85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%						
					Collision rates before avoidance													year total						
						1.31	0.88	1.22	1.43	1.71	1.79	1.79	1.58	2.21	1.84	1.39	1.19	**18**						
Stage E																								
Allow for large array correction?		No																						
Width of windfarm	w	4.4	km																					
			large array correction			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year						
					Collision rates allowing for avoidance																			
Avoidance rates modelled		95.00%	100.00%			0.07	0.04	0.06	0.07	0.09	0.09	0.09	0.08	0.11	0.09	0.07	0.06	**0.92**						
		98.00%	100.00%			0.03	0.02	0.02	0.03	0.03	0.04	0.04	0.03	0.04	0.04	0.03	0.02	**0.37**						
		99.00%	100.00%			0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	**0.18**						
		99.50%	100.00%			0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.09**						

Table 22: CRM spreadsheet for red kite

COLLISION RISK MODEL		Required input data is in	orange	boxes														
		Calculated output is in	blue	boxes														
			green	boxes are for information only, to show variables used at each stage														
		Value	Units					Value	Units					Value	Units			
Bird data				**Windfarm data**								**Turbine data**						
Species name		**Red Kite**		Site name				**Ballach**				Model		**Nordex N163/6.x**				
Bird length	L	0.63	m	Latitude				57.4863	degrees			Hub height		118.5	m			
Wingspan	W	1.85	m	No of turbines	T			20				Rotor radius	R	81.5	m			
Bird flight speed	v	11	m s^{-1}	Width of windfarm	w			4.4	km			No of blades	b	3				
Flight type, flapping or gliding		gliding										Rotation speed	Ω	8.2	rpm			
% of flights upwind/downwind		50%	50%									Max blade width	C	4.3	m			
Nocturnal activity ranking 1-5		1										Blade pitch	λ	15	degrees			
Nocturnal activity factor	f_{night}	0%										Risk height range		37-200	m			
normal approach		Set to 'normal approach' to use survey data on bird density																
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A																
Stage A					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge	
Daytime bird density	D_A		birds/km^2		0.002509	0.002509	0.00128	0.00128	0.00128	0.00128	0.00128	0.002509	0.002509	0.002509	0.002509	0.002509	0.0020	
Proportion at rotor risk height	Q_{2R}	100.00%																
At latitude 57.5		Daylight hours per month			228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3	
		Nighttime hours per month			515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7	
Stage B																		
No of turbines	T	20																
Rotor radius	R	81.5	m															
		Total rotor frontal area m^2		417345														
Nocturnal activity factor	f_{night}	0%																
Bird flight speed	v	11	m s^{-1}		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total	
		Projected number of rotor transits			58.1	66.8	47.4	55.6	66.6	69.7	69.7	120.6	98.2	82.0	61.7	53.1	**849**	
Stage C																		
No of blades	b	3				Bird length	l	0.63	m									
Rotation speed	Ω	8.2	rpm			Wingspan	w	1.85	m									
Rotor radius	R	81.5	m			Bird flight speed	v	11	m s^{-1}									
Max blade width	C	4.3	m			Flight type		gliding										
Pitch	λ	15	degrees	% of flights upwind/downwind				50%	50%									
Blade profile		see Blade profile sheet																
		Single transit risk		upwind	8.18%													
				downwind	4.38%													
				weighted mean	**6.28%**													
Stage D					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge	
Proportion of time operational	Q_{op}				85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	
				Collision rates before avoidance													year total	
					3.10	3.57	2.53	2.97	3.56	3.72	3.72	6.44	5.24	4.38	3.30	2.83	**45**	
Stage E																		
Allow for large array correction?		No																
Width of windfarm	w	4.4	km															
			large array correction		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year	
				Collision rates allowing for avoidance														
Avoidance rates modelled		95.00%	100.00%		0.16	0.18	0.13	0.15	0.18	0.19	0.19	0.32	0.26	0.22	0.16	0.14	**2.27**	
		98.00%	100.00%		0.06	0.07	0.05	0.06	0.07	0.07	0.07	0.13	0.10	0.09	0.07	0.06	**0.91**	
		99.00%	100.00%		0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.06	0.05	0.04	0.03	0.03	**0.45**	
		99.50%	100.00%		0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.01	**0.23**	

Table 23: CRM spreadsheet for white-tailed eagle

COLLISION RISK MODEL		Required input data is in	orange	boxes														
		Calculated output is in	blue	boxes														
			green	boxes are for information only, to show variables used at each stage														
		Value	Units					Value	Units						Value	Units		
Bird data					**Windfarm data**								**Turbine data**					
Species name		**White-tailed Eagle**			Site name			**Ballach**					Model		**Nordex N163/6.x**			
Bird length	L	0.8	m		Latitude			57.4863	degrees				Hub height		118.5	m		
Wingspan	W	2.2	m		No of turbines	T		20					Rotor radius	R	81.5	m		
Bird flight speed	v	12	m s^{-1}		Width of windfarm	w		4.4	km				No of blades	b	3			
Flight type, flapping or gliding		gliding											Rotation speed	Ω	8.2	rpm		
% of flights upwind/downwind		50%	50%										Max blade width	C	4.3	m		
Nocturnal activity ranking 1-5		1											Blade pitch	λ	15	degrees		
Nocturnal activity factor	f_{night}	0%											Risk height range		37-200	m		
normal approach		Set to 'normal approach' to use survey data on bird density																
		Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A																
Stage A						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2			0.000379	0	0	0	0	0	0	0	0.000379	0.000379	0.000379	0.000379	0.0002
Proportion at rotor risk height	Q_{2R}	100.00%																
At latitude 57.5		Daylight hours per month				228.6	262.6	365.1	428.3	513.4	536.8	536.8	474.0	386.1	322.2	242.7	208.7	4505.3
		Nighttime hours per month				515.4	409.4	378.9	291.7	230.6	183.2	207.2	270.0	333.9	421.8	477.3	535.3	4254.7
Stage B																		
No of turbines	T	20																
Rotor radius	R	81.5	m															
		Total rotor frontal area m^2		417345														
Nocturnal activity factor	f_{night}	0%																
Bird flight speed	v	12	m s^{-1}			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits				9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.2	13.5	10.2	8.7	**58**
Stage C																		
No of blades	b	3					Bird length	l	0.8	m								
Rotation speed	Ω	8.2	rpm				Wingspan	w	2.2	m								
Rotor radius	R	81.5	m				Bird flight speed	v	12	m s^{-1}								
Max blade width	C	4.3	m				Flight type		gliding									
Pitch	λ	15	degrees		% of flights upwind/downwind				50%	50%								
Blade profile		see Blade profile sheet																
		Single transit risk		upwind	8.18%													
				downwind	4.38%													
				weighted mean	**6.28%**													
Stage D						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}					85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
					Collision rates before avoidance													year total
						0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.72	0.54	0.47	**3**
Stage E																		
Allow for large array correction?		No																
Width of windfarm	w	4.4	km															
			large array correction			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
					Collision rates allowing for avoidance													
Avoidance rates modelled		95.00%	100.00%			0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.03	0.02	**0.16**
		98.00%	100.00%			0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01	**0.06**
		99.00%	100.00%			0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	**0.03**
		99.50%	100.00%			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**

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TECHNICAL APPENDIX 10.1 - WATER CROSSING SCHEDULE

Ballach Wind Farm



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24th July 2025

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Document status

Version	Revision	Authored by	Reviewed by	Approved by	Review date
0	0	David Gemmell	Stuart Clarke	David Gemmell	24 July 2025
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David Gemmell	Director	DG	24 July 2025

File Name

794-ENV-GDE-21095Z Ballach Water Crossing Schedule V0 R0

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Energiekontor UK Ltd

1. INTRODUCTION

Under the *Water Environment (Controlled Activities) (Scotland) Regulations 2011*, as amended, all activities occurring within the water environment are regulated and require authorisation at an appropriate level from the Scottish Environment Protection Agency (SEPA). This includes construction of new water crossings and upgrading of existing water crossings.

The development will require construction of new access tracks and amendments to existing tracks, requiring 14 new watercourse crossings within the main windfarm development area to facilitate this and the upgrade of five existing watercourse crossings for the proposed access route. All of the 19 watercourse crossings are shown on OS 1:50k mapping.

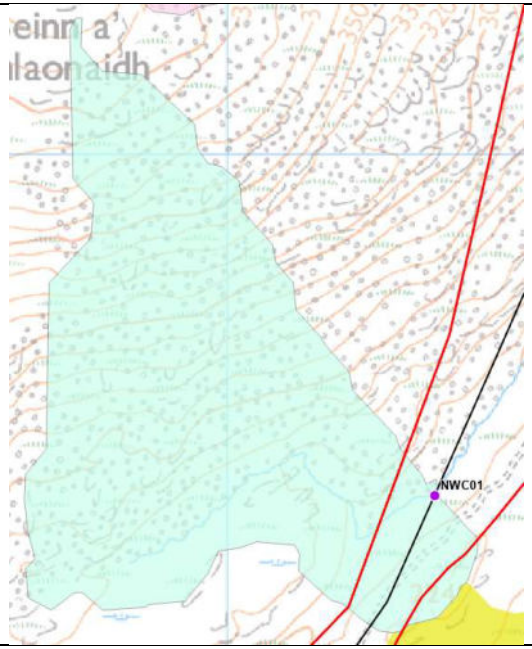
This document systematically identifies all the watercourse crossings (new and existing) that will be required for the development and records details of the watercourse, including an appropriate crossing type.

Details of each crossing within the main development area, including minor catchment size, photographs and indicative crossing design, are provided in Table 10.1. Minor catchments have been calculated from a 5m DTM and have approximated the minor basin/catchment draining to the point of each respective water crossing (which are considered to be the pour points). Crossing types for new water crossings have been based on a combination of catchment size and an inspection of the watercourse at the water crossing location (where access has allowed). Upgrading of any existing water crossings have been recommended based on an inspection of the water crossing (where access has allowed).

The figure presented in Appendix A highlights the locations of all new (fourteen number) and five existing (to be upgraded) water crossings, at lower resolution relative to major catchments.

Table 10.1 – Water Crossing Schedule

Crossing:	New Water Crossing 1 (NWC1)
Location:	Access track north of EWC5
Watercourse:	Unnamed tributary of River Beauly
NGR:	NH 243348, 844428
Description:	As shown (January 2025)
Catchment Area:	0.40km^2
Crossing Type:	New crossing: Circular Culvert

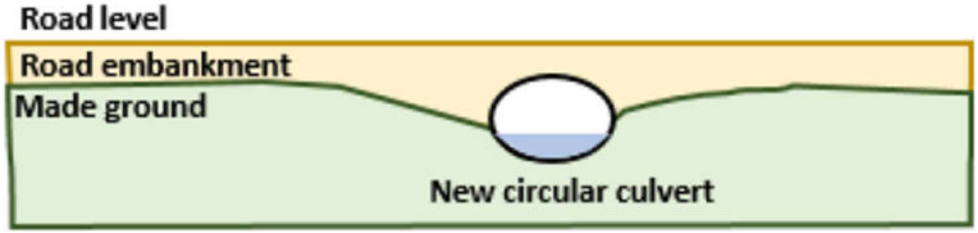




View upstream

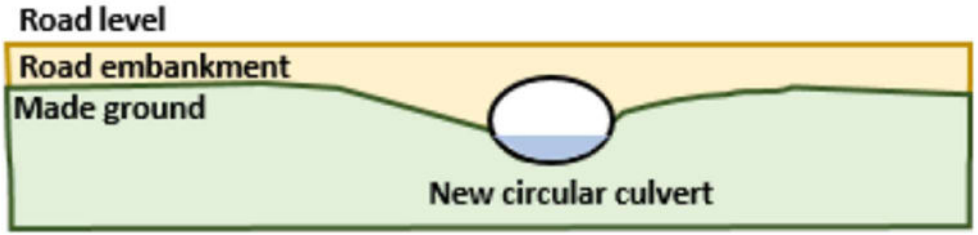


View downstream

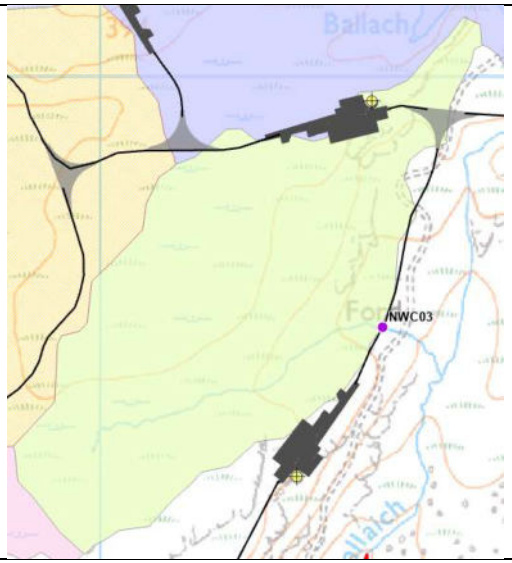


Indicative crossing type, not to scale

Crossing:	New Water Crossing 2 (NWC2)	
Location:	South of construction compound	
Watercourse:	Unnamed tributary of River Beauly	
NGR:	NH 243814, 845549	
Description:	As shown (January 2025)	
Catchment Area:	2.776km^2	
Crossing Type:	New crossing: Circular Culvert	

		
View upstream	View downstream	Indicative crossing type, not to scale

Crossing:	New Water Crossing 3 (NWC3)
Location:	North of T6
Watercourse:	Unnamed tributary of River Beauly
NGR:	NH 244460, 846592
Description:	As shown (January 2025)
Catchment Area:	0.287km^2
Crossing Type:	New crossing: Circular Culvert

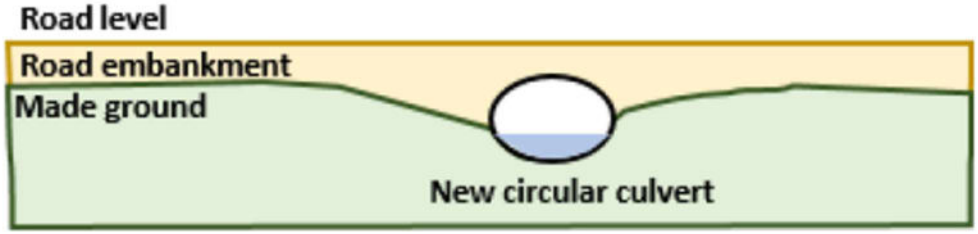




View upstream

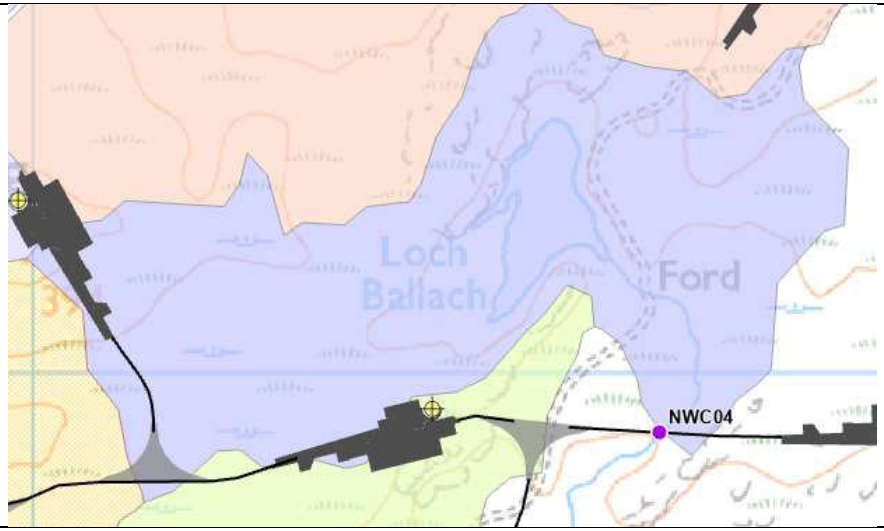


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 4 (NWC4)
Location:	Between T2 and T4
Watercourse:	Unnamed tributary of River Beauly
NGR:	NH 244695, 846935
Description:	As shown (January 2025)
Catchment Area:	0.255km^2
Crossing Type:	New crossing: Circular Culvert

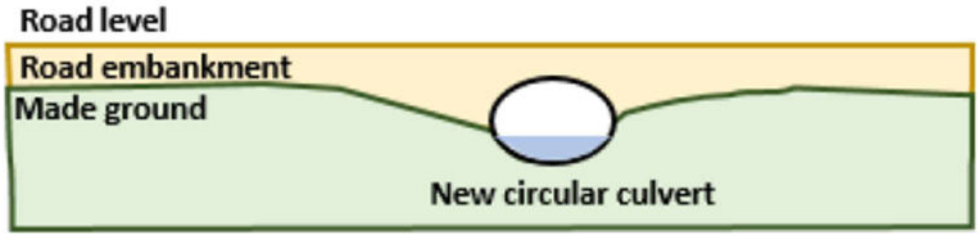




View upstream

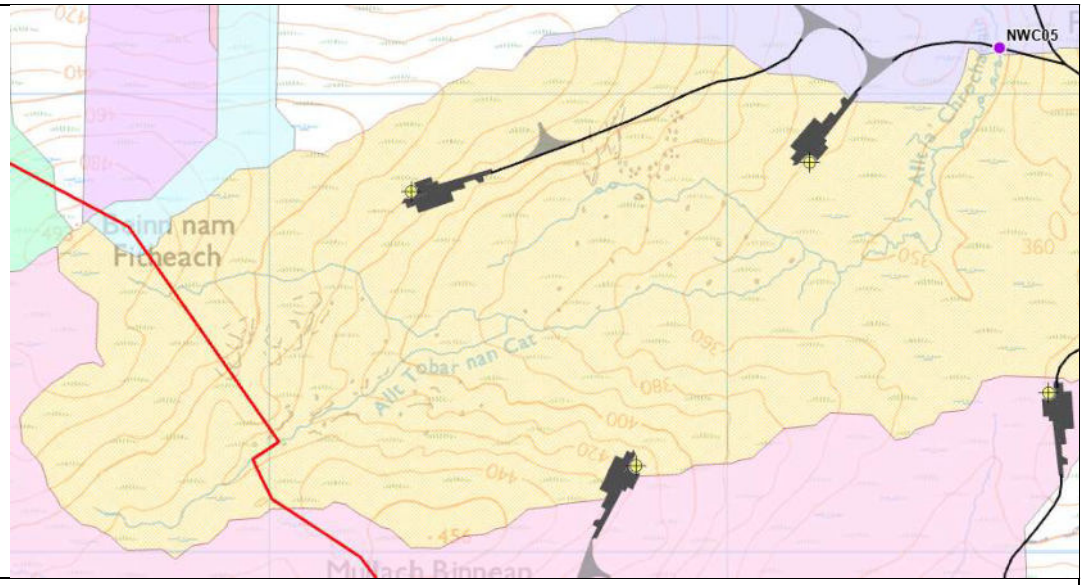


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 5 (NWC5)
Location:	East of T11
Watercourse:	Allt a' Chrochaidh (tributary of the Gleann Goibhre)
NGR:	NH 243595, 847101
Description:	As shown (January 2025)
Catchment Area:	1.995km^2
Crossing Type:	New crossing: Circular Culvert

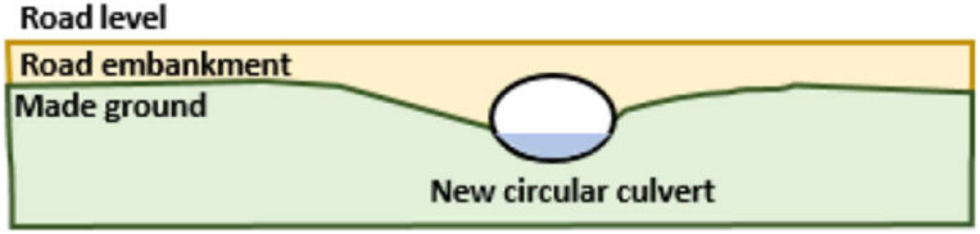




View upstream

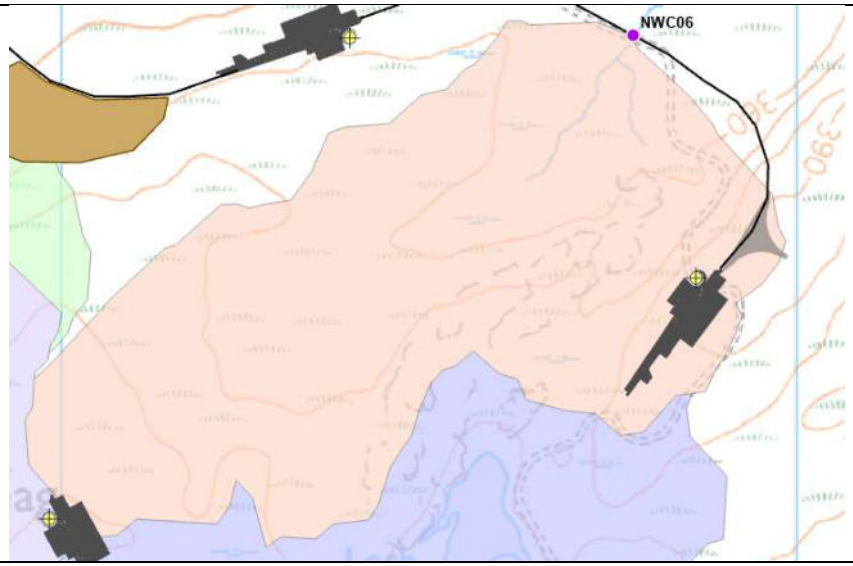


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 6 (NWC6)
Location:	Between T1 and T3
Watercourse:	Unnamed tributary of Allt Goibhre
NGR:	NH 244777, 847850
Description:	As shown (January 2025)
Catchment Area:	0.414km^2
Crossing Type:	New crossing: Circular Culvert

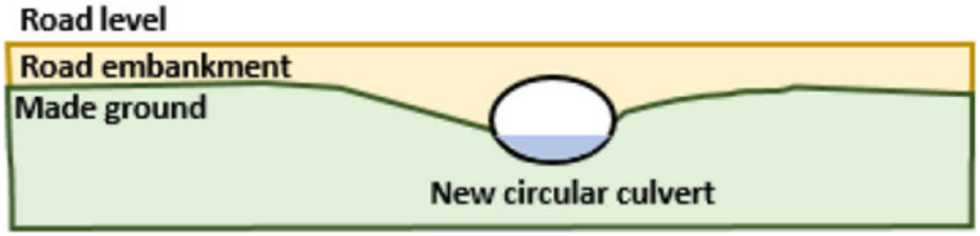




View upstream

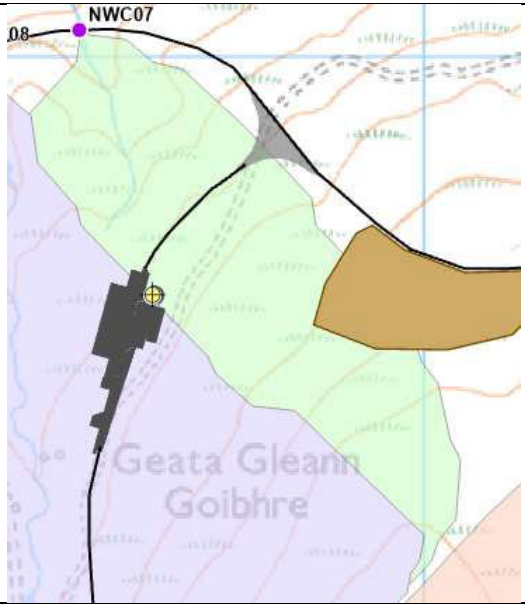


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 7 (NWC7)
Location:	North of T9
Watercourse:	Unnamed tributary of Gleann Goibhre
NGR:	NH 243619, 848030
Description:	As shown (January 2025)
Catchment Area:	0.108km^2
Crossing Type:	New crossing: Circular Culvert

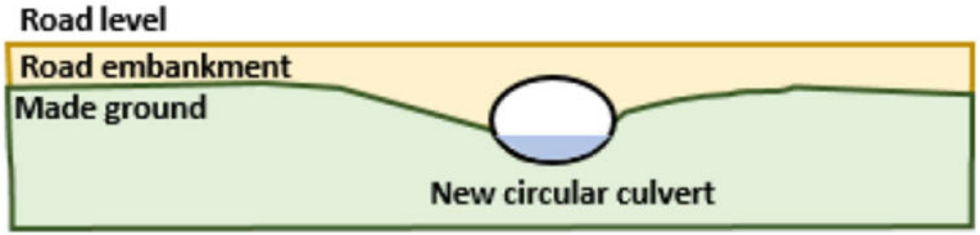




View upstream

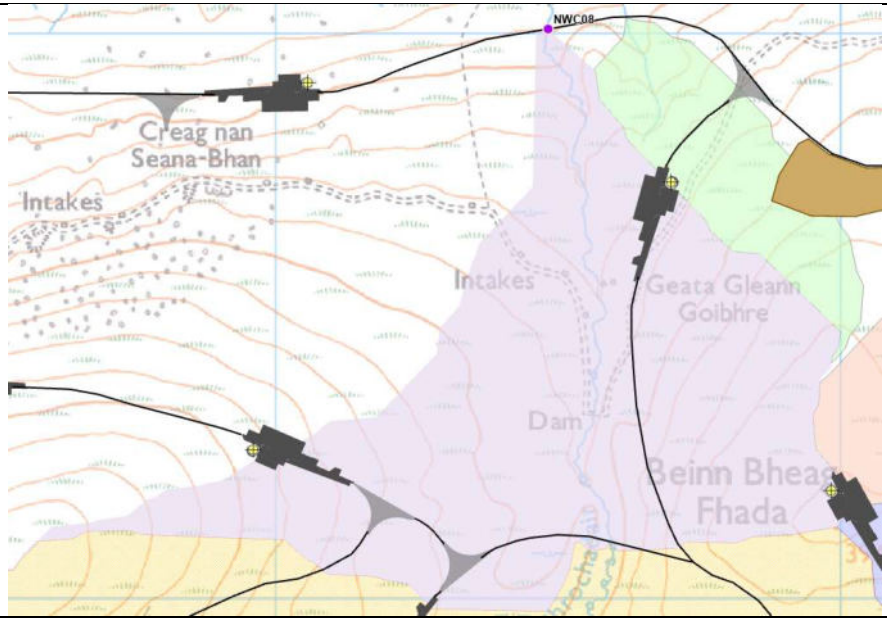


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 8 (NWC8)
Location:	East of T15
Watercourse:	Unnamed tributary of Gleann Goibhre
NGR:	NH 243481, 848009
Description:	As shown (January 2025)
Catchment Area:	0.559km^2
Crossing Type:	New crossing: Circular Culvert

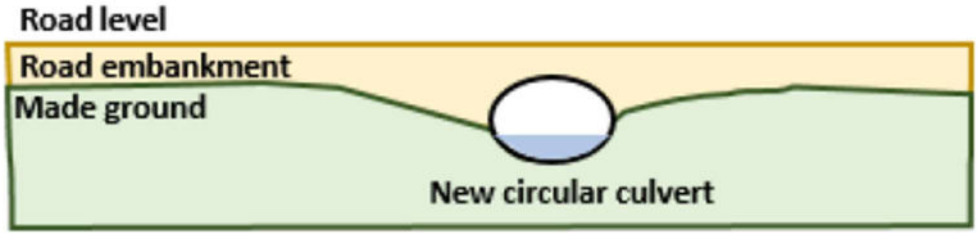




View upstream

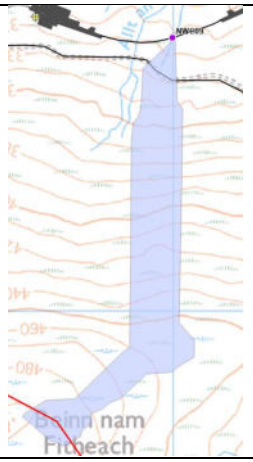


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 9 (NWC9)
Location:	West of T17
Watercourse:	Tributary of Gleann Goibhre
NGR:	NH 241997, 847722
Description:	As shown (January 2025)
Catchment Area:	0.135km^2
Crossing Type:	New crossing: Circular Culvert

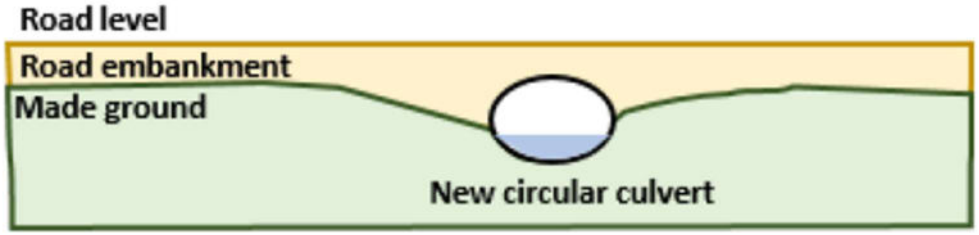




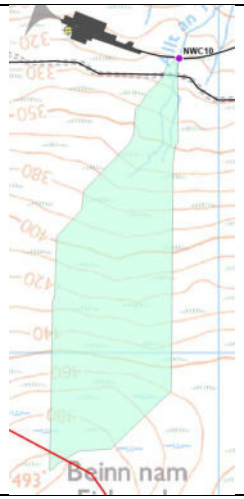
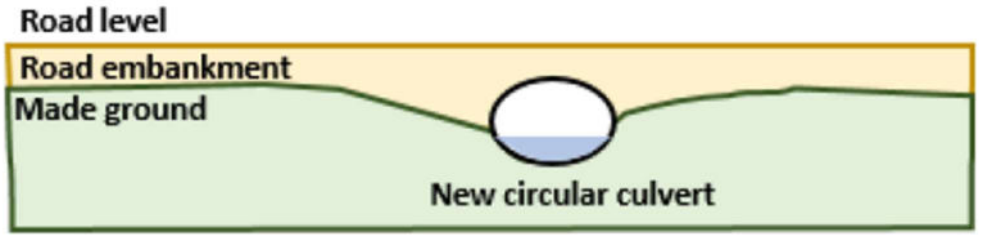
View upstream



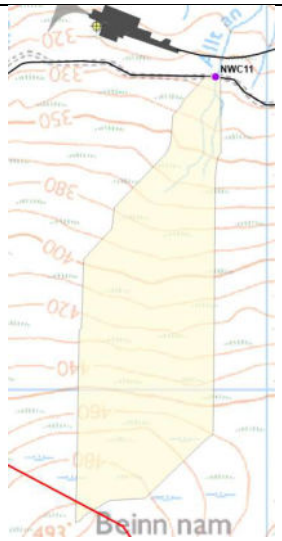
View downstream



Indicative crossing type, not to scale

Crossing: New Water Crossing 10 (NWC10) **Location:** East of T18 **Watercourse:** Tributary of Gleann Goibhre **NGR:** NH 241905, 847709 **Description:** As shown (January 2025) **Catchment Area:** 0.198km^2 **Crossing Type:** New crossing: Circular Culvert		
View upstream	View downstream	 Indicative crossing type, not to scale

Crossing:	New Water Crossing 11 (NWC11)
Location:	Immediately south of NCW10
Watercourse:	Tributary of Gleann Goibhre
NGR:	NH 241891, 847668
Description:	As shown (January 2025)
Catchment Area:	0.197km^2
Crossing Type:	New crossing: Circular Culvert

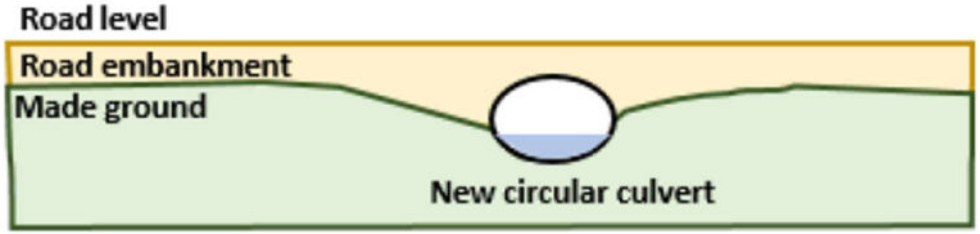




View upstream

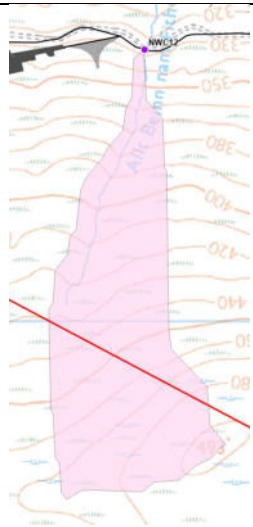


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 12 (NWC12)
Location:	East of T19
Watercourse:	Tributary of Gleann Goibhre
NGR:	NH 241376, 847662
Description:	As shown (January 2025)
Catchment Area:	0.253km^2
Crossing Type:	Upgrade existing circular culvert crossing: Circular Culvert

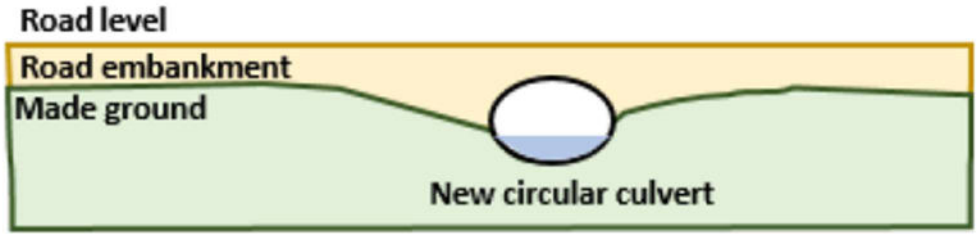




View upstream

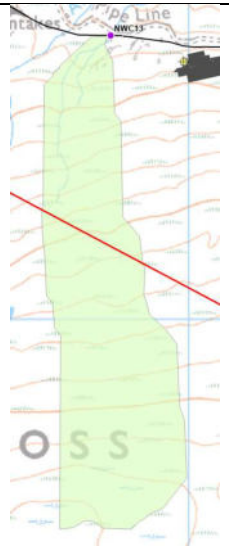


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 13 (NWC13)
Location:	West of T19
Watercourse:	Allt Creagach (tributary of Gleann Goibhre)
NGR:	NH 240804, 847709
Description:	As shown (January 2025)
Catchment Area:	0.287km^2
Crossing Type:	New crossing: Circular Culvert

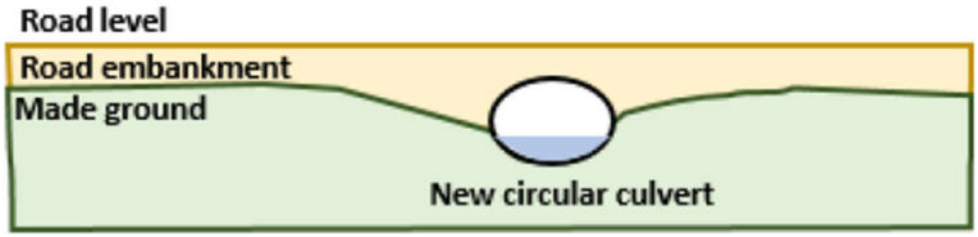




View upstream

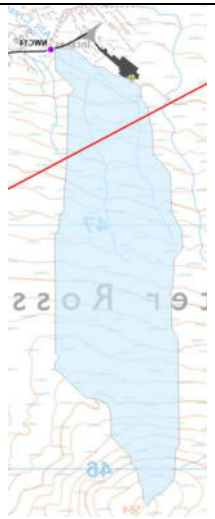


View downstream



Indicative crossing type, not to scale

Crossing:	New Water Crossing 14 (NWC14)
Location:	West of T19
Watercourse:	Allt Creagach (tributary of Gleann Goibhre)
NGR:	NH 240696, 847718
Description:	As shown (January 2025)
Catchment Area:	0.668km^2
Crossing Type:	New crossing: Circular Culvert

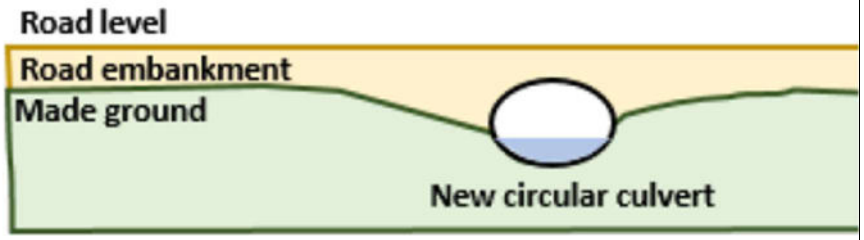




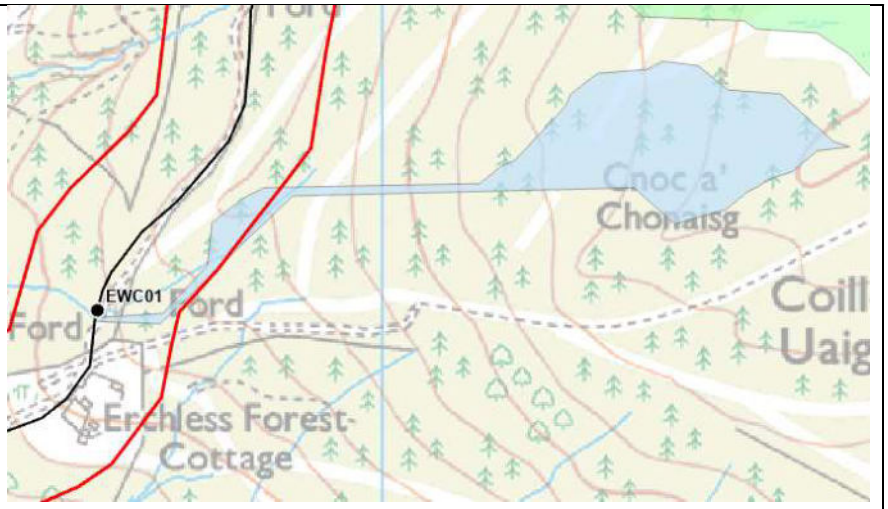
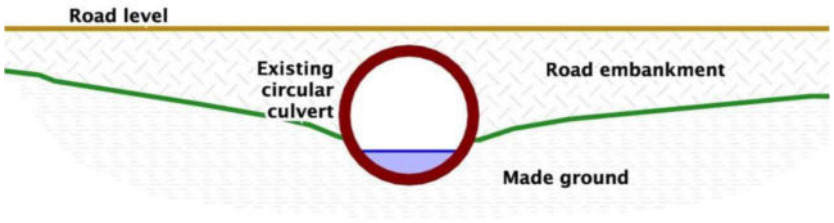
View upstream

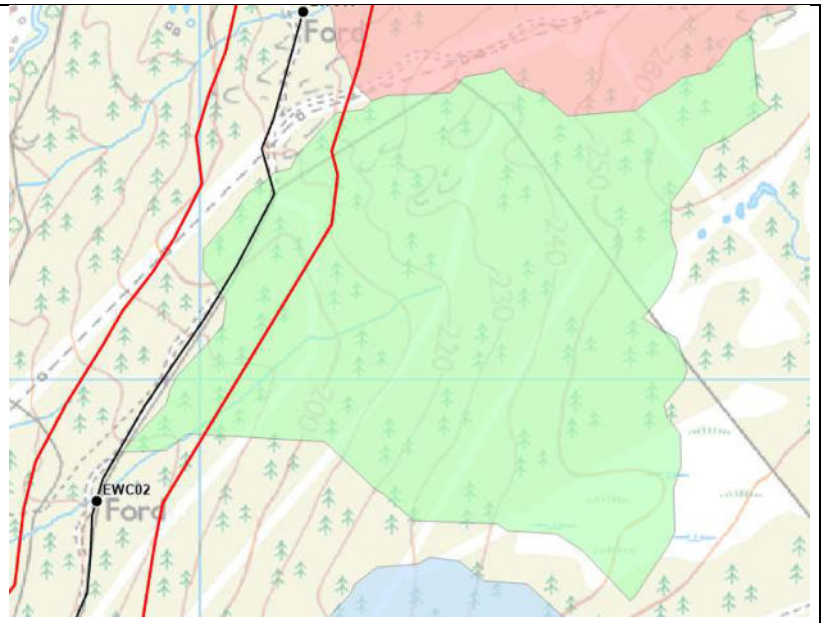


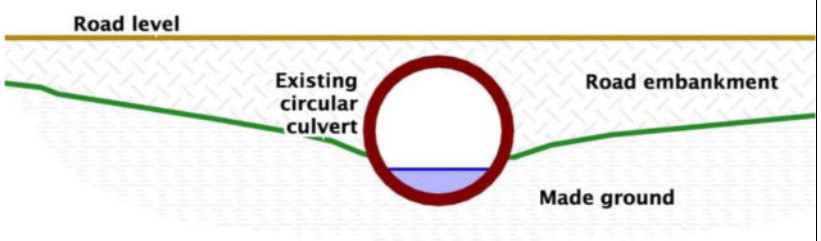
View downstream

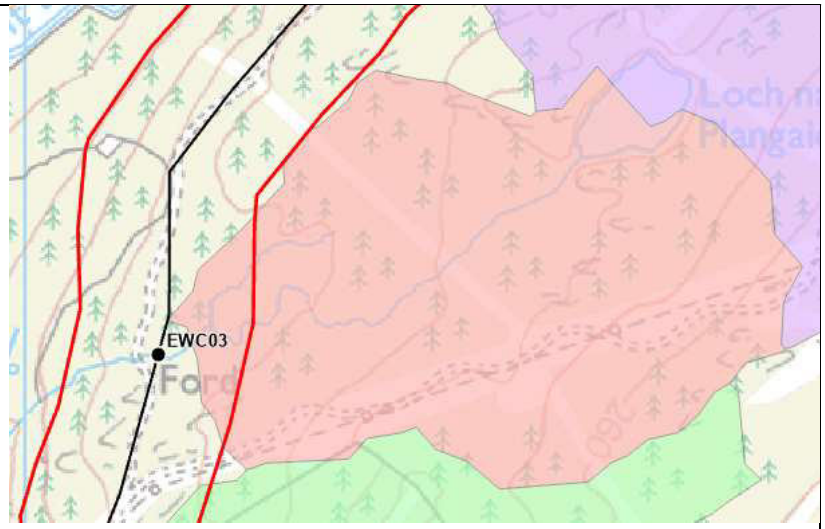


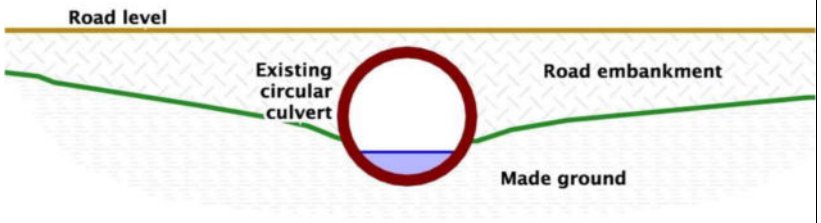
Indicative crossing type, not to scale

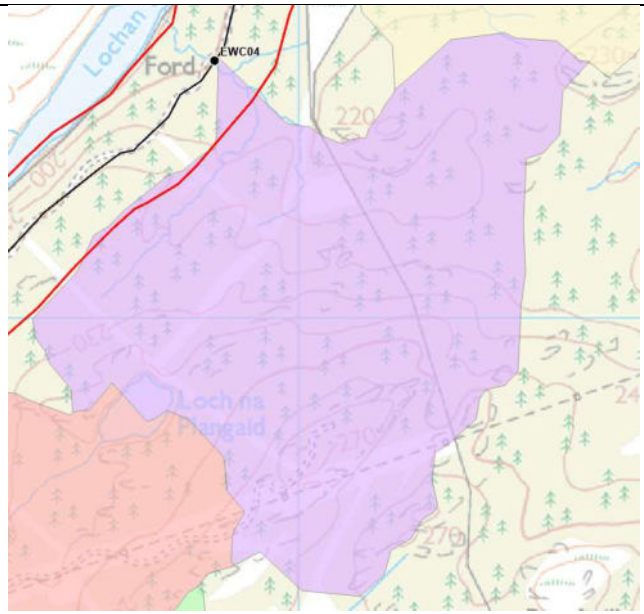
Crossing: **Location:** **Watercourse:** **NGR:** **Description:** **Catchment Area:** **Crossing Type:**	Existing Water Crossing 1 (EWC1) Access track to site Unnamed tributary of Erchless Burn NH 241650, 841429 As shown (January 2025), there was no upstream or downstream flow at the time 0.057km^2 Existing crossing: Circular Culvert (to be retained as is/replaced/upgraded)	
		
Existing culvert		Indicative crossing type, not to scale

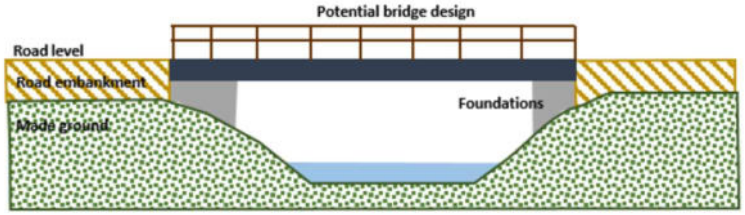
Crossing:	Existing Water Crossing 2 (EWC2)	
Location:	Access track to site	
Watercourse:	Unnamed tributary of Erchless Burn	
NGR:	NH 241845, 841819	
Description:	As shown (January 2025)	
Catchment Area:	0.427km^2	
Crossing Type:	Existing crossing: Circular Culvert (to be retained as is/replaced/upgraded)	

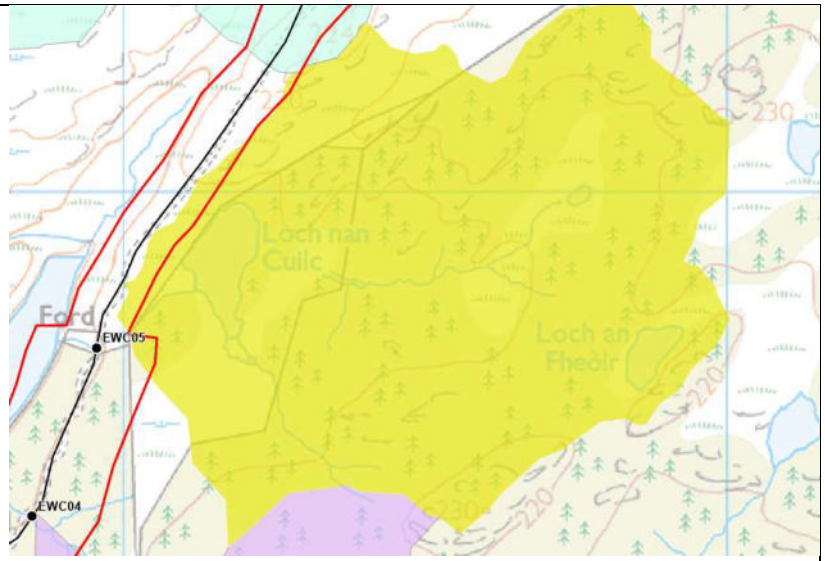
		
View upstream	View downstream	Indicative crossing type, not to scale

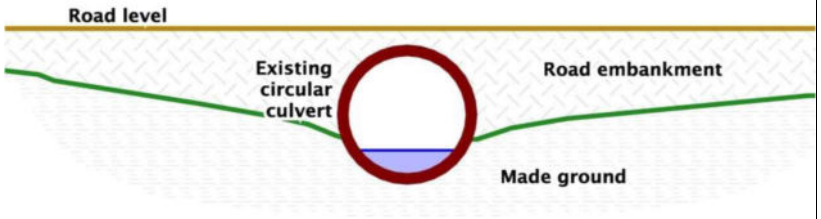
Crossing:	Existing Water Crossing 3 (EWC3)	
Location:	Access track to site	
Watercourse:	Unnamed tributary of Erchless Burn	
NGR:	NH 242154, 842550	
Description:	As shown (January 2025)	
Catchment Area:	0.251km^2	
Crossing Type:	Existing crossing: Circular Culvert (to be retained as is/replaced/upgraded)	

		
View upstream	View downstream	Indicative crossing type, not to scale

Crossing:	Existing Water Crossing 4 (EWC4)	
Location:	Access track to site	
Watercourse:	Unnamed tributary of Erchless Burn	
NGR:	NH 242848, 843464	
Description:	As shown (January 2025)	
Catchment Area:	0.552km^2	
Crossing Type:	Existing crossing: Span Bridge (to be retained as is/replaced/upgraded)	

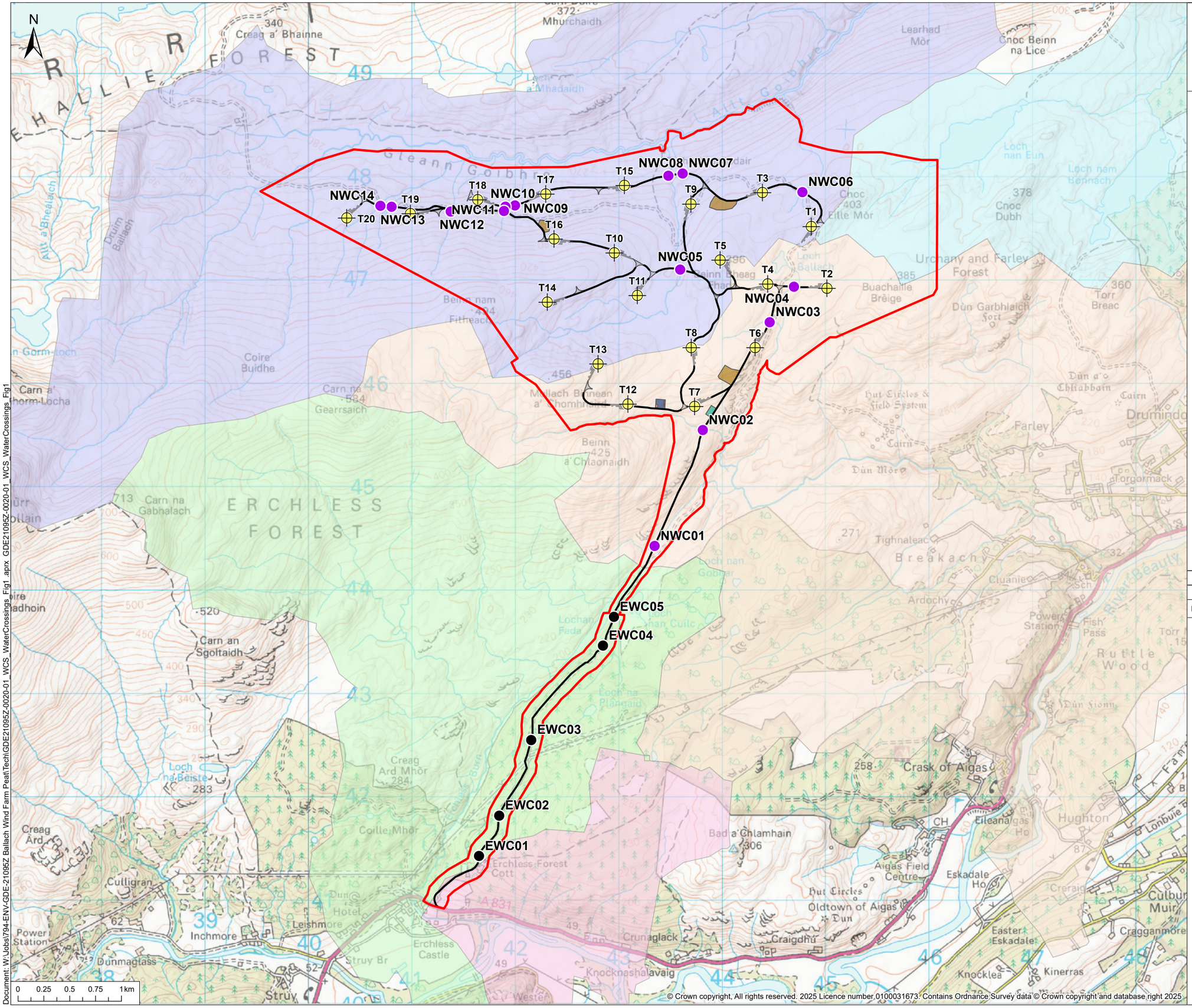
		
View upstream	View downstream	Indicative crossing type, not to scale

Crossing:	Existing Water Crossing 5 (EWC5)	
Location:	Access track to site	
Watercourse:	Unnamed tributary of Erchless Burn	
NGR:	NH 242955, 843742	
Description:	As shown (January 2025)	
Catchment Area:	0.612km^2	
Crossing Type:	Existing crossing: Circular Culvert (to be retained as is/replaced/upgraded)	

		
View upstream	View downstream	Indicative crossing type, not to scale

APPENDIX A

FIGURE



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Notes
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2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.

Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head
- Major Water Catchment 1
- Major Water Catchment 2
- Major Water Catchment 3
- Major Water Catchment 4
- Major Water Catchment 5

Water Crossing

- Existing
- New

Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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TECHNICAL APPENDIX 10.1 - WATER CROSSING SCHEDULE

Ballach Wind Farm

2025-07-24

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TECHNICAL APPENDIX 10.2 - OUTLINE PEAT MANAGEMENT PLAN

Ballach Wind Farm

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1 INTRODUCTION

RPS Consulting Services Ltd (RPS) has been commissioned by Energiekontor UK Ltd (EK) to prepare an outline peat management plan (PMP) for the proposed Ballach Wind Farm Development (hereafter referred to as the 'Development') to be included as a Technical Appendix to Chapter 10 Hydrology, Geology and Peat of the Environmental Impact Assessment Report (EIA Report) for the development.

The Proposed Development is illustrated on Figure 3.1 in Chapter 3 Project Description and consists of the following principal components:

- Up to 20 turbines;
- Associated turbine compound areas including foundations and hardstanding areas for erecting cranes at each turbine location;
- On-site tracks connecting each turbine;
- An energy storage compound to store batteries with a 5MW capacity which would be within the construction compound footprint;
- Underground cables linking the turbines to the substation;
- Up to 3 borrow pits for the extraction of stone on-site (indicated on Figure 3.1 as borrow pit search areas);
- A temporary construction compound including provision for onsite concrete batching;
- On-site substation;
- Forestry felling and restocking as proposed within Chapter 14: Other Issues; and
- Habitat Management provisions as proposed within Technical Appendix 8.4 within Volume 3 of this EIA Report.

The design of the Development has been undertaken as an iterative process to avoid areas of deep (>1.0m) peat as much as possible to limit peat excavation and to limit the potential for peat slide, as presented in Chapter 4: Design Evolution and Chapter 10: Hydrology, Geology and Peat.

This outline PMP provides details on the approximate predicted volumes of peat that would be excavated during construction, the characteristics of the peat that would be excavated, and the principles of how and where this excavated peat would be stored, reused and managed.

Further details and specific plans would be determined during the detailed design process and once further pre-construction site investigations have been undertaken. These details would then be included in a detailed PMP as part of the detailed Construction Environment Management Plan (CEMP). The responsibility for the implementation of the detailed PMP would be with the Principal Contractor.

The potential volumes of peat extracted and re-used has been calculated based on input parameters generated based on the design freeze layout shapefiles and a modelled peat contour plan developed by high-density probing surveys. This has allowed high levels of confidence in the estimation of the volumes of peat that would be excavated and that would then require appropriate re-use.

2 OBJECTIVES

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

The outline PMP has been developed to demonstrate that peat has been afforded significant consideration during the planning and early design phase of the development and acts as a base document within the construction phase. It aims to propose mitigation measures that would minimise any impacts, along with the long-term habitat restoration and management plans prepared separately.

The outline PMP seeks to identify that appropriate proposals to re-use the surplus peat can be accommodated within the development and associated Outline Habitat Management Plan (OHMP) proposals (presented in Chapter 8: Ecology and within Technical Appendix 8.4), without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

The layout of the outline PMP is in general accordance with Annex 1 of the Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012).

3 POLICY AND GUIDANCE FOR PEAT MANAGEMENT

This outline PMP has been compiled in accordance with current policy and best practice guidance.

Scotland's National Planning Framework 4 (NPF4) Policy 5 (Soils) states that development proposals on peatland, carbon-rich soils or priority peatland habitat will only be supported for:

- Essential infrastructure and if 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.

NPF4 goes on to state 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.

This assessment 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.

The Highland Council Local Development Plan Policy 55 (Peat and Soils) states the following:

- Development proposals should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils.
- Unacceptable disturbance of peat will not be permitted unless it is shown that the adverse effects of such disturbance are clearly outweighed by social, environmental or economic benefits arising from the development proposal.
- Where development on peat is clearly demonstrated to be unavoidable then The Council may ask for a peatland management plan to be submitted which clearly demonstrates how impacts have been minimised and mitigated.
- New areas of commercial peat extraction will not be supported unless it can be shown that it is an area of degraded peatland which is clearly demonstrated to have been significantly damaged by human activity and has low conservation value and as a result restoration is not possible.
- Proposals must also demonstrate to the Council's satisfaction that extraction would not adversely affect the integrity of nearby Natura sites containing areas of peatland.

The guidance relevant to the above assessment is as follows:

- SEPA Regulatory Position Statement – Developments on Peat (SEPA, 2010);
- 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, 2017);

- Guidance on Developments on Peatland: Site Surveys (Scottish Government, Scottish Natural Heritage and SEPA, 2017);
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017);
- Good Practice during Windfarm Construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019); and
- Advising on Peatland, Carbon-Rich Soils and Priority Peatland Habitat in Development Management (NatureScot, June 2023).

4 PEAT CONDITIONS

4.1 Definitions of Peat

The Scottish Government Peat Landslide Hazard Best Practice Guide (2017) uses the following Joint Nature Conservation Committee (JNCC) report 455 'Towards an Assessment of the State of UK Peatlands' definition for classification of peat deposits:

- **Peaty (or organo-mineral) soil:** a soil with a surface organic layer less than 0.5m deep;
- **Peat:** a soil with a surface organic layer greater than 0.5m deep which has an organic matter content of more than 60%; and
- **Deep Peat:** a peat soil with a surface organic layer greater than 1.0m deep.

4.2 Peat Conditions at the Site

A desk study has been undertaken to review published geological conditions, based on British Geological Survey (BGS) mapping, the SNH Carbon and Peatlands Map (2016) and aerial photography. Details of the desk study can be found in EIA Report Chapter 10: Hydrology, Geology and Peat.

Following on from the desk study, which suggested that peat could be present across much of the development site, field surveys were undertaken to measure the peat depth and provide additional observations relating to slopes, general topography including evidence of past peat landslides, ground cover and consideration of existing and new/existing water crossings. Peat survey work undertaken at the site is summarised below and further detail is provided in the overarching EIA Chapter 10 Hydrology, Geology and Peat and Technical Appendix 10.3: Peat Landslide Hazard and Risk Assessment.

Peat depth surveys have subsequently been undertaken at the site over the course of various phases. Phase 1 peat probing was carried out by Wildlife Consulting in 2024 (Phase 1) and was undertaken across the developable area at the time to inform an understanding of general peat depth and distribution. These works were undertaken within the turbine development area only and were completed on a 100m grid. During these works, pockets of deep peat were encountered across the site but most notable in southern and eastern areas of the turbine development area.

Following completion of Phase 1 probing, the site design was reviewed, and changes were made to avoid or minimise siting infrastructure on areas of deeper peat. A 'design chill' was subsequently arrived at.

Phase 2 probing (Phase 2a) was then undertaken in February 2025 by RPS.

The Phase 2 probing undertaken comprised detailed probing at each proposed turbine and hardstanding location, along all proposed new access tracks/turning heads, and at other proposed infrastructure locations including the site substation, construction compound and borrow pits.

The pattern of Phase 2 probing in relation to proposed turbine locations and other infrastructure elements can be broadly described as follows:

- Probe at each proposed turbine location plus an additional probe, approximately 25m from the turbine location to the north, south, east and west;
- Probes advanced on a grid at approximate 25m centres across the area of each proposed turbine hardstanding and crane pad area;
- Probes advanced at 50 m centres along the proposed routes of new access tracks; and

- Probes advanced on a grid at approximate 25m centres at the location of the proposed substation construction compound and borrow pits.

The above density (reduced in relation to guidance) reflected the fact that all infrastructure (except some sections of track) were located on peat less than 1.0m as informed by previous probing. This approach has been acceptable to SEPA on other Applicant windfarm schemes.

Following completion of Phase 2 probing, the site design was further reviewed to avoid or minimise siting infrastructure on areas of deeper peat. A revised 'design chill' was subsequently arrived at.

SEPA were then consulted (by way of teams call on 11 March 2025 where combined Phase 1/2 peat depth mapping was shared) to seek their initial feedback on the revised 'design chill' development layout and its potential impact upon peat. During this call SEPA raised some concerns with the location of infrastructure/turning heads associated with T8, T13, T19 and T20. SEPA also asked whether potential GWDTEs would be assessed and reminded the Applicant of SEPAs new GWDTE (and groundwater abstractions) guidance. The Applicant also advised SEPA of their intention to float tracks over any localised areas of deep peat.

Following the SEPA call the design was further optimised (to address SEPA comments amongst other changes required due to other constraints) and a second phase of Phase 2 probing (Phase 2b) was undertaken in late March 2024 to address the data gaps. These works were undertaken using the probing patterns described above (again due to peat being expected to be less than 1.0m).

Data obtained from the Phase 2b probing was subsequently used to plot the presence and distribution of peat across the further revised 'design chill' development layout, which was issued to SEPA on 8 April 2025 which SEPA commented on, on 15 April 2025. No further changes were made to the design following SEPA's 15 April 2025 comments and the design was subsequently 'frozen'. The data was subsequently used to inform an outline Peat Slide Risk Assessment (PSRA), presented as Technical Appendix 9.3 and development of this outline Peat Management Plan (PMP).

In total 2,746 peat probes were advanced across the development site. Contouring of the peat probe results from all stages of the work has been undertaken to establish an estimation of the peat depths across the assessment site (Figures 1 and 2 in Appendix A). Recorded peat depths are tabulated within Appendix B. See Appendix C for EK Phase 1 peat probing findings. See SEPA email trail relating to peat in Appendix D.

The peat probing undertaken has generally confirmed that the majority of infrastructure has avoided deep peat with the exception of T18 (where the peat is considered to be very localised). Localised areas of deeper peat are also noted to have been recorded within turbine hardstanding areas associated with T20 and T15 (on its northern periphery) and within the substation area (localised probe locations). Sections of track which are proposed to be constructed over deeper areas of peat are proposed to be floated. The average depth of peat across the site is 0.80m. The maximum recorded peat depth was 4.07m.

Based on the final turbine layout the following peat depths have been recorded at the probe closest to each turbine location (Table 1):

Table 1: Recorded Peat Depths at Turbine Locations

Turbine Reference	Nearest Recorded Probe Depth (m)
1	0.3
2	0.5

Turbine Reference	Nearest Recorded Probe Depth (m)
3	0.3
4	0.2
5	0.4
6	0.3
7	0.2
8	0.3
9	0.2
10	0.3
11	0.3
12	0.1
13	0.2
14	0.6
15	0.2
16	0.7
17	0.4
18	1.8
19	0.3
20	0.2
Average	**0.39**

5 POTENTIAL IMPACTS ON PEAT DURING CONSTRUCTION

The initial construction phase for wind energy projects will often include soil and peat stripping and excavation activities associated with constructing the foundations for turbine bases, crane pads, access tracks/turning heads, substation, construction compound 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 gullying, 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 (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 in the next section which are designed to prevent these impacts from occurring.

6 GENERAL EXCAVATION PRINCIPLES

The development design was phased with a view 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, watercourse stand-off buffers, topography, telecommunications links and efficient operation of the turbines. Where it has not been possible to site infrastructure in areas of <1m of peat due to these other factors, efforts have been made to minimise the footprint of site infrastructure on deep peat as far as practicable.

The result is that most infrastructure has been sited outside areas of deep peat, as summarised below:

- 16 of the 20 turbine locations (exc. hardstanding areas) are sited on 'peaty soil' rather than peat, i.e. peat depth less than 0.5 m thick.
- Three of the 20 turbine locations (exc. hardstanding areas) are sited on peat recorded at depths between 0.5 m and 1.0 m, therefore defined as peat, but not deep peat.
- The remaining one of the 20 turbines (T18) is sited on peat recorded at depths greater than 1.0m (1.8m) constituting deep peat, however is considered to be a very localised peat deposit given the predominance of peat <1.0m thick in surrounding probe locations. T18 is also restricted by the watercourses to the west and east of the crane pad and the pipeline to the south. Following detailed pre-construction site investigations, there may be an opportunity to micro-site T18 in order to reduce the volume of peat requiring excavation.
- Localised areas of deeper peat are also noted to have been recorded within turbine hardstanding areas associated with T20 and T15 (on its northern periphery) and within the substation area (localised probe locations).
- All other infrastructure elements (construction compound, , borrow pits) are sited on areas with average peat depth less than 1.0 m.
- Proposed new tracks/turning heads/crane pads are generally sited on areas where peat depth is less than 1.0 m with the exception of some localised thicker peat deposits, including the turning head and section of track either side to south of T5 which had to be relocated due to a bog pool in the vicinity of the turning heads original position to the south. The requirement for peat excavation at these locations will be minimised, via the construction of 2.01km of floating road.

Micro-siting would be subject to findings from detailed pre-construction site investigation works and advice by the geotechnical engineering supervisor during construction works. The Applicant has requested a micrositing allowance of 100m for turbines and for infrastructure, to allow maximum flexibility.

During the construction of the development, all reasonable measures will be taken to avoid or minimise excavations and minimise disturbance to peat and peatland habitats.

Ground disturbance areas around excavations will be kept to a minimum and will be clearly defined on-site. Access to working areas during construction will be restricted to specified routes, comprising constructed tracks.

Cable routes will in general follow access tracks. Any peat excavated will be replaced immediately upon laying of the cable in the order of excavation. Therefore, this has not been included within the excavation volumes in the following section however will still need to be managed on-site and the details of this will be provided within the Detailed PMP for the development, to be prepared post-consent and following pre-investigative works, as specified by condition.

Peat and topsoil excavated at the construction compound will be stored and then reinstated immediately following the construction phase. Therefore, peat generated from this area has also not been included within the excavation volumes however again will still need to be managed on-site. The details of site-specific storage methodology and locations will be provided within the Detailed PMP, to be prepared post-consent and following pre-investigative works, as specified by condition.

7 ESTIMATION OF PEAT VOLUMES TO BE EXCAVATED

It is considered that there will be a requirement to excavate peat as part of the following construction activities (noting the assumptions in Section 6):

- New track (including turning heads, internal site tracks and site access) construction;
- Turbine foundation and crane hardstanding construction;
- Substation construction; and
- Borrow Pit development.

The estimation of volumes of excavated peat generated from each of the above construction activities are presented in Table 2 below and are based on input parameters generated based on the design freeze layout shapefiles and a modelled peat contour plan developed by high-density probing surveys (Figure 2). Please also note the associated assumptions, some of which are based on input parameters provided by the Applicant for previous similar schemes.

Table 2: Estimation of Excavated Peat

Construction Process*	Construction Type	Assumption	Approximate Estimated Peat Volume(m^3) per type	Approximate Estimated Peat Volume(m^3) Excavation to Full Depth	Approximate Estimated Peat Volume(m^3) Assuming max excavation depth of 45cm for all track elements
New Track (Approximate)		Excavated to full depth of peat below footprint	31665.53	**31,666**	**22,587**
Turning Heads		Excavated to full depth of peat below footprint	17023.70	**17,024**	**11,498**
Turbine Foundation and Crane hardstanding construction*	Crane Pad/Hardstanding	Excavated to full depth of peat below footprint	66541.27	**66,541**	**66,541**
Substation	Substation	Excavated to full depth of peat below footprint	6320.97	**6,321**	**6,321**
Borrow Pit Development	BP1 (north)	Excavated to full depth of peat below footprint	7319.03	**19,505**	**19,505**
	BP2 (south)	Excavated to full depth of peat below footprint	8318.69		
	BP3 (West)	Excavated to full depth of peat below footprint	3867.52		
Grand Total				**141,057**	**126,453**

Assumptions		Example Figure
Construction Process*	All excavations for the construction process will remove the full depth of Peat below the footprint of the infrastructure **Volumes in Red added assuming the maximum excavation depth is 45cm**	
New tracks and turning heads	Files do not differentiate between existing, new, temporary, floating tracks and therefore **the result will likely be an over-estimate of approximate Peat Excavation**	
Turbine Foundation and Crane hardstanding construction*	Files received for Crane Pads give a combined footprint for turbine foundations, Crane hardstandings, Laydown areas, Boom supports, track, etc - **the result will likely be an over-estimate of approximate Peat Excavation**	

Overlaps and Gaps	These calculations contain no overlapping areas and do not include any Temporary construction (Construction Compound) Gaps in the supplied footprint files, between features (Tracks and Borrow Pits, etc have **not** been filled in)	

Total peat excavation: The total calculated volume of excavated peat as a result of the development construction is therefore 126,453m^3.

There are two distinct layers within peat, the upper acrotelm and the lower catotelm. The acrotelm is the fibrous surface to the peatland, which exists between the growing peat surface and the lowest position of the water table in dry summers.

Peat soil generally below 0.5 m to up to 1 m in depth is classified as the catotelm, moderately decomposed with a high fibrous content and moderate water content. There are various stages of decomposition of the vegetation as it slowly becomes assimilated into the body of the peat.

It is assumed the upper 0.4m of peat is acrotelm and any deeper peat is catotelm. As such the total acrotelm and catotelm will be 50,581m^3 and 75,872m^3 respectively.

7.1 Estimated Volumes of Peat Reuse

7.2 Reuse Opportunities

During the construction phase there are considered to be a number of opportunities where peat may be reused on site. A number of these are described in the Scottish Renewables / Scottish Environment Protection Agency guidance document 'Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste', January 2012 (hereafter referred to as the SR/SEPA Guidance), while others are considered to be best practice techniques that are commonly used during windfarm construction. The following re-use opportunities are considered to applicable at Ballach:

Peat shoulders: The SR/SEPA Guidance provides comment on peat shoulders / verges as:

'Dressing off and reinstating peat on the slopes and edges of constructed infrastructure as soon as practicable after construction. This is a necessary part of the landscaping restoration process and should create a suitable tie-in with the surrounding topography, thereby reducing visual impacts while seeking at the same time to retain as much of the existing habitat as possible.'

It is considered that peat shoulders will be utilised on the verges of the new access tracks/turning heads and around the perimeter of all turbine foundations and crane hardstandings. Opportunities for the development of other peat shoulders may also be determined at detailed design stage based upon finalised infrastructure configurations.

Borrow pit restoration / habitat enhancement: The SR/SEPA Guidance comments on reinstatement of borrow pits as:

'Peat may be reused within borrow pits for the purpose of their restoration provided the method of reuse and final restoration profile is in keeping with overall habitat and environmental reinstatement objectives and requirements at the site and presents no residual risks from pollution of the environment or harm to human health.'

It is anticipated that each borrow pit would have a thickness of up to 1.0m of peat spread over the finished floor. It is considered that the deposition of this thickness of peat will aid in the enhancement of the future habitat within the area of each borrow pit.

Peatland restoration / habitat enhancement: The SR/SEPA Guidance comments on peatland restoration / habitat enhancement as:

'Peat may be used for ditch blocking as part of peatland restoration on blanket or raised bogs. This may be required as mitigation or enhancement measures for the site. The aim of ditch blocking is to raise the water table to restore the blanket bog conditions. Saturated peat may be the most suitable material for this use. Peat may be also required for creation of specific habitats, e.g. wetlands.'

More information on the above-noted peatland restoration proposals is provided in the Outline Habitat Management Plan, included as Technical Appendix 8.4.

7.3 Reuse Volume Capacity

7.11 Table 3 shows the estimated volumes of peat that can be used to reinstate infrastructure and provide appropriate landscaping for Ballach in line with the current best practice listed above and supplemented by input parameters generated based on the design freeze layout shapefiles (Appendix E). Please also note the associated assumptions and notes, some of which are based on input parameters provided by the Applicant for previous similar schemes:

Table 3: Reuse of Excavated Peat

Construction Process	Calculation	Approximate Estimated Peat Volume (m^3)
Track / Turning Heads Shoulders	Road Length (m) + Turning Head Perimeter Length (m) x Cross Sectional Area (m^2)	3,308
	10,760 + 4,992 x 0.21	
Turbine Foundation Covering	No. Turbines x Area (m^2) x Peat Thickness (m)	2,628
	20 x 219 x 0.6	
Crane Hardstanding Shoulders	No. Hardstandings x Perimeter Length (m) x Cross Sectional Area (m^2)	3,552
	20 x 555 x 0.32	
Crane Hardstanding Covering	No. Turbines x Area (m^2) x Peat Thickness (m)	60,540
	15 x 5045 x 0.6	
Borrow Pit Restoration	Excavation Area (m^2) x Peat Thickness (m)	
	BP1 (North) = 22,466 x 1.0	22,466
	BP2 (West) = 21,894 x 1.0	21,894
	BP3 (South) = 7,443 x 1.0	7,443
	Grand Total	**121,831**

Notes:

New track (including turning heads, internal site tracks and site access): There will be 10,760m of new track constructed on site (which includes section of floating track). The perimeter length of each of the 15 turning heads (based on shapefiles provided by Applicant) is anticipated to be approximately 333m. It is assumed that a 0.45m thick track shoulder will be formed with a side slope gradient of 1:2 (i.e. base width 0.9m). It is anticipated that peat shoulders would be utilised on both sides of the track to form a side slope of 1:3 (i.e. 1.35m base width). On this basis the cross-sectional area of peat shoulder per metre length of track would be approximately 0.21m^2. The total calculated volume of peat reuse capacity in track/turning head shoulders is therefore estimated to be approximately 3,308m^3.

Turbine foundation covering: The development consists of 20 turbines. The average excavation per turbine is estimated (based on shapefiles provided by Applicant) to cover an area of approximately 314m^2.

It is anticipated that up to 30% of this area will be finished with rockfill with the remaining 70% (219m^2) being available for the re-use of peat as a surface dressing. It is considered reasonable that a thickness of up to 0.6m of peat could be spread over these areas.

On this basis the total calculated volume of peat reuse capacity in turbine foundation covering is estimated to be approximately 2,628m^3.

Crane hardstanding shoulders: The development requires 20 turbine crane hardstandings. The perimeter length of each hardstanding (based on shapefiles provided by Applicant) is anticipated to be 555m. It is anticipated that the hardstandings will be approximately 0.8m thick (average).

It is assumed that the hardstanding shoulder construction will be formed with a side slope gradient of 1:2 (i.e. base width of 1.6m). Peat shoulders would be utilised on all sides of the hardstanding to form a side slope of 1:3 (i.e. 2.4m base width). On this basis the cross-sectional area of peat shoulder around the perimeter of each hardstanding would be approximately 0.32m^2.

The total calculated volume of peat reuse capacity in crane hardstanding shoulders is therefore estimated to be 3,552m^3.

Crane hardstanding covering: The average crane hardstanding excavation is estimated to cover an area of approximately 7,207m^2. It is also anticipated that up to 30% of this area will be finished

with rockfill with the remaining 70% (5,045m^2) being available for the re-use of peat as a surface dressing. It is considered reasonable that a thickness of up to 0.6m of peat could be spread over these areas.

The total calculated volume of peat reuse capacity in crane hardstanding cover is therefore estimated to be 60,540m^3.

Borrow pit restoration / habitat enhancement: Each used borrow pit would undergo some restoration / habitat enhancement once the required rock has been excavated. It is anticipated that this restoration / enhancement would include the initial placement of surplus rock material that may arise from the construction works (e.g. from tracks no longer needed following construction or construction compound hardcore etc). This will then be covered by an approximate 1.0m thickness of peat across the extracted borrow pit area. The combined anticipated area of the three borrow pits is 51,803m^2.

The total calculated volume of peat reuse capacity in borrow pit restoration is therefore 51,803m^3.

Restoration of temporary peat storage areas: On the basis of the above it is noted that the locations where peat can be re-used will not be available until completion of the majority of the construction works. As such, any peat identified for reuse in these areas will require to be temporarily stored on site prior to being moved to its permanent place.

The location of these areas are still to be confirmed at this stage and will be determined as the project progresses and the volume of peat requiring temporary storage is confirmed (and will be documented in the detailed PMP). It is assumed that any temporary peat storage areas will be situated in areas where there is little or no peat. As a result, the required peat strip to allow 'bedding' of the storage area on firm ground, has not been considered in the excavation estimates detailed in Table 2.

Following removal of peat from any temporary stockpile area(s), it is anticipated that these areas will require to be restored. Restoration is anticipated to include placement of up to 1.5m thickness of peat over the area. The possible re-use capacity for this has not been considered in the estimation of the overall reuse of excavated peat volume due to the uncertainty of the volumes of peat that will require to be temporarily stored.

Total peat reuse capacity: The total calculated volume of peat reuse capacity for the development construction is therefore approximately 121,831m^3.

On the assumption that the upper 0.4 m of peat is acrotelm and any deeper peat is catotelm, the total acrotelm and catotelm peat re-used on site will be 48,732m^3 and 85,282m^3 respectively.

7.4 Peat Excavation / Reuse Balance

On the basis of the available information, it appears that the estimated capacity for the permanent reuse of peat on site is less than the estimated excavation volume with a surplus of 4,662m^3. This surplus material will be used as part of the peat restoration works that are proposed to be undertaken as part of the habitat management plan. These restoration works are proposed to be undertaken within an area located in various locations across the development area. Reference to the Technical Appendix 8.4 Outline Habitat Management Plan, an area of 552ha is considered to be required to mitigate impact to peatland habitat and deliver significant biodiversity enhancements. The surplus peat would be used to dress areas of bare peat that are present within the developable area and to block drains / gullies to raise and stabilise the water table and slow runoff.

8 MANAGEMENT OF PEAT DURING CONSTRUCTION

8.1 General

The following recommendations form part of best practice guidance which may be considered by the contractor when directly handling peat to prevent instability (local and slide) of the natural peat and any peat stockpiles. The contractor will be required to produce a method statement identifying how good site practice will be implemented to ensure soils and peat are proposed to be safeguarded and to describe all mitigation measures that will be implemented.

All mitigation measures should be confirmed as suitable by the geotechnical representative responsible for peat and may be amended to suit site conditions. The contractor may propose alternative methodologies, and these should be considered by the geotechnical representative responsible for peat at that time, provided that a similar level of mitigation is provided.

8.2 Site Wide Recommendations

Wherever peat is encountered, and unstable conditions potentially exist, peat probes should be undertaken in advance of any excavation works at a maximum of 10m intervals unless otherwise advised by the geotechnical representative responsible for peat. Peat probe results should be recorded, and an assessment undertaken with regard to the suitability of the existing techniques and construction proposals prior to proceeding. The assessment of the techniques / proposals should be recorded.

Tracking of plant on undisturbed peat should not be permitted outside of the construction boundaries. Where this activity is necessary within the construction boundaries, machines should only track along proposed site tracks and designated construction areas. Any areas where the peat surface is broken or permanently altered should be inspected by the geotechnical representative responsible for peat and an assessment undertaken with regards to peat stability. The broken peat surface should be protected where considered necessary.

8.3 Earthworks and Excavations

The excavation and re-use of peat on site will be undertaken in accordance with best practice and as outlined in the Detailed Peat Management Plan.

Any peat deposits that are excavated as part of the development works will require to be excavated in turves and handled with care to avoid the mixing of peat layers (i.e. acrotelmic / catotelmic) and underlying mineral soils. Excavated peat turves should be stored in the correct manner (i.e. vegetation side up) and in proximity to the area in which they will be reinstated, to minimise double handling. The peat should be reinstated as soon as possible following excavation, to ensure that the peat remains in good condition.

In all areas where the works create unsupported excavations in peat, the excavations should be assessed by the geotechnical representative responsible for peat with regard to stability. Where it is not feasible or appropriate to leave the unsupported material at a safe angle of repose, consideration should be given to measures to support the excavation or revise the construction proposals. Wherever the construction proposals are amended this should be recorded.

All unsupported excavations in peat should be inspected by the contractor on a weekly basis and following periods of heavy rainfall or during thaw conditions. The inspection should record, as a minimum, the height and length of the unsupported excavation any evidence of erosion at the face of the excavation, and any evidence of tension cracks or instability in the adjacent peat mass. If

any differing or changing conditions are reported, works will cease and the geotechnical representative responsible for peat should be consulted and further assessment undertaken.

Where floating roads are constructed the performance of the road, type of road construction, and behaviour of the adjacent peat mass should be assessed by the contractor on a weekly basis. The assessment should include survey monitoring of the road level, recording of any cracking of the road surface, and any degradation or change in conditions since the previous inspection and since initial construction. Should any unexpected / unacceptable deformation in road or peat behaviour occur, works should cease, and an assessment be undertaken by the geotechnical representative responsible for peat and appropriate remedial actions taken.

8.4 Stockpiling

All areas where excavated arisings or imported materials are to be stockpiled should be assessed and approved by the geotechnical representative responsible for peat and the ECoW. Each proposed storage area should be stripped of peat beforehand, with the exception of areas where peat is to be deposited, unless instructed by the geotechnical representative responsible for peat. No materials will be stored in any areas of moderate / high risk of peat slide.

A maximum 1.0m height of peat stockpiling would apply where side casting from road excavations and a maximum 2.0m height of peat would apply within areas approved for peat stockpiling, unless otherwise agreed by the geotechnical representative responsible for peat. Excavated peat should be stored to ensure that the living layer of peat is retained for re-use. Excavated acrotelmic and catotelmic peat deposits should not be mixed and should be stored separately. The mixing of peat with other site won material should be avoided.

All areas of stockpiled arisings should be inspected by the contractor on a weekly basis and following periods of heavy rainfall or during thaw conditions. The inspection should record the height, length, and slope gradients of the stockpile, any evidence of instability or erosion and any change in conditions since the previous inspection or since initial construction. If any differing or changing conditions are reported, works will cease and the geotechnical representative responsible for peat consulted and further assessment undertaken.

The topography, peat depth, peat condition / strength, and proximity to water courses should be investigated / considered prior to selection of any area for stockpiling of peat.

8.5 Drainage

Ponding of water on the site surface, within excavations, and on roads should be avoided wherever possible. Should ponding occur, the water should be drained in a controlled manner to an appropriate discharge point, as soon as practicable. Measures should be implemented to prevent re-occurrence of the ponding event. Any areas where ponding has occurred, and actions taken, should be recorded.

Wherever surface water is to be discharged (pumped or new drainage ditch discharge) an assessment should be undertaken by the contractor, and geotechnical representative responsible for peat as necessary, with regard to the adequacy of the receptor. The assessment should consider, as a minimum the existing potential flow rate and volume of water, the route of the ditch or stream if relevant, topography of surrounding ground, depth of peat, and evidence of existing erosion or potential for erosion to occur, both during normal flow and storm flow conditions. The assessment should be recorded.

All new pumped drainage discharges should be attenuated prior to entering existing watercourses. Attenuation measures may include discharge onto existing vegetation, discharge into ponds, and discharge through soakaways. The attenuation measures considered / adopted should be recorded. All pumped discharge points should be inspected on a daily basis and no pumps left

running overnight or when no personnel are in attendance. The inspection should include the recording of any build-up of material on the surface, the presence of standing water, saturation of the ground, settlement / heave of the peat, cracking of the surface, and any degradation and change in conditions since the previous inspection and since initial construction.

All drainage discharge locations should be inspected by the contractor on a weekly basis and following periods of heavy rainfall or during thaw conditions. The inspection should record, as a minimum, the observed depth of water, and any evidence of erosion along the route of discharge area / ditch / stream as relevant. During each inspection consideration should be given to amending the location of pumped discharge to avoid concentrating flow into limited areas.

Whenever possible multiple discharge points should be adopted to distribute the flow from each source.

Pumping out with normal working hours would not be permitted, unless agreed by the geotechnical representative responsible for peat.

8.6 Cable Trenches

During construction of cable trenches consideration should be given to the potential for these to act as drainage conduits. Where necessary temporary outfalls from the trenches should be provided, with the outfalls subject to assessment and recorded.

In the permanent condition the cable trench should incorporate clay bunds, or similar means of mitigating against uncontrolled water flow, at regular intervals. The location and nature of any mitigating measures should be recorded.

9 CONCLUSION

An outline peat management plan has been undertaken for the proposed Ballach Wind Farm development with respect to the most recent proposed turbine and infrastructure layouts and additional information obtained from peat probing works that have been undertaken at the site.

These peat probing exercises have indicated that peat is present across the assessment site, although the iterative design process has resulted in deep (>1.0m) peat being avoided with the exception of T18 and some sections of turning heads and track (which will be floated). As a result, there is a requirement for consideration to be made in relation to the volume of peat that is anticipated to be excavated, opportunities for the excavated peat to be used as part of the development and best practice methods that should be employed during construction.

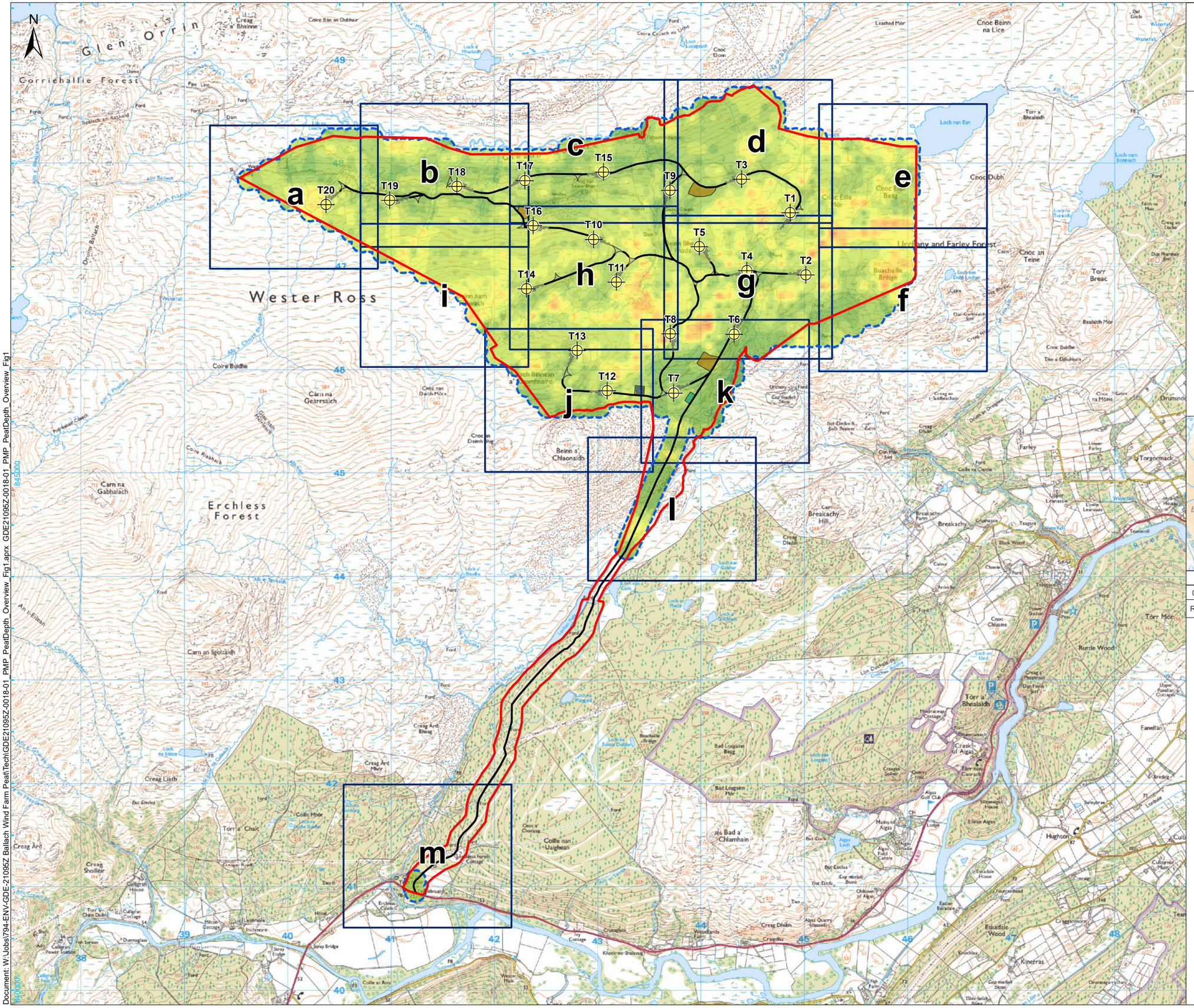
On the basis of the available information the estimated capacity for the permanent reuse of peat on site is less than the estimated excavation volume with a surplus of 4,662m^3 remaining. This surplus material will be used as part of the peat restoration works that are proposed to be undertaken as part of the habitat management plan for the site.

A number of best practice recommendations for the management of peat during the construction phase of the development have been presented in this report. All items should be confirmed as suitable by the geotechnical representative responsible for peat during the development. Alternative methodologies may be proposed and in this case, these should be considered at that time by the geotechnical representative responsible for peat.

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 conditioned, and maintenance and updating of this plan in conjunction with an updated geotechnical (peat) risk register by a Geotechnical Engineer would also be conditioned.

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. The detailed PMP and the CEMP for the development would also include detailed Construction Method Statements and a ‘live’ Geotechnical Risk Register. These documents and the associated management and monitoring onsite would ensure the active consideration and protection of peat in all aspects of the construction process.

Appendix A
INTERPOLATED PEAT DEPTH



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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)
- Tile Extent

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m

Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:35,000	16/06/25
Figure Number		**Rev**
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

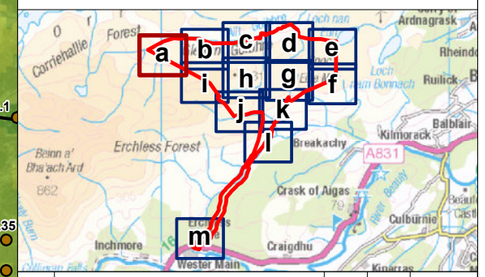
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RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
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- 2.50 - 2.99m



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- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

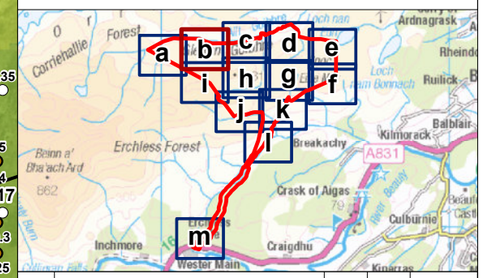
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

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- Phase 2b (March 2025)

Interpolated Peat Depth

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EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

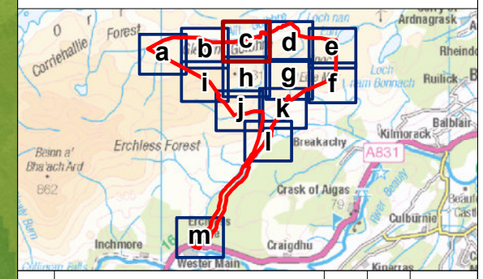
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
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- 2.00 - 2.49m
- 2.50 - 2.99m



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- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

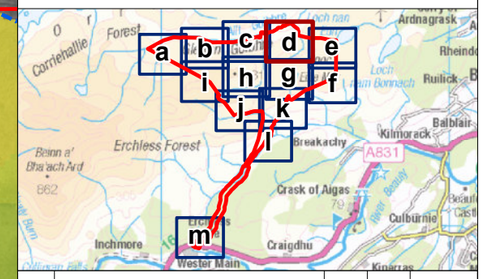
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RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0m
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- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
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Project: Ballach Wind Farm

Title: Interpolated Peat Depth

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0.7 1.34 0.43 0.13 0.9 0.27 1.11 0.05 0.17
0.74 0.26 0.31 0.34 0.39 0.44 2.2 0.33 1.89 0.08
2.18 0.4 0.26 0.32 0.45 0.79 1.34 1.84 0.28 0.64
0.29 1.96 1.53 2.62 3.18 0.76 1.04 0.08 0.51
0.75 0.22 1.66 1.58 0 1.06 0.54 0.19 0.24
1.56 2.53 1.65 0.57 0.14 2.96 3.41 3.64 2.97
0.35 3.99 2.85 2.43 3.28 2.63 1.8 1.25 1.61
3.67 1.61 3.13 0.49 0.52 0.37 1.38 1.75 1.72

bing

0 50 100 150 200 Metres

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Legend

Site Boundary

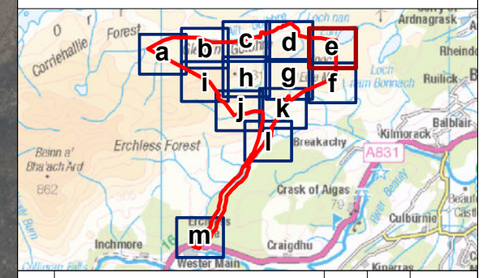
Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

Phase 1

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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T: +44(0)131 555 5011 E: RPS.Edinburgh@rps.tetratech.com

Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2e		**01**

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245500
246000
246500
847000
846500
N
0.35 3.99 2.85 2.43 3.28 2.63 1.8 1.25 1.61
3.67 1.61 3.13 0.49 0.52 0.37 1.38 1.75 1.72
1.33 1.25 0.62 0.86 0.54 0.51 0.98 2.64 1.19
0.45 1.62 0.66 0.55 0.31 1.9 2.23 2.1 2.84
0.61 0.77 0.08 0.44 0.31 0.97 3.13 2.65 0.42
3.28 2.44 0.41 0.23 2.06 0.27 3.64 0.25
0.66 0.21 0 0.2 0.35 0.42 0.06 1.98
0.31 0.25 0.09 0.16 0.22 0.4 0.1
0.09 0.11 0.05 0.08 0.44 0.41
0.22 0.51 0.49 0.24
0.04 0.87
bing
0 50 100 150 200 Metres

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Legend

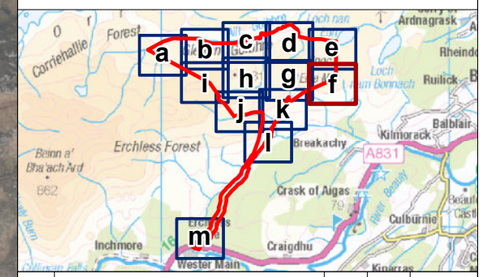
- Site Boundary
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 1

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



Rev	Description	By	CB	Date
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Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
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244000 244500 245000

N

T5 T4 T6 T8 T2

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

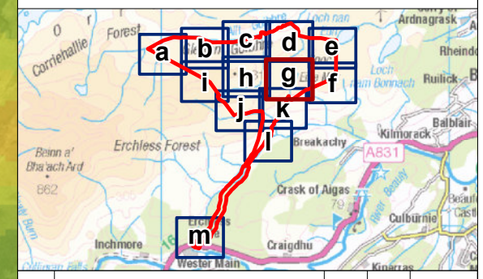
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

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Project Number	**Scale @ A3**	**Date Created**
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0 50 100 150 200 Metres

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242500 243000 243500

847000 846500

T16 T10 T14 T11 T8

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

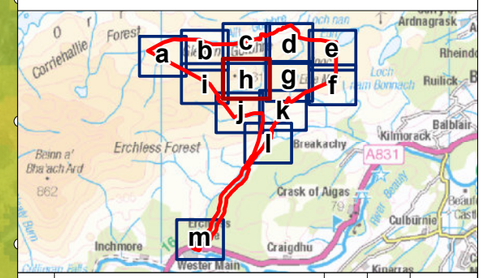
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

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241000 241500 242000

847000

846500

N

0.88 0.74 0.84 1.38 0.74 0.72 2.2 1.08 0.96 0.38 0.54 0.4 0.48 0.8 0.71 1.02 0.85 0.4 0.55 0.95 0.85 0.85 0.9 0.6 0.7 0.75 0.95 0.8 0.7 1.1 1.2

0.84 1.5 0.7 1.73 0.8 2.2 1.18 0.52 0.94 0.48 1.16 0.8 0.56 0.52 0.37 0.42 0.75

0.26 0.54 2.2 0.24 1.86 0.42 0.34 0.58 0.36 0.4 1.3 1.16 2.05 0.92 0.86

2.2 1.16 1.16 0.44 0.68 0.5 0.53 1.12 0.52 1.56 1.24 1.56 1.1

1.1 0.54 0.82 0.42 1 0.82 0.98 0.5 1.88 0.53 1.12

1.06 1.18 0.92 1.9 0.82 2.2 0.88 0.23 0.11 0.5 0.45 0.3 0.9 T14 0.55 1.8 0.75 0 0.3

1.9 0.98 0.94 1.88 2.37 1.09

0.16 1.7 1.88 1.14 0.41 0.08

3 1.68 1.4 0 0.84 0.83

0.07 0.37 0.6 1.62 1.96

0.66 0.18 0.68 0.91

0.9 0.52 0.92 0.72

0.55 0.72 1.21 0.7

0.12 2.8

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

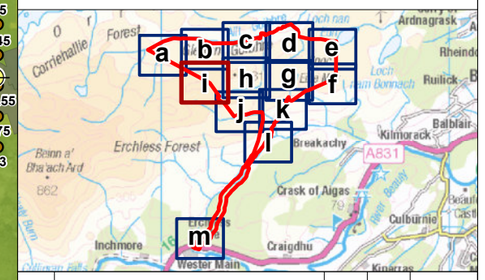
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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242000 242500 243000 243500

N

T13 T12

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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

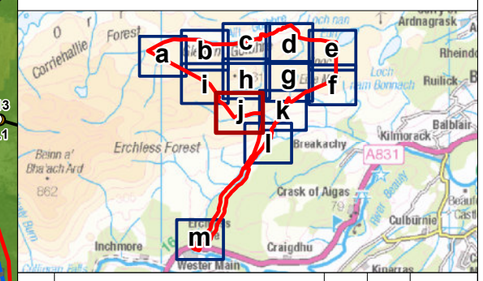
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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243500 244000 244500 245000

N

T8 T6 T7

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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

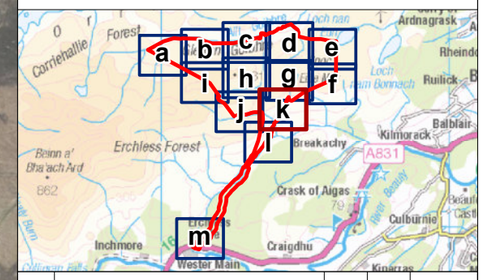
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Figure Number		**Rev**
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0 50 100 150 200 Metres

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243000 243500 244000 244500

846000 844500 843000

N

0.25 0.2 0.3 0.05 0.05 0.05 0.1 0.1 0.1 2.25 2.5 2.45 0.1 0.15 0.1 0.6 0.3 0.1 0.05 0.05 0.05 0.25 0.1 0.1 0.05 0.1 0.1 0.2 0.3 0.3 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.4 0.2 0.1 0.1 0.1 0.1 0.1 1.2 0.1 0.1 0.8 1.9 0.3 1.7 2 1.9 2 2 0.3 1.5 1.8 2.4 0.6 1.6 0.1 0.2 0.2 0.2 0.1 0.2 0.2 0.2

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Legend

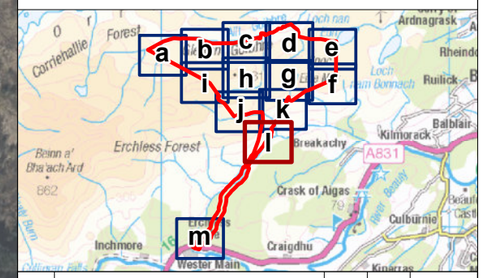
- Site Boundary
- Site Access Track
- Peat Analysis Boundary (100m)

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
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241000
241500
242000
841500
841000
N
0.35
0.3
0.25
bing

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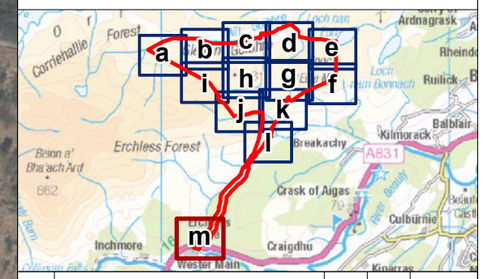
- Site Boundary
- Site Access Track
- Peat Analysis Boundary (100m)

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0.25 - 0.49m



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Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
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Document: W:\Jobs\794-ENV-GDE-21095Z Ballach Wind Farm Peat\Tech\GDE21095Z-0019-01_PMP_PeatDepth_Tiles_Fig2.aprx GDE21095Z-0018-01_PMP_PeatDepth_Tiles_Fig2

Appendix B
TABULATED RECORDED PEAT DEPTH

Label_ID	Easting	Northing	Depth
A001	243269	844275	0.2
A002	243278	844271	0.2
A003	243287	844267	0.2
A004	243289	844321	0.2
A005	243298	844317	0.2
A006	243307	844313	0.1
A007	243310	844367	1.6
A008	243319	844363	0.1
A009	243328	844359	0.2
A010	243330	844412	1.8
A011	243339	844408	2.4
A012	243348	844404	0.6
A013	243350	844458	2
A014	243359	844454	0.3
A015	243368	844450	1.5
A016	243370	844504	2
A017	243379	844499	1.9
A018	243389	844495	2
A019	243390	844550	1.9
A020	243399	844546	0.3
A021	243408	844542	1.7
A022	243411	844595	0.1
A023	243420	844591	0.1
A024	243429	844587	0.8
A025	243431	844641	0.1
A026	243440	844637	0.1
A027	243449	844633	1.2
A028	243452	844686	0.4
A029	243461	844682	0.2
A030	243470	844678	0.1
A031	243472	844732	0.1
A032	243481	844728	0.1
A033	243490	844724	0.1
A034	243492	844778	0.1
A035	243501	844774	0.1
A036	243510	844770	0.1
A037	243512	844824	0.1
A038	243521	844820	0.1
A039	243530	844816	0.1
A040	243532	844870	0.2
A041	243541	844866	0.1
A042	243550	844862	0.1
A043	243552	844916	0.2
A044	243561	844911	0.3
A045	243570	844907	0.3
A046	243573	844961	0.05
A047	243582	844957	0.1
A048	243591	844952	0.1
A049	243596	845006	0.25
A050	243605	845001	0.1
A051	243614	844997	0.1
A052	243619	845050	0.05
A053	243628	845046	0.05
A054	243637	845041	0.05
A055	243641	845095	0.6
A056	243650	845090	0.3
A057	243659	845086	0.1
A058	243664	845139	0.1

A059	243673	845135	0.15
A060	243682	845130	0.1
A061	243687	845183	2.25
A062	243696	845179	2.5
A063	243705	845175	2.45
A064	243706	845228	0.1
A065	243715	845225	0.1
A066	243725	845222	0.1
A067	243722	845276	0.05
A068	243732	845272	0.05
A069	243741	845269	0.05
A070	243739	845323	0.25
A071	243748	845320	0.2
A072	243758	845316	0.3
A073	243755	845369	0.1
A074	243765	845367	0.05
A075	243774	845365	0.3
A076	243766	845417	0.75
A077	243775	845416	1
A078	243785	845414	1.25
A079	243775	845468	2.85
A080	243785	845465	0.8
A081	243794	845461	1.2
A082	243792	845515	0.25
A083	243801	845512	0.1
A084	243810	845508	0.15
A085	243809	845562	0.1
A086	243819	845558	0.15
A087	243828	845555	0.15
A091	243846	845600	0.05
A092	243981	845811	0.1
A093	244008	845853	0.2
A094	244036	845895	0.2
A095	244063	845937	0.2
A096	243519	845737	0.1
A097	243471	845748	0.6
A098	243421	845752	0.6
A099	243371	845756	0.7
A100	243321	845760	0.25
A101	243272	845766	2.55
A102	243222	845771	0.15
A103	243172	845776	0.2
A104	243956	845893	0.2
A105	243999	845919	0.1
A106	244039	845949	0.1
A107	242735	845887	1.2
A108	242765	845847	0.1
A109	242805	845818	0.15
A110	242852	845801	0.5
A111	243662	846110	0.1
A112	243647	846062	0.1
A113	243635	846014	0.1
A114	243617	845967	0.05
A115	243605	845919	0.15
A116	243607	845869	0.1
A117	244540	846853	0.1
A118	244522	846807	0.3
A119	244504	846760	0.2
A120	244494	846712	0.2

A121	244484	846662	0.2
A122	244469	846615	0.2
A123	244448	846570	0.2
A124	244756	846931	0.2
A125	244706	846934	0.2
A126	244656	846937	0.2
A127	244114	846998	0.2
A128	243424	847031	2.65
A129	243471	847048	2.8
A130	243517	847066	0.2
A131	243566	847075	2.55
A132	243616	847077	0.45
A133	243666	847075	0.4
A134	243715	847069	0.1
A135	243105	847064	0.3
A136	243060	847044	0.15
A137	243012	847032	1.1
A138	242963	847020	0.45
A139	242917	847002	1
A140	242871	846981	0.95
A141	242826	846960	0.15
A142	242781	846939	0.2
A143	242734	846921	0.1
A144	242874	847310	1.1
A145	242826	847323	0.7
A146	242777	847336	0.65
A147	242729	847349	0.3
A148	242681	847363	0.3
A149	242632	847371	0.6
A150	244948	847715	0.4
A151	244921	847756	0.3
A152	244880	847784	0.2
A153	244839	847814	0.2
A154	244797	847840	0.2
A155	244753	847863	0.2
A156	244709	847887	0.2
A157	244665	847911	0.2
A158	244617	847924	0.2
A159	244567	847923	0.2
A160	244518	847912	0.2
A161	244471	847897	0.3
A162	243621	847488	0.1
A163	243614	847438	0.1
A164	243615	847388	0.1
A165	243623	847339	0.3
A166	243637	847291	0.25
A167	243652	847243	0.2
A168	243670	847197	0.2
A169	243688	847150	0.25
A170	243708	847104	0.5
A171	243739	847065	1.05
A172	243781	847039	0.7
A173	243826	847018	0.3
A174	243864	846986	0.3
A175	243884	846941	0.6
A176	243906	846896	0.75
A177	243943	846865	0.9
A178	243991	846850	0.4
A179	244040	846847	2.3

A180	241239	847680	0.3
A181	241236	847716	0.1
A182	241286	847703	0.1
A183	241325	847690	0.2
A184	241386	847659	0.1
A185	241449	847676	0.2
A186	241486	847698	0.2
A187	241535	847700	0.1
A188	241585	847701	0.1
A189	241636	847700	0.1
A190	241685	847686	0.1
A191	241730	847672	0.1
A192	241780	847671	0.1
A193	241830	847670	0.1
A194	241881	847669	0.1
A195	241932	847660	0.05
A196	241970	847625	0.05
A197	242015	847609	0.35
A198	242065	847609	0.1
A199	242115	847609	2.2
A200	242160	847590	1
A201	240970	847694	0.1
A202	240921	847700	1.2
A203	240871	847705	0.1
A204	240821	847708	0.1
A205	240772	847709	0.3
A206	240722	847710	0.1
A207	240672	847711	0.2
A208	240622	847711	0.15
A209	240573	847701	0.2
A210	241860	847715	0.4
A211	241909	847709	0.3
A212	241959	847712	0.6
A213	242007	847725	0.3
A214	242055	847740	0.2
A215	243736	847826	0.4
A216	242369	847878	0.7
A217	242419	847886	0.1
A218	242468	847892	0.2
A219	242518	847896	0.3
A220	242568	847896	0.1
A221	242618	847895	0.2
A222	242668	847895	0.2
A223	243151	847910	0.2
A224	243198	847928	0.1
A225	243244	847947	0.3
A226	243291	847963	0.2
A227	243339	847979	0.2
A228	243386	847993	0.9
A229	243436	848001	0.2
A230	243485	848009	0.1
A231	243534	848018	0.2
A232	243583	848027	0.2
A233	243633	848031	0.2
A234	243683	848028	0.3
A235	243731	848016	0.2
B0001	243812	845655	0.3
B0002	243837	845655	0.35
B0003	243862	845655	0.3

B0004	243887	845655	0.25
B0005	243762	845680	0.15
B0006	243787	845680	0.2
B0007	243812	845680	0.25
B0008	243837	845680	0.9
B0009	243862	845680	0.25
B0010	243887	845680	0.25
B0011	243912	845680	0.1
B0012	243762	845705	0.15
B0013	243787	845705	0.2
B0014	243812	845705	0.35
B0015	243837	845705	0.65
B0016	243862	845705	0.2
B0017	243887	845705	0.2
B0018	243912	845705	0.15
B0019	243012	845730	0.25
B0020	243037	845730	0.45
B0021	243062	845730	0.1
B0022	243087	845730	0.4
B0023	243562	845730	0.1
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B0025	243612	845730	0.05
B0026	243637	845730	0.05
B0027	243787	845730	0.25
B0028	243812	845730	0.1
B0029	243837	845730	0.5
B0030	243862	845730	0.15
B0031	243887	845730	0.1
B0032	243912	845730	0.35
B0033	243937	845730	0.1
B0034	242937	845755	0.1
B0035	242962	845755	0.2
B0036	242987	845755	0.1
B0037	243012	845755	0.1
B0038	243037	845755	0.05
B0039	243062	845755	0.1
B0040	243087	845755	0.1
B0041	243112	845755	0.95
B0042	243587	845755	0.1
B0043	243612	845755	0.1
B0044	243637	845755	0.1
B0045	243662	845755	0.05
B0046	243687	845755	0.55
B0047	243712	845755	0.9
B0048	243737	845755	0.25
B0049	243762	845755	1.2
B0050	243787	845755	1.4
B0051	243812	845755	0.7
B0052	243837	845755	0.65
B0053	243862	845755	0.5
B0054	243887	845755	0.25
B0055	243912	845755	0.15
B0056	243937	845755	0.2
B0057	242887	845780	0.3
B0058	242912	845780	0.45
B0059	242937	845780	0.2
B0060	242962	845780	1.2
B0061	242987	845780	0.1
B0062	243012	845780	0.15

B0063	243037	845780	0.15
B0064	243062	845780	0.3
B0065	243087	845780	0.1
B0066	243112	845780	1.2
B0067	243137	845780	0.2
B0068	243612	845780	0.1
B0069	243637	845780	0.1
B0070	243662	845780	0.05
B0071	243687	845780	0.05
B0072	243712	845780	0.2
B0073	243737	845780	0.2
B0074	243762	845780	0.1
B0075	243787	845780	0.15
B0076	243812	845780	0.3
B0077	243837	845780	0.3
B0078	243862	845780	0.4
B0079	243887	845780	0.3
B0080	243912	845780	0.3
B0081	243937	845780	0.3
B0082	243962	845780	0.3
B0083	242887	845805	0.15
B0084	242912	845805	0.4
B0085	242937	845805	0.7
B0086	242962	845805	1.45
B0087	242987	845805	0.75
B0088	243012	845805	0.1
B0089	243037	845805	0.2
B0090	243062	845805	0.2
B0091	243087	845805	0.05
B0092	243112	845805	1.15
B0093	243612	845805	0.15
B0094	243637	845805	0.2
B0095	243662	845805	0.3
B0096	243687	845805	0.3
B0097	243712	845805	0.4
B0098	243737	845805	0.5
B0099	243762	845805	0.4
B0100	243787	845805	0.1
B0101	243812	845805	0.6
B0102	243837	845805	0.2
B0103	243862	845805	0.2
B0104	243887	845805	0.4
B0105	243912	845805	0.4
B0106	243937	845805	0.2
B0107	243037	845830	0.2
B0108	243062	845830	0.1
B0109	243087	845830	0.05
B0110	243612	845830	0.15
B0111	243637	845830	0.15
B0112	243712	845830	0.4
B0113	243737	845830	0.5
B0114	243762	845830	0.2
B0115	243787	845830	0.2
B0116	243812	845830	0.2
B0117	243837	845830	0.2
B0118	243862	845830	0.3
B0119	243887	845830	0.2
B0120	243737	845855	0.3
B0121	243762	845855	0.2

B0122	243787	845855	0.3
B0123	243812	845855	0.2
B0124	243837	845855	0.3
B0125	243862	845855	0.2
B0126	243887	845855	0.1
B0127	243912	845855	0.2
B0128	243787	845880	0.2
B0129	243862	845880	0.2
B0130	243887	845880	0.2
B0131	243912	845880	0.1
B0132	242612	845930	0.35
B0133	242637	845930	0.25
B0134	242687	845930	0.2
B0135	242712	845930	0.4
B0136	242612	845955	0.35
B0137	242637	845955	0.3
B0138	242662	845955	0.2
B0139	242687	845955	0.2
B0140	242712	845955	0.55
B0141	242637	845980	1.1
B0142	242662	845980	0.2
B0143	242687	845980	0.1
B0144	242712	845980	0.7
B0145	244087	845980	0.4
B0146	242662	846005	0.15
B0147	242687	846005	0.25
B0148	242712	846005	0.25
B0149	244037	846005	0.3
B0150	244062	846005	0.2
B0151	244087	846005	0.2
B0152	244112	846005	0.2
B0153	242687	846030	0.2
B0154	242712	846030	0.15
B0155	242737	846030	0.8
B0156	243962	846030	0.3
B0157	243987	846030	0.4
B0158	244012	846030	0.6
B0159	244037	846030	0.3
B0160	244062	846030	0.4
B0161	244087	846030	0.3
B0162	244112	846030	0.5
B0163	244137	846030	0.6
B0164	242687	846055	0.1
B0165	242712	846055	0.2
B0166	242737	846055	0.25
B0167	242762	846055	0.85
B0168	243962	846055	0.3
B0169	243987	846055	0.3
B0170	244012	846055	0.3
B0171	244037	846055	0.7
B0172	244062	846055	0.4
B0173	244087	846055	0.4
B0174	244112	846055	0.7
B0175	244137	846055	0.6
B0176	242712	846080	0.15
B0177	242737	846080	0.1
B0178	242762	846080	0.2
B0179	242787	846080	0.5
B0180	242812	846080	1.25

B0181	243962	846080	0.3
B0182	243987	846080	0.2
B0183	244012	846080	0.5
B0184	244037	846080	0.4
B0185	244062	846080	0.4
B0186	244087	846080	0.4
B0187	244112	846080	0.3
B0188	244137	846080	0.5
B0189	244162	846080	0.4
B0190	242737	846105	0.1
B0191	242762	846105	0.15
B0192	242787	846105	0.15
B0193	242812	846105	1.4
B0194	243987	846105	0.3
B0195	244012	846105	0.4
B0196	244037	846105	0.4
B0197	244062	846105	0.3
B0198	244087	846105	0.4
B0199	244112	846105	0.4
B0200	244137	846105	0.4
B0201	244162	846105	0.4
B0202	242737	846130	1.1
B0203	242762	846130	0.15
B0204	242787	846130	0.2
B0205	242812	846130	1.05
B0206	242837	846130	1.7
B0207	243987	846130	0.2
B0208	244012	846130	0.2
B0209	244037	846130	0.3
B0210	244062	846130	0.2
B0211	244087	846130	0.3
B0212	244112	846130	0.4
B0213	244137	846130	0.3
B0214	244162	846130	0.3
B0215	242737	846155	0.15
B0216	242762	846155	0.1
B0217	242787	846155	0.2
B0218	242812	846155	0.2
B0219	242837	846155	1.7
B0220	242862	846155	1.45
B0221	243662	846155	0.2
B0222	243687	846155	0.15
B0223	244012	846155	0.2
B0224	244037	846155	0.2
B0225	244062	846155	0.3
B0226	244087	846155	1.3
B0227	242762	846180	0.2
B0228	242787	846180	0.25
B0229	242812	846180	0.2
B0230	242837	846180	1.55
B0231	242862	846180	1.6
B0232	243662	846180	0.2
B0233	243687	846180	0.25
B0234	244012	846180	0.2
B0235	244037	846180	0.3
B0236	244187	846180	0.2
B0237	244212	846180	0.2
B0238	242762	846205	0.15
B0239	242787	846205	0.2

B0240	242812	846205	0.25
B0241	242837	846205	0.5
B0242	243637	846205	1.7
B0243	243662	846205	0.3
B0244	243687	846205	0.2
B0245	244187	846205	0.2
B0246	244212	846205	0.2
B0247	244237	846205	0.2
B0248	243662	846230	0.5
B0249	243687	846230	0.1
B0250	244187	846230	0.2
B0251	244212	846230	0.2
B0252	244237	846230	0.2
B0253	243637	846255	2.6
B0254	243662	846255	2.3
B0255	243687	846255	0.3
B0256	243712	846255	0.2
B0257	244187	846255	0.2
B0258	244212	846255	0.2
B0259	244237	846255	0.2
B0260	244262	846255	0.2
B0261	243637	846280	3.7
B0262	243662	846280	3.75
B0263	243687	846280	3.25
B0264	243712	846280	1.3
B0265	244162	846280	0.2
B0266	244187	846280	0.2
B0267	244212	846280	0.2
B0268	244237	846280	0.2
B0269	244262	846280	0.2
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B0298	244262	846380	0.2

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B0307	244362	846405	0.3
B0308	244387	846405	0.2
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B0727	242337	847530	0.4
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B0774	243637	847580	0.1
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B0785	240362	847605	0.2
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B0787	240412	847605	0.5
B0788	240437	847605	0.2
B0789	240837	847605	0.2
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B0791	240887	847605	0.2
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B0812	240387	847630	0.4
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B0822	241062	847630	0.6
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B1032	244287	847805	0.4
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C010	240512	847780	1.3
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C013	240513	847831	0.8
C014	240537	847805	0.5
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C026	241238	847655	0.2
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C029	241263	847680	0.2
C030	241263	847655	0.35
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C040	242662	845930	0.2
C041	242662	845905	0.6
C042	242668	845848	0.2
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C044	242703	845813	0.4
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C046	242712	846130	0.2
C047	242712	846105	0.2
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C067	243287	847005	1.75
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C102	243570	847107	0.3
C103	243618	847095	0.35
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C106	243634	847390	0.7
C107	243638	847341	2.15
C108	243647	847291	1.3
C109	243665	846038	0.2
C110	243696	846077	0.1
C111	243712	846230	0.6
C112	243712	846205	0.6
C113	243712	846180	0.4
C114	243712	846155	0.3
C115	243722	846388	0.2
C116	243724	846119	0.2
C117	243737	846380	0.1
C118	243737	846355	0.1
C119	243737	846280	0.2
C120	243737	846255	0.2
C121	243737	846230	0.5
C122	243737	846205	0.1
C123	243737	846180	0.2
C124	243737	846155	0.4
C125	243741	846421	0.25
C126	243762	846380	0.3
C127	243762	846355	0.1
C128	243762	846330	0.6
C129	243762	846305	2.1
C130	243762	846280	0.1
C131	243762	846255	0.2
C132	243762	846230	0.4
C133	243762	846205	0.3
C134	243782	846447	0.8
C135	243829	846463	1.2
C136	243868	846493	0.5
C137	243898	846533	0.4

C138	243906	846870	0.5
C139	243906	846845	0.45
C140	243917	846579	0.15
C141	243931	846772	0.45
C142	243931	846895	0.2
C143	243931	846870	0.15
C144	243931	846845	0.6
C145	243931	846820	0.5
C146	243931	846795	0.3
C147	243951	846616	0.95
C148	243956	846870	0.95
C149	243956	846845	0.6
C150	243956	846820	0.2
C151	243956	846795	1.65
C152	243957	846772	1.8
C153	243957	846759	2.2
C154	243969	846661	0.6
C155	243972	846711	0.15
C156	243981	846870	0.65
C157	243981	846845	0.55
C158	244006	846870	1.5
C159	244027	846876	2.1
C160	244059	846879	0.45
C161	244086	846905	1.3
C162	244113	846930	2.35

Appendix C
ATMOS PHASE 1 PEAT FINDINGS

Point Number	Easting	Northing	Depth
1	244017	845438	50
2	243917	845538	0
3	244017	845538	0
4	244117	845538	0
5	242517	845638	47
6	242617	845638	18
7	242717	845638	15
8	242817	845638	15
9	242917	845638	17
10	243017	845638	4
11	243617	845638	0
12	243717	845638	38
13	243817	845638	22
14	243917	845638	30
15	244017	845638	0
16	244117	845638	0
17	242417	845738	20
18	242517	845738	9
19	242617	845738	58
20	242717	845738	16
21	243117	845738	280
22	243217	845738	63
23	243317	845738	6
24	243417	845738	60
25	243517	845738	13
26	243617	845738	0
27	243717	845738	52
28	243817	845738	45
29	243917	845738	9
30	244017	845738	12
31	244117	845738	22
32	244217	845738	35
33	242317	845838	18
34	242417	845838	42
35	242517	845838	47
36	242617	845838	265
37	243217	845838	8
38	243317	845838	50
39	243417	845838	62
40	243517	845838	9
41	243617	845838	7
42	243717	845838	25
43	243817	845838	0
44	243917	845838	0
45	244017	845838	40
46	244117	845838	0
47	244217	845838	3
48	242317	845938	75
49	242417	845938	30
50	242517	845938	40
51	242617	845938	28
52	243317	845938	77
53	243417	845938	40
54	243517	845938	28
55	243617	845938	28
56	243717	845938	8
57	243817	845938	10
58	243917	845938	6

59	244017	845938	8
60	244117	845938	0
61	244217	845938	0
62	244317	845938	0
63	242217	846038	12
64	242317	846038	280
65	242417	846038	245
66	242517	846038	39
67	242617	846038	14
68	243917	846038	30
69	244017	846038	64
70	244117	846038	15
71	244217	846038	0
72	244317	846038	0
73	242017	846138	55
74	242117	846138	72
75	242217	846138	121
76	242317	846138	70
77	242417	846138	110
78	242517	846138	28
79	242617	846138	107
80	244117	846138	35
81	244217	846138	21
82	244317	846138	0
83	242017	846238	90
84	242117	846238	52
85	242217	846238	92
86	242317	846238	72
87	242017	846338	66
88	242117	846338	18
89	242217	846338	68
90	241917	846438	7
91	242017	846438	37
92	242117	846438	60
93	241817	846538	300
94	241917	846538	168
95	242017	846538	140
96	241817	846638	16
97	241917	846638	170
98	242017	846638	188
99	241717	846738	190
100	241817	846738	98
101	241917	846738	94
102	242017	846738	188
103	241517	846838	106
104	241617	846838	118
105	241717	846838	92
106	241817	846838	190
107	241917	846838	82
108	242017	846838	220
109	241317	846938	110
110	241417	846938	54
111	241517	846938	82
112	241617	846938	42
113	241717	846938	100
114	241817	846938	82
115	241917	846938	98
116	242017	846938	50
117	241117	847038	220

118	241217	847038	116
119	241317	847038	116
120	241417	847038	44
121	241517	847038	68
122	241617	847038	50
123	241717	847038	53
124	241817	847038	112
125	241917	847038	52
126	242017	847038	156
127	240917	847138	26
128	241017	847138	54
129	241117	847138	220
130	241217	847138	24
131	241317	847138	186
132	241417	847138	42
133	241517	847138	34
134	241617	847138	58
135	241717	847138	36
136	241817	847138	40
137	241917	847138	130
138	242017	847138	116
139	240717	847238	84
140	240817	847238	150
141	240917	847238	70
142	241017	847238	173
143	241117	847238	80
144	241217	847238	220
145	241317	847238	118
146	241417	847238	52
147	241517	847238	94
148	241617	847238	48
149	241717	847238	116
150	241817	847238	80
151	241917	847238	56
152	242017	847238	52
153	240617	847338	36
154	240717	847338	88
155	240817	847338	74
156	240917	847338	84
157	241017	847338	138
158	241117	847338	74
159	241217	847338	72
160	241317	847338	220
161	241417	847338	108
162	241517	847338	96
163	241617	847338	38
164	241717	847338	54
165	241817	847338	40
166	241917	847338	48
167	242017	847338	80
168	240417	847438	44
169	240517	847438	54
170	240617	847438	136
171	240717	847438	22
172	240817	847438	88
173	240917	847438	70
174	241017	847438	202
175	241117	847438	52
176	241217	847438	90

177	241317	847438	32
178	241417	847438	86
179	241517	847438	80
180	241617	847438	148
181	241717	847438	46
182	241817	847438	66
183	241917	847438	48
184	242017	847438	38
185	240217	847538	84
186	240317	847538	194
187	240417	847538	50
188	240517	847538	162
189	240617	847538	122
190	240717	847538	22
191	240817	847538	104
192	240917	847538	50
193	241017	847538	178
194	241117	847538	50
195	241217	847538	12
196	241317	847538	24
197	241417	847538	22
198	241517	847538	80
199	241617	847538	62
200	241717	847538	84
201	241817	847538	24
202	241917	847538	8
203	242017	847538	58
204	240017	847638	10
205	240117	847638	186
206	240217	847638	220
207	240317	847638	220
208	240417	847638	78
209	240517	847638	94
210	240617	847638	18
211	240717	847638	106
212	240817	847638	50
213	240917	847638	220
214	241017	847638	16
215	241117	847638	10
216	241217	847638	10
217	241317	847638	22
218	241417	847638	96
219	241517	847638	78
220	241617	847638	10
221	241717	847638	22
222	241817	847638	40
223	241917	847638	4
224	242017	847638	80
225	239817	847738	28
226	239917	847738	66
227	240017	847738	188
228	240117	847738	76
229	240217	847738	220
230	240317	847738	98
231	240417	847738	18
232	240517	847738	94
233	240617	847738	60
234	240717	847738	58
235	240817	847738	116

236	240917	847738	20
237	241017	847738	32
238	241117	847738	66
239	241217	847738	86
240	241317	847738	40
241	241417	847738	106
242	241517	847738	72
243	241617	847738	112
244	241717	847738	74
245	241817	847738	44
246	241917	847738	114
247	242017	847738	220
248	245617	847738	79
249	245717	847738	134
250	245817	847738	184
251	245917	847738	28
252	246017	847738	64
253	239617	847838	58
254	239717	847838	28
255	239817	847838	74
256	239917	847838	70
257	240017	847838	10
258	240117	847838	26
259	240217	847838	38
260	240317	847838	12
261	240417	847838	10
262	240517	847838	112
263	240617	847838	62
264	240717	847838	80
265	240817	847838	60
266	240917	847838	22
267	241017	847838	8
268	241117	847838	66
269	241217	847838	66
270	241317	847838	96
271	241417	847838	4
272	241517	847838	4
273	241617	847838	12
274	241717	847838	15
275	241817	847838	29
276	241917	847838	39
277	242017	847838	4
278	242117	847838	81
279	242217	847838	40
280	242317	847838	36
281	242417	847838	28
282	242517	847838	72
283	242617	847838	13
284	242717	847838	42
285	245417	847838	34
286	245517	847838	39
287	245617	847838	44
288	245717	847838	220
289	245817	847838	33
290	245917	847838	189
291	246017	847838	8
292	239817	847938	94
293	239917	847938	44
294	240017	847938	0

295	240117	847938	28
296	240217	847938	0
297	240317	847938	42
298	240417	847938	28
299	240517	847938	42
300	240617	847938	42
301	240717	847938	49
302	240817	847938	6
303	240917	847938	48
304	241017	847938	24
305	241117	847938	10
306	241217	847938	23
307	241317	847938	4
308	241417	847938	11
309	241517	847938	89
310	241617	847938	6
311	241717	847938	15
312	241817	847938	14
313	241917	847938	19
314	242017	847938	8
315	242117	847938	11
316	242217	847938	22
317	242317	847938	35
318	242417	847938	13
319	242517	847938	19
320	242617	847938	15
321	242717	847938	14
322	242817	847938	78
323	242917	847938	23
324	243017	847938	188
325	243117	847938	30
326	243217	847938	13
327	243317	847938	12
328	243417	847938	11
329	243517	847938	18
330	244817	847938	189
331	244917	847938	129
332	245017	847938	220
333	245117	847938	17
334	245217	847938	70
335	245317	847938	134
336	245417	847938	43
337	245517	847938	13
338	245617	847938	90
339	245717	847938	27
340	245817	847938	111
341	245917	847938	5
342	246017	847938	17
343	240017	848038	44
344	240117	848038	46
345	240217	848038	0
346	240317	848038	44
347	240417	848038	22
348	240517	848038	80
349	240617	848038	24
350	240717	848038	96
351	240817	848038	26
352	240917	848038	37
353	241017	848038	13

354	241117	848038	37
355	241217	848038	98
356	241317	848038	7
357	241417	848038	38
358	241517	848038	115
359	241617	848038	125
360	241717	848038	31
361	241817	848038	79
362	241917	848038	84
363	242017	848038	99
364	242117	848038	138
365	242217	848038	128
366	242317	848038	110
367	242417	848038	91
368	242517	848038	218
369	242617	848038	100
370	242717	848038	8
371	242817	848038	27
372	242917	848038	8
373	243017	848038	7
374	243117	848038	9
375	243217	848038	11
376	243317	848038	12
377	243417	848038	41
378	243517	848038	28
379	243617	848038	11
380	243717	848038	8
381	243817	848038	34
382	244217	848038	20
383	244317	848038	31
384	244417	848038	44
385	244617	848038	45
386	244717	848038	43
387	244817	848038	51
388	244917	848038	142
389	245017	848038	101
390	245117	848038	99
391	245217	848038	37
392	245317	848038	67
393	245417	848038	220
394	245517	848038	21
395	245617	848038	6
396	245717	848038	59
397	245817	848038	184
398	245917	848038	74
399	246017	848038	187
400	240117	848138	100
401	240217	848138	0
402	240317	848138	82
403	240417	848138	188
404	240517	848138	74
405	240617	848138	130
406	240717	848138	20
407	240817	848138	23
408	240917	848138	89
409	241017	848138	220
410	241117	848138	220
411	241217	848138	134
412	241317	848138	103

413	241417	848138	51
414	241517	848138	10
415	242717	848138	30
416	242817	848138	19
417	242917	848138	38
418	243017	848138	98
419	243117	848138	106
420	243217	848138	40
421	243317	848138	45
422	243417	848138	31
423	243517	848138	11
424	243617	848138	7
425	243717	848138	40
426	243817	848138	33
427	243917	848138	89
428	244017	848138	73
429	244117	848138	5
430	244217	848138	38
431	244317	848138	39
432	244417	848138	202
433	244517	848138	220
434	244617	848138	11
435	244717	848138	49
436	244817	848138	136
437	244917	848138	126
438	245017	848138	54
439	245117	848138	96
440	245217	848138	220
441	245317	848138	147
442	245417	848138	11
443	245517	848138	41
444	245617	848138	220
445	245717	848138	152
446	245817	848138	215
447	245917	848138	49
448	246017	848138	220
449	240417	848238	24
450	240517	848238	28
451	240617	848238	20
452	240717	848238	44
453	240817	848238	47
454	243217	848238	9
455	243317	848238	30
456	243417	848238	4
457	243517	848238	51
458	243617	848238	99
459	243717	848238	23
460	243817	848238	15
461	243917	848238	41
462	244017	848238	34
463	244117	848238	35
464	244217	848238	29
465	244317	848238	27
466	244417	848238	107
467	244517	848238	220
468	244617	848238	220
469	244717	848238	100
470	244817	848238	99
471	244917	848238	188

472	245017	848238	220
473	245117	848238	220
474	243517	848338	23
475	243617	848338	83
476	243717	848338	199
477	243817	848338	38
478	243917	848338	38
479	244017	848338	21
480	244117	848338	31
481	244217	848338	40
482	244317	848338	18
483	244417	848338	32
484	244517	848338	11
485	244617	848338	86
486	244717	848338	25
487	243817	848438	14
488	243917	848438	131
489	244017	848438	22
490	244117	848438	63
491	244217	848438	38
492	244317	848438	39
493	244417	848438	7
494	244517	848438	69
495	244617	848438	26
496	244717	848438	88
497	244017	848538	5
498	244117	848538	8
499	244217	848538	40
500	244317	848538	34
501	244417	848538	94
502	244517	848538	95
503	244617	848538	7
504	244717	848538	38
505	244317	848638	56
506	244417	848638	67
507	244517	848638	84
508	244617	848638	76

Appendix D
SEPA CORRESPONDENCE

From: Morris, Calum
To: Gemmell, David
Cc: Clarke, Stuart
Subject: RE: Ballach Wind Farm - Phase 2 Peat
Date: 28 May 2025 17:23:09
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.gif

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Hi David,

I provided the below to SEPA but never got a response, explaining that all infrastructure was un shallow peat and therefore outwith the 100m buffer distance.

There were no further changes made following Georgias email of the 15th.

Cheers

Calum

From: Gemmell, David <David.Gemmell@rps.tetratech.com>
Sent: 26 May 2025 10:53
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Mcdougall, John <John.Mcdougall@Energiekontor.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>; Clarke, Stuart <Stuart.Clarke@rps.tetratech.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

Morning Calum,

Just wondering if you responded to SEPA's query of 16 April below in relation to GWDTEs? If so can you please forward for our records.

Also be great if you could advise what you tweaked (if anything) following SEPA's email of 15 April below? Again for our records.

Thanks

David

Gemmell, David
Director
RPS | Consulting UK & Ireland
T +44 7483 904948
E david.gemmell@rps.tetratech.com

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We have moved: We have relocated our Edinburgh office to 3rd Floor Quay 2, 139 Fountainbridge, Edinburgh EH3 9QG,where we now sit alongside colleagues from across the Tetra Tech group of companies.

From: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Sent: 16 April 2025 09:08
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

You don't often get email from georgia.burborough@sepa.org.uk. Learn why this is important

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Calum,

No worries at all.

Oh that is a pain, hopefully you'll be able to break through.

I forgot to ask about how the verification of the potential GWDTEs was coming along. You've probably seen this already, but we've finally been able to publish our updated guidance on GWDTEs and ground-water abstractions. Where previously they were in a combined guidance document, they're now separate and on our website

Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems - Guidance which sets out SEPA's expectations for the assessment of impact of developments on Groundwater Dependent Terrestrial Ecosystems (GWDTE). It is intended for developers, local authorities, and determining authorities.

Guidance on Assessing the Impacts of Development on Groundwater Abstractions - Guidance which sets out SEPA's expectations for the assessment of impact of developments on groundwater abstractions, both public and private water supplies. It is intended for developers, local authorities, and determining authorities.

Warm regards
Georgia

Georgia Burborough
Senior Planning Officer
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

georgia.burborough@sepa.org.uk
Waverley Court I 4 East Market Street I Edinburgh I EH8 8BG
Postal address: Angus Smith Building I Unit 6, 4 Parklands Avenue I Holytown I Motherwell I ML1 4WQ

From: Morris, Calum <calum.morris@energiekontor.com>
Sent: 15 April 2025 17:01
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

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Hi Georgia,

Thanks very much for coming back on this so quickly, appreciated the comments, and this will allow us to move ahead with the application.

Still no response at all from SSE unfortunately on Fairburn – we continue to try and engage.

Best Regards

Calum

OFFICIAL

From: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Sent: 15 April 2025 15:15
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

Some people who received this message don't often get email from georgia.burborough@sepa.org.uk. Learn why this is important

OFFICIAL

Hi Calum,

I've had a look at the further peat probing and layout tweaks and picked up on the below:

- T20 turning head has been moved to less deep peat
- T19 turning head has been moved to similar or maybe slightly less deep peat (hard to quantify)
- New turning head / track between T5 and T8 – potential to shift slightly west to avoid deep peat or float?
- T8 has been shifted out of deeper peat
- T11 slight shift away from deeper peat
- New substation location, potential to shift slightly to north to shallower peat?

I foolishly didn't re-read your initial email where you covered the changes before I looked at the new set of plans, but from my spot the difference attempt I manage to pick up on many of the same points!

Overall, looks like the changes have avoided areas of deeper peat which is great so thank you for that and carrying out the additional probing to be sure. Any floating of tracks or other infrastructure where avoidance of peat isn't possible would certainly be encourages by us.

I assume still no luck with getting access via the windfarm to the north?

Warm regards
Georgia

Georgia Burborough
Senior Planning Officer
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From: Morris, Calum <calum.morris@energiekontor.com>
Sent: 08 April 2025 12:58
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>; Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

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Hi Georgia,

Yes all good, enjoying seeing the sunshine – here's hoping it lasts till the weekend!!

No problem, look forward to hearing back once you've had a chance to review.

Best Regards

Calum

OFFICIAL

From: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Sent: 08 April 2025 12:31
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>; Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

OFFICIAL

Hi Calum,

All good here and hope the same for you?

Brill, thanks very much for sending that across. I probably won't get a chance to have a good look at it this week but will try to do this by end of next week and get back to you then if that's ok?

Warm regards
georgia

Georgia Burborough
Senior Planning Officer
Scottish Environment Protection Agency
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From: Morris, Calum <calum.morris@energiekontor.com>
Sent: 08 April 2025 11:37
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>; Mcdougall, John <John.Mcdougall@Energiekontor.com>; Gemmell, David <David.Gemmell@rps.tetratech.com>; Hirshall, Sophie <Sophie.Hirshall@energiekontor.com>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

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Good Morning Georgia,

Hope all is well with you?

Further to our meeting last month, we have now carried out the additional Phase 2 probing for the points discussed where there were some areas of deeper peat which we agreed were best to avoid. With the results back, I thought it would be worthwhile running these past you and hopefully you will be content with the changes.

As you will note from the attached plans, the areas of change are:

- T20 crane pad moved slightly and track leading into new turning head at T20
- Track south of T9 moved by about 20m to east (towards potentially deeper peat - shown on Tile c)
- Turning head at T11 moved slightly
- New additional turning head to SW of T5, and one directly south of T5 possibly moved slightly
- Turning head south of T13 moved

The probing results for these look to be positive in that all infrastructure tweaks (including the new substation location) have generally avoided deep peat. There a few areas of deeper peat in some of the new/tweaked turning heads but assume these can be addressed by floating track etc. as required.

If you have any comments on the proposed, please let me know.

Happy to chat through on a call if you feel needed.

Best Regards

Calum

OFFICIAL

From: Morris, Calum
Sent: 24 February 2025 11:17
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

Great, I will send out an invite.

Look forward to catching up then.

Best Regards

Calum

From: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Sent: 24 February 2025 11:16
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

OFFICIAL

Hi Calum,

How about Tuesday 11th at 11am?

Warm regards
georgia

Georgia Burborough
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From: Morris, Calum <calum.morris@energiekontor.com>
Sent: 24 February 2025 11:14
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

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Hi Georgia,

I could do anything on Tuesday 11th or the afternoon of Thursday 13th.

Would something around then work?

Best Regards

Calum

OFFICIAL

From: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Sent: 24 February 2025 11:08
To: Morris, Calum <calum.morris@energiekontor.com>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>
Subject: RE: Ballach Wind Farm - Phase 2 Peat

OFFICIAL

Good morning Calum,

Thank you very much for getting in touch with this and I'd be happy to meet and hear about the further works that has been done.

Is there a date / time in w/c 10th March that would suit you? I've got a few things to get out in the next couple of weeks but could try find some time if that would work better for you.

Warm regards
Georgia

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From: Morris, Calum <calum.morris@energiekontor.com>
Sent: 20 February 2025 16:48
To: Burborough, Georgia <georgia.burborough@sepa.org.uk>
Cc: Haslam, Susan <Susan.Haslam@sepa.org.uk>
Subject: Ballach Wind Farm - Phase 2 Peat

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Good Afternoon Georgia,

Hope all well with you?

Further to our recent pre app on Ballach, we have now completed phase 2 peat probing on site (see attached) based on the proposed layout and infrastructure for the windfarm.

Would you have some time over the coming weeks to have a call to discuss and run through the proposal? Always find it a helpful exercise.

Look forward to hearing from you.

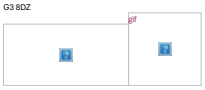
Best Regards

Calum

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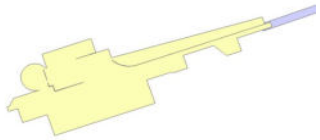


Appendix E
TECHNICAL DATA

Construction Process*	Construction Type	Approximate Estimated Peat Volume(m³) per type	Approximate Estimated Peat Volume(m³) Excavation to Full Depth	Approximate Estimated Peat Volume(m³) Assuming max excavation depth of 45cm for all track elements
New Track (Approximate)		31665.53	**31666**	**22587**
Turning Heads		17023.70	**17024**	**11498**
Turbine Foundation and Crane hardstanding construction*	Crane Pad/Hardstanding	66541.27	**66541**	**66541**
Substation	Substation	6320.97	**6321**	**6321**
Borrow Pit Development	BP1 (north)	7319.03	**19505**	**19505**
	BP2 (south)	8318.69		
	BP3 (West)	3867.52		
	Grand Total		**141057**	**126453**

Assumptions	
Construction Process*	All excavations for the construction process will remove the full depth of Peat below the footprint of the infrastructure **Volumes in Red added assuming the maximum excavation depth is 45cm**
New tracks and turning heads	Files do not differentiate between existing, new, temporary, floating tracks and therefore **the result will likely be an over-estimate of approximate Peat Excavation**
Turbine Foundation and Crane hardstanding construction*	Files received for Crane Pads give a combined footprint for turbine foundations, Crane hardstandings, Laydown areas, Boom supports, track, etc - **the result will likely be an over-estimate of approximate Peat Excavation**
Overlaps and Gaps	These calculations contain no overlapping areas and do not include any Temporary construction (Construction Compound) Gaps in the supplied footprint files, between features (Tracks and Borrow Pits, etc have **not** been filled in)

Example Fig



Peat Excavation output	Assuming max track depth @ 45cm	126453

Construction Process	Calculation	Approximate Estimated Peat Volume (m3)
Track/Turning Head Shoulders	*Road length (m) + turning head perimeter length (m) x cross sectional area (m²)*	**3307.92**
Turbine Foundation Covering	*No. turbines x area (m²) x peat thickness (m)*	**2628**
Crane Hardstanding Shoulders	*No. hardstandings x perimeter length (m) x cross sectional area (m²)*	**3552**
Crane Hardstanding Covering	*No. turbines x area (m²) x peat thickness (m)*	**60540**
Borrow Pit Restoration	*Excavation area (m²) x peat thickness (m)*	
	BP1 (Northern)=	**22466**
	BP2 (Central)=	**21894**
	BP3 (Southern)=	**7443**
Total		**121830.92**

TECHNICAL APPENDIX 10.2 - OUTLINE PEAT MANAGEMENT PLAN

Ballach Wind Farm

2025-07-24

794-ENV-GDE-21095Z

0

0

Contact

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TECHNICAL APPENDIX 10.3 - OUTLINE PEAT SLIDE RISK ASSESSMENT

Ballach Wind Farm

794-ENV-GDE-21095Z
0
0
24 July 2025

rpsgroup.com

Document status

Version	Revision	Authored by	Reviewed by	Approved by	Review date
0	0	Stuart Clarke	David Gemmell	David Gemmell	24 July 2025

Approval for issue

David Gemmell	Director	DG	24 July 2025

File Name

794-ENV-GDE-21095Z R SC Ballach PSRA V0 R0

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Prepared by:

RPS

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Prepared for:

Energiekontor UK Ltd

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1. INTRODUCTION

1.1 Project Summary

RPS Consulting Services Ltd (RPS) has been commissioned by Energiekontor Ltd to prepare a peat slide risk assessment (PSRA) for the proposed Ballach Wind Farm Development (hereafter referred to as the 'Development') to be included as a Technical Appendix to Chapter 10 Hydrology, Geology and Peat of the Environmental Impact Assessment Report (EIA Report) for the development.

The Proposed Development is illustrated on Figure 3.1 in Chapter 3 Project Description and consists of the following principal components:

- Up to 20 turbines;
- Associated turbine compound areas including foundations and hardstanding areas for erecting cranes at each turbine location;
- On-site tracks connecting each turbine;
- An energy storage compound to store batteries with a 5MW capacity which would be within the construction compound footprint;
- Underground cables linking the turbines to the substation;
- Up to 3 borrow pits for the extraction of stone on-site (indicated on Figure 3.1 as borrow pit search areas);
- A temporary construction compound including provision for onsite concrete batching;
- On-site substation;
- Outline Habitat Management provisions as proposed within Technical Appendix 8.4 within Volume 3 of this EIA Report.

The design of the Development has been undertaken as an iterative process to avoid areas of deep peat as much as possible to limit peat excavation and to limit the potential for peat slide, as presented in Chapter 4: Design Evolution and Chapter 10: Hydrology, Geology and Peat.

This PSRA has been undertaken in general accordance with the Energy Consents Unit Scottish Government (ECUSG) guidance document 'Peat Landslide Hazard and Risk Assessments - Best Practice Guide for Proposed Electricity Generation Developments' (2017).

The PSRA includes a review of available desk-based information, and the results obtained from various phases of peat probing that have been undertaken across the development site as the design has been modified.

The data collected during the desk study and subsequent site works has been collated and utilised to produce a hazard and risk ranking, which will be used to inform the final development infrastructure layout. A risk ranking register with specific mitigation measures has been This PSRA completed for any infrastructure considered to be located within Medium or High-risk areas to reduce these areas to a lower risk ranking. It should be noted that the peat slide risk assessment will be updated on the basis of information obtained from detailed ground investigation to be undertaken prior to commencement of the development works and further detailed design.

The author of this report, Stuart Clarke Bsc (Hons) MSc, has approximately 10 years of relevant experience in ground conditions baseline assessments including peat and peat slide risk assessment for a range of infrastructure and renewable energy developments across Northern Ireland and Scotland.

The reviewer of this Chapter, David Gemmell BSc (Hons) MSc, a chartered Environmentalist and Scientist, has approximately 19 years of relevant experience in ground conditions baseline assessments relating to ground conditions including peat and peat slide risk assessment for a range of infrastructure, mining and renewable energy developments across Western Australia, the UK and particularly Scotland.

2. PEAT FAILURE CHARACTERISTICS AND MECHANISMS

ECUSG guidance determines peat landslide in two categories, 'peat slides', and 'bog bursts'. It is indicated that peat slides have a greater risk of occurrence in areas where peat depth is shallow (up to 2.0m) and slope gradients are steep (5º – 15º), while bog bursts are indicated to have a greater risk of occurrence in areas where peat is deeper, and slope gradients are shallow. As recorded in the Best Practice Guide, bog burst events have generally only been reported in Irish and Northern Irish peat bogs. They are uncommon in Scotland and therefore are not considered to attribute significant risk in relation to this assessment. It should be noted that peat instability events (including bog bursts), although extremely uncommon, may occur outside the limits mentioned above.

Further to the simple definition above, a number of natural factors are considered to interact and create the potential for peat instability to occur. These natural factors would typically include:

- **Slope Gradient:** as noted in the Best Practice Guide, peat slides have a greater likelihood of occurrence where slope angles range from 5 to 15º. Deposits with shallower slope gradients are less susceptible to failure due to the reduced influence of gravity. Deposits with steeper slope gradients are less susceptible to failure due to the general lack of peat presence (although peaty debris slide may occur).
- **Peat Depth:** Boyland et al. (2008) describes three common types of peat, controlled to an extent by rainfall and elevation:
  - Upland Blanket Bog: blanket bogs are typically about 3 m thick, however, they can be up to 5 m thick, generally thinning at higher elevations (note, the Development site is considered to generally fit the definition of an upland blanket bog site although recorded peat depths are generally shallower than the range noted).
  - Lowland Blanket Bog: similar to the upland version, however, they form around sea levels in areas of very high rainfall.
  - Raised Bog: generally, 3-12 m thick, averaging 7 m, with growth occurring above the water table.

Peat depth can give an indication of peat strength and the potential magnitude of a slide, where the generalisation can be made that the potential for peat instability increases with peat depth provided gradients exist to allow movement. However, when combined with other instability indicators, any depth of peat can fail.

- **Peat Strength:** the shear strength of peat is an important aspect in assessing the risk of landslip in blanket peat areas, with areas of lower shear strength likely to be the cause of any peat slide. However, due to the influence of fibres within the deposits and of stratification with depth, reliable values of shear strength are difficult to near impossible to obtain, using common place in situ and laboratory soil strength tests. Where data is available, it can be used, with extreme caution, to assist in assessing likely risk.
- **Relief:** the combination of slope gradient and variation in elevation can result in confined and unconfined zones i.e. where undulating or hummocky terrain (confined) exists, the natural relief has the potential to mitigate the occurrence of a peat slide. However, convex sloping hillsides (unconfined) can increase the hazard potential.
- **Evident and /or Potential Areas of Instability:** the presence of certain geomorphological characteristics may signify an increased risk of peat instability. However, peat instability events may occur in areas where no such geomorphological characteristics are present, if the general characteristics match those mentioned above.

- **Vegetation Cover:** the vegetation cover of an area of bog / mire gives an indication as to its hydrological setting and therefore physical characteristics, as noted in the Best Practice Guide and detailed by Hobbs, 1986.
- **Peat Stratification:** the peat formation process causes peat to show natural anisotropic strength. The interface between the three distinct layers (indicating three hydroseral stages) within a peat mass is defined by hydrology. The three layers are:
  - Top Mat: living vegetation of herbaceous plants, grasses, and mosses;
  - Acrotelm: decomposing peat which is saturated periodically and is of relatively high permeability; and
  - Catotelm: permanently saturated dense peat of relatively low permeability.

  Peat stratification is linked to peat depth (Dykes, 2006), with thinner peat deposits having a thinner or no catotelm layer. A minimal or absent catotelm layer leads to peat mass having a higher shear strength, as the overlying top mat and acrotelm layers are more fibrous in nature compared to the underlying catotelm layer.
- **Hydrology (Surface and Subsurface):** surface (seeps and springs, wet flushes, watercourses, concentration of drainage networks etc.) and subsurface (pipe systems, underground channels etc.) drainage pathways can provide areas of peat with a water supply which may be absorbed by and potentially increase the mass of the peat. This can cause pooling / piping within the peat mass, or an increase in water at the base of the peat mass, each of which increases the susceptibility of the peat mass to failure.

The presence of a number of the above natural factors may create the potential for peat instability to occur, however, the actual instability is generally the result of a combination of further contributing factors. These factors have been grouped into two categories within the Best Practice Guide described as preparatory and triggering factors.

Preparatory factors, which affect the stability of peat slopes in the medium to long-term (tens to hundreds of years), are:

- increase in mass of the peat through peat formation;
- increase in mass of the peat through increase in water content;
- increase in mass of the peat through afforestation;
- reduction in shear strength from changes in the physical structure of the peat due to creep,
- weathering or vertical tension cracks of the material;
- loss of surface vegetation and associated tensile strength (e.g. deforestation);
- changes in the subsurface hydrology (water filled pools and / or pipes etc.); and
- afforestation reducing the water held in the peat body, increasing the potential for formation of desiccation cracks which can be exploited by rainfall on forest harvesting.

Triggering factors, which can have an immediate effect on peat stability and act on susceptible slopes, include:

- intensive rainfall or snow melt causing development of high porewater pressures within the peat;
- alterations to drainage patterns generating high porewater pressures within the peat;
- peat extraction at the toe of the slope i.e. fluvial incision, cut slopes etc. reducing the support of the upslope material;

- peat loading commonly due to stockpiling, plant during construction and permanent infrastructure following construction (or natural causes i.e. landslide) causing an increase in shear stress;
- changes to the vegetation cover i.e. by stripping the surface cover or afforestation; and
- earthquakes or man-made rapid ground accelerations, such as blasting or mechanical vibrations, causing an increase in shear stress.

Evidence of the potential for peat instability within an area may be observed through the recording of the geomorphological conditions of the area. These existing geomorphological characteristics may indicate the presence of existing or historical failures or areas of future potential instability. The characteristics of particular interest include the presence of the following:

- historical failure scars and debris;
- tension cracking and tearing;
- compression ridges / thrusts or extrusion;
- peat creep;
- subsurface drainage (pools and / or piping);
- seeps and springs;
- cracking related to drying;
- concentration of surface drainage networks; and
- the presence of organic clays at the peat and bedrock interface.

3. BASELINE CONDITIONS

3.1 Geography, Topography and Geomorphology

The main windfarm development area currently comprises an area of undeveloped moorland which is located on the western slope of an area of high ground centred to the northeast of two peaks known as Beinn nam Fitheach, which sits approximately 494m Above Ordnance Datum (AOD) and Mallach Binnean a Chomhnriard, which sits approximately 456m AOD.

Access to the main windfarm development area is intended to be afforded via the existing track from the A831 to the south, which will upgraded accordingly and re-routed in its northern section to meet the construction compound in the main windfarm development area.

A number of tributaries of the River Beauly are located along the proposed access route. The River Beauly ultimately discharges into the Moray Firth.

The northern windfarm development predominantly lies on the north facing slopes of Beinn nam Fitheach and Beinn Bheag Fhada. The slope here is considered to be predominantly rectilinear but becomes more concave at its base where it meets the Gleann Goibhre watercourse on the northern boundary. The central part of the development area is noted to comprise a relatively flat lying area of land that is surrounded by high ground (Beinn nam Fitheach to the west, Beinn Bheag Fhada and Cnoc Eille Mor to the north, Mullach Binnean a' Chomhnaird to the south and Buachaille Breige to the east). Again, the slopes here are considered to be predominantly rectilinear but become concave at their base where they meet the flat lying plateaued area.

No evidence of historical slope failure has be discerned from current or historical aerial photography or during peat probing visits undertaken at the site. Reference to information within the BGS landslide database also indicates that no landslides have been recorded within the development area.

A plan highlighting the Development Site layout is included in Appendix A.

3.2 History

Historically, the main windfarm development site is shown to have largely comprised undeveloped moorland, with historical maps from the mid-1800s to 1974 showing no development onsite.

No potential sources of contamination are shown to be present on-site on the available historical maps. In addition to this, no recent development is noted to have taken place on site during site visits undertaken as part of this assessment.

A review of available historic aerial photography on the National Collection of Aerial Photography (NCAP) website was also completed. Aerial photographs dating from 13 June 1988 were available to review. On the basis of these photograohs, the development site was shown to comprise undeveloped land, with no discernible development noted.

Current aerial photography was also consulted as part of the desk study review of site conditions. Close inspection of these photographs was undertaken to identify any signs of any failure, creep, changes in topography etc. however no such signs have been identified. As such, no further material information was gained from this review that was not already evident from available mapping and site reconnaissance work, with the site shown to be in the same condition.

3.3 Rainfall

Rainfall data has been obtained from the Inverness Weather Station, which is located approximately 24.0 km east of the Development site. Reference to Met Office long term average

data, a rainfall precipitation rate of 755 mm per year is indicated, based on averages collated between 1991 and 2020.

3.4 Geological Conditions

BGS online mapping for the study area shows that the development site is underlain by metamorphic bedrock of the Tarvie Psammite Formation which comprises psammite, thin-bedded, siliceous to micaceous. In the northeast of the site are area underlain by Achnaconeran Striped Formation which comprises interbedded psammite and semipelite. Both formations were formed approximately 720 to 1,000 million years ago. These rocks was originally sedimentary in origin, forming in shallow seas, and has subsequently undergone low grade metamorphic change.

Small igneous intrusion (Unnamed Igneous Intrusion, Pre-Caledonian and Caledonian Supersuite) are also shown to be present in the east and southern eastern part of the site.

BGS mapping shows that bedrock across the site area is overlain by various superficial deposits including Till, Hummocky Glacial Deposits, River Terrace Deposits, Alluvium and Peat. The Till and Hummocky Glacial Deposits are expected to comprise poorly sorted sand, gravel, cobbles and boulders in a clay matrix, localised to the south of the access road (Till) and to the north of the site, in proximity to five of the turbines and two of the borrow pits. River Terrace Deposits and Alluvium are present along the northern most site boundary and are not anticipated to be present in proximity to any of the site infrastructure. The central parts of the site are shown to be underlain by Peat deposits, in proximity to a number of turbines, borrow pits and infrastructure.

With respect to soil resources, reference to the National Soil Map of Scotland indicates that soils across the majority of the north of the site are classified as Dystrophic blanket peat and Peaty gleyed podzols with dystrophic semi-confined peat with peaty gleys. In the south eastern and south of the site the soils area classified as Humus-iron podzols with peaty gleyed podzols.

A series of peat depth surveys have been undertaken across the development site to identify and characterise peat deposits that may be present around proposed turbines and associated infrastructure, see Section 4 for further details.

3.5 Surface Water

There are a number of watercourses within the main windfarm development area. The largest of these is Gleann Giobhre, which runs along the northern extent, draining to the east. Allt Creagach, Allt Beinn Nam Fitheach, Allt an Torra Dhuinn, Allt a' Chrochadair and Allt Dearg all spring within the northern part of the study area and flow towards the Gleann Giobhre, along with nine unnamed tributaries. Allt an Torra Dhuinn itself has several unnamed tributaries within the central part of the main windfarm development area. Loch Ballach is located in the central part of the main windfarm development area, connected to Allt an Locha Bhallaich, which flows towards the Breakachy Burn immediately to the southeast of the main windfarm development area. Allt Tobar nan Cat is shown to spring in the central part of the site and flows in a north-easterly direction before it confluences with Allt a' Chrochadair in the northern part of the site. Allt Liath is also noted to spring in the central part of the site and flow in a south / easterly direction along the development sites southern boundary before discharging into Allt an Locha Bhallaich in the south-east.

Reference to the SEPA Water Classification Hub indicates that Gleann Goibhre had an overall status of Poor and Breakachy Burn had an overall status of High in 2023.

3.6 Hydrogeology

The groundwater body beneath the site is indicated by SEPA to comprise part of the Northern Highlands groundwater body. This groundwater body was classified by SEPA in 2023 as having an overall status of good.

Hydrogeology mapping data from the BGS shows that the bedrock beneath the main site area comprises a low productive aquifer in which flow is virtually all through fractures and other discontinuities.

Peat and peaty soils would be expected to contain perched groundwater but would also be expected to inhibit groundwater flow. Hummocky Glacial Deposits and Till, where present, are anticipated to be of variable permeability, depending on the proportion of clays and silts relative to coarser components (sand, gravel, cobbles and boulders).

No private water supply (PWS) have been identified within approximately 2km of the nearest proposed infrastructure . Given distance from these features, PWS are considered unlikely to be impacted by the proposed development works.

3.7 Human Receptors

Human receptors that may be at risk from peat slide include construction staff during construction of the development, and hillwalkers who may use the site. Given the transient use of the site by these receptors, there is considered to be a low risk of direct harm from peat slide.

3.8 Ecology

No terrestrial protected species have been identified as likely to be impacted by peat slide within the study area. Therefore, these have not been considered further in this assessment.

Ecological resources associated with watercourses are considered as part of the identified surface water receptors noted in the Surface Water section above.

3.9 Archaeology

No heritage assets have been identified within the site boundary and are not considered further in this assessment.

3.10 Infrastructure and Built Environment

The development site is currently undeveloped and comprises open moorland. Access tracks are proposed to be constructed on site, which may potentially be impacted by peat slide and are considered in this assessment. The proposed turbines themselves also have the potential to be impacted by peat slide derived from other infrastructure locations which may be upslope. The turbines are considered as potential receptors in the assessment of peat slide risk.

No residential and / or commercial properties are located within the main windfarm development area or within its immediate surroundings. On this basis, the risks to potential residential / commercial receptors have not been considered as part of this assessment.

4. PEAT DEPTH SURVEY

A desk study has been undertaken to review published geological conditions, based on British Geological Survey (BGS) mapping, the SNH Carbon and Peatlands Map (2016) and aerial photography. Details of the desk study can be found in the overarching EIA Report Chapter 9: Hydrology, Geology and Peat.

Following on from the desk study, which suggested that peat could be present across much of the development site (see Figure 3), field surveys were undertaken to measure the peat depth and provide additional observations relating to slopes, general topography including evidence of past peat landslides, ground cover and consideration of existing and new/existing water crossings. Peat survey work undertaken at the site is summarised below and further detail is provided in the overarching EIA Chapter 10 Hydrology, Geology and Peat and Technical Appendix 10.2: Outline Peat Management Plan.

Peat depth surveys have subsequently been undertaken at the site over the course of various phases. Phase 1 peat probing was carried out by Wildlife Consulting in 2024 (Phase 1) and was undertaken across the developable area at the time to inform an understanding of general peat depth and distribution. These works were undertaken within the turbine development area only and were completed on a 100m grid. During these works, pockets of deep peat were encountered across the site but most notable in southern and eastern areas of the turbine development area.

Following completion of Phase 1 probing, the site design was reviewed, and changes were made to avoid or minimise siting infrastructure on areas of deeper peat. A ‘design chill’ was subsequently arrived at.

Phase 2 probing (Phase 2a) was then undertaken in February 2025 by RPS.

The Phase 2 probing undertaken comprised detailed probing at each proposed turbine and hardstanding location, along all proposed new access tracks/turning heads, and at other proposed infrastructure locations including the site substation, construction compound and borrow pits.

The pattern of Phase 2 probing in relation to proposed turbine locations and other infrastructure elements can be broadly described as follows:

- Probe at each proposed turbine location plus an additional probe, approximately 25m from the turbine location to the north, south, east and west;
- Probes advanced on a grid at approximate 25m centres across the area of each proposed turbine hardstanding and crane pad area;
- Probes advanced at 50 m centres along the proposed routes of new access tracks; and
- Probes advanced on a grid at approximate 25m centres at the location of the proposed substation construction compound and borrow pits.

The above density (reduced in relation to guidance) reflected the fact that all infrastructure (except some sections of track) were located on peat less than 1.0m as informed by previous probing. This approach has been acceptable to SEPA on other Applicant windfarm schemes.

Following completion of Phase 2 probing, the site design was further reviewed to avoid or minimise siting infrastructure on areas of deeper peat. A revised ‘design chill’ was subsequently arrived at.

SEPA were then consulted (by way of teams call on 11 March 2025 where combined Phase 1/2 peat depth mapping was shared) to seek their initial feedback on the revised ‘design chill’ development layout and its potential impact upon peat. During this call SEPA raised some concerns with the location of infrastructure/turning heads associated with T8, T13, T19 and T20. SEPA also asked whether potential GWDTEs would be assessed and reminded the Applicant of

SEPAs new GWDTE (and groundwater abstractions) guidance. The Applicant also advised SEPA of their intention to float tracks over any localised areas of deep peat.

Following the SEPA call the design was further optimised (to address SEPA comments amongst other changes required due to other constraints) and a second phase of Phase 2 probing (Phase 2b) was undertaken in late March 2024 to address the data gaps. These works were undertaken using the probing patterns described above (again due to peat being expected to be less than 1.0m).

Data obtained from the Phase 2b probing was subsequently used to plot the presence and distribution of peat across the further revised 'design chill' development layout, which was issued to SEPA on 8 April 2025 which SEPA commented on on 15 April 2025. No further changes were made to the design following SEPA's 15 April 2025 comments and the design was subsequently 'frozen'. The data was subsequently used to inform an outline Peat Management Plan, presented as Technical Appendix 10.2 and development of this PSRA.

In total 2746 peat probes were advanced across the development site and has generally confirmed that the majority of infrastructure has avoided deep peat with the exception of T18 (where the peat is considered to be very localised). Localised areas of deeper peat are also noted to have been recorded within turbine hardstanding areas associated with T20 and T15 (on its northern periphery) and within the substation area (localised probe locations). Sections of track which are proposed to be constructed over deeper areas of peat are proposed to be floated. The average depth of peat across the site is 0.80m. The maximum recorded peat depth was 4.07m.

The general distribution of depth of penetration recorded during the Phase 2/2b peat surveys is summarised in Table 1 below.

Table 1 - Distribution of Peat Depth Recorded at the Site

Peat Depth Interval (m)	Number of Occurrences	% of Probes
0.00 to 0.50	1,157	74.3
0.51 to 1.00	212	13.6
1.01 to 1.50	93	6.0
1.51 to 2.00	48	3.1
2.01 to 2.50	25	1.6
2.51 to 3.00	16	1.0
>3.00	6	0.4
Total	**1,557**	**100**

The Scottish Government Peat Landslide Hazard Best Practice Guide (2017) uses the following Joint Nature Conservation Committee (JNCC) report 455 'Towards an Assessment of the State of UK Peatlands' definition for classification of peat deposits:

- **Peaty (or organo-mineral) soil:** a soil with a surface organic layer less than 0.5m deep;
- **Peat:** a soil with a surface organic layer greater than 0.5m deep which has an organic matter content of more than 60%; and
- **Deep Peat:** a peat soil with a surface organic layer greater than 1.0m deep.

Applying these definitions indicates that the deposits underlying around 75% of the surveyed site area comprise peaty or organo-mineral soil. The above definition of peat applies to conditions recorded at around 13% of probes, with the remaining 12% of probes encountering deep peat.

Data obtained from the peat depth surveys were subsequently used to plot the presence and distribution of peat across the proposed development areas, create a peat contour plan, and feed into detailed design iteration[1]. These data have been used to inform an outline PMP included in Technical Appendix 10.2 and development of this Peat Slide Risk Assessment (PSRA).

During the various phases of peat probing the site was observed to comprise open peat moorland that was covered by vegetation, which meant that the conditions of underlying soils remained predominantly hidden. However, in some locations, e.g., exposed banks of watercourses granular till materials were observed. No evidence of any instability features were observed within the survey area during the survey works undertaken at the site. A summary of the geomorphology of the site is provided as Figure 4 in Appendix A.

[1] Inverse distance weighted (IDW) interpolation has been used to interpolate the peat probe data. This method determines cell values using a linearly weighted combination of a set of sample points. The weight is a function of inverse distance and works on the assumption that the variable being mapped decreases in influence with distance from its sampled location. For the calculations used in this report, a power value of 2 has been used. The number of points used in each calculation has also been limited to 8.

5. ASSESSMENT OF PEAT LANDSLIDE LIKELIHOOD

5.1 Introduction

For the purposes of this peat slide risk assessment, the following definition of risk has been adopted:

Risk = Probability of a Peat Landslide x Adverse Consequences

Probability, or likelihood, can be estimated in a number of ways and should take account of both natural factors and man-made factors that could influence slope stability. Man-made factors can include overgrazing from over-stocking, excavation of drainage ditches or grips, or heather burning for land management purposes. Natural factors can include extreme weather events such as very high intensity rainfall, or prolonged dry periods followed by storms.

The methods of assessment of likelihood and adverse consequences used here are described below.

5.2 Assessing Likelihood

As peat slope failures are mainly considered to resemble planar translational slides, the assessment of likelihood of a peat landslide makes use of the Infinite Slope Model (Boylan & Long, 2014) to assess stability of the peat across the slopes in the Site, in line with the Scottish Government guidance (Scottish Government, 2017). The Infinite Slope Model assesses slope stability by calculating the forces resisting failure (shear strength or cohesion) and the forces inducing failure (shear stress) and taking a ratio of these, known as the Factor of Safety. The modified Infinite Slope Model equation is as follows:

$$F = \frac{c'}{\gamma\, z \sin\beta \cos\beta}$$

where
- F = Factor of Safety, the ratio of forces resisting a slide to forces causing a slide
- c' = undrained shear strength of the material; kPa
- γ = specific weight of peat, undrained in situ; kN/m^3
- z = peat depth; m
- β = slope of ground surface, assumed to be parallel to the slope of the failure plane; degrees

If F > 1, the slope is stable; if F < 1 the slope is unstable; if F = 1 the forces are exactly balanced. It is possible to state with some confidence, therefore, that if F > 1.3 the slope is stable and would have some resistance to change.

Values assigned to the parameters above are provided in Table 2, along with an explanation for their selection.

Table 2 – Parameters for the Infinite Slope Model

Parameter	Value and Derivation
F	Calculated value
c'	5kPa - Shear strength values for peat vary from 4.5 to 60 kPa (e.g. Long, 2004). Credible conservative cohesion value based on literature review
γ	10.5KN/m^3 - Density of peat varies depending on degree of decomposition and water content. Published values range from 5.0 to 14.0 kN/m^3. Credible mid-range value.
Z	Average (mean) peat depths measured for each grid cell.
B	Average (mean) slope angles calculated for each grid cell using 5m DTM mapping.

To produce a site-wide dataset for Factor of Safety, a grid of 25 x 25 m cells was overlain across the site (20,328 in total) and a Factor of Safety calculated for each cell. It is a standard and widely recognised GIS technique to use a regular grid for terrain analyses of this kind as it allows a systematic process across the landscape and minimises the subjectivity of the analysis. The 25 x 25 m cells are referred to as 'grid cells' throughout the analysis.

The Factor of Safety, F, has been calculated for each grid cell within the site, where peat probing has been undertaken. The Factors of Safety have been divided into classes, which have been used to map the likelihood of a peat landslide occurring within each grid cell across the site. It should be noted that the Factor of Safety values have been calculated to include an allowance for loadings that may be experienced during construction. The results are presented in Table 3 and a Factor of Safety Plan is provided as Figure 5.

Table 3 – Summary of Factor of Safety Ratings

Factor of Safety	No. of Cells	% of Cells
>3.00 (Stable)	18,334	90.20%
2.00 - 3.00 (Stable)	1,550	7.62%
1.40 – 2.00 (Stable)	349	1.72%
1.0 - 1.40 (Marginally Unstable)	76	0.37%
<1.0 (Unstable)	19	0.09%
Totals	20,328	100%

From the factor of safety assessment that has been undertaken, it can be seen that the majority of grid cells (99.9%) have recorded scores of >1.0. This indicates that much of the development site is considered to be stable and that the risk of peat slide is likely to be low.

The grid cells that have been classified as unstable are situated in four localised areas across the development area and are summarised as follows.

Eight cells are located approximately 25m from the main access track in the south-eastern corner of the site. These grid cells are associated with two localised pockets of deeper peat that are situated towards the base of the eastern slope of Beinn a' Chlaonaidh. Given the depth of peat in these areas it is considered that the access track will likely be of floating construction here. As such, it is considered that the peat within these grid cells is unlikely to be significantly disturbed as part of the construction works.

Two cells are located in the western part of the site and situated approximately 350m south of the nearest infrastructure (T14). Given this distance, it is considered that the peat within these grid cells is unlikely to be disturbed by the proposed construction works.

Seven cells are located in the north-eastern part of the site and are situated approximately 100 – 225m north and west of T1. Of these, six grid cells are clustered around a pocket of deep peat situated to the west of T1 and one cell is located on a separate pocket of deep peat situated to the north of T1. The cells are noted to be situated on an area of moderately sloping ground and are all situated down gradient of T1. Given the distance of these areas from the nearest infrastructure, it is considered that the peat within these grid cells are unlikely to be disturbed by the proposed construction works.

The remaining grid cell is situated in the eastern part of the survey area and approximately 650m from the nearest infrastructure (T1). Given its distance from the nearest infrastructure, it is considered that the peat within this grid cell is unlikely to be disturbed by the proposed construction works.

5.3 Peat Stability Hazard Scoring

5.4 Introduction

The Best Practice Guide defines the hazard scoring assessment as 'the likelihood of a peat landslide event occurring.' It states that there are a number of possible methods for hazard scoring and that an initial qualitative hazard scoring matrix methodology be employed using professional judgement based on qualitative scoring scales.

5.5 Methodology

The allocation of hazard score values for the various parameters which influence peat landslide occurrence (e.g. slope gradient, peat depth) is not defined in the Best Practice Guide and there is no published guidance specifically relating to this issue. As such, it is left to the assessment teams to develop their own approach for categorising the hazard scoring for the site and the following sections outline the approach used for this specific site.

Firstly, it is important to note that the Development layout, including siting of turbines and other infrastructure, resulted from an iterative process which took into account the findings from peat survey work. Deeper peat was avoided wherever possible, in order to minimise the requirement to disturb and / or excavate peat, and to minimise peat slide risk associated with construction across and within peat.

Given that there is no evidence of current or historical peat instability at the site, and that the site design largely avoids areas of deep peat and steep slopes, it is considered appropriate to focus the assessment of peat slide risk on the proposed infrastructure locations, rather than the wider site where no disturbance or construction activity is proposed.

The potential for a peat slide to occur is controlled by a number of natural controlling factors. These are typically:

- Slope gradient;
- Peat depth;
- Peat strength;
- Relief;

- Evidence of historical failures / potential instability (e.g. tension cracks, creep, compression ridges);
- Vegetation cover; and
- Hydrology.

The Best Practice Guide relates peat landslide hazard, or likelihood, to a scale of 1 to 5, with 1 being negligible likelihood and 5 being almost certain. This scale relates to the final hazard potential for all the controlling factors under consideration. No guidance is provided on how the various factors should be combined to derive a final hazard scoring and the assessment team has derived a numerical scoring system as detailed in the following sections.

The most important of the above controlling factors are considered to be peat depth and slope gradient as without both of these elements a risk of peat slide would be unlikely to exist. However, there are additional factors which can contribute to the potential for instability to occur, as set out above, and these have been considered in the evaluation of likelihood of peat slide (i.e. hazard scoring). This approach to the hazard, or likelihood, evaluation is described below and has resulted from a review of several case studies and assessments by experts in PSRA for Scottish wind energy developments, and associated literature sources on peat slide mechanisms and reported contributing factors, as referenced in the sections below.

In total, eight factors have been considered in the hazard scoring process. These are noted below, with details of the scoring attributed for each factor set out in the subsequent paragraphs.

- Slope angle;
- Peat depth;
- Nature of substrate;
- Geomorphology;
- Drainage / hydrology;
- Forestry;
- Relief / convexity; and
- Land use.

Peat strength has not been included as a factor in the hazard scoring process. Site specific peat strength data was not collated for the site at this stage. Shear strength is linked to peat depth as strength is considered to decrease with thickness. As such this parameter is considered to be factored into the hazard scoring for peat depth.

It is important to note that this study only focuses on peat soils and the criteria used are specifically tailored to the key factors affecting peat stability. As such it does not account for the stability of other mineral soils or rock.

5.6 Input Data Sets

The input data sets used for the analysis were as follows:

- Slope angle: Terrain 5 DTM with a 5 m grid size;
- Peat depth: Site survey information for peat depth and site observations;
- Substrate: BGS geological mapping and surveyor observations of exposed substrate at the site and feel of substrate on termination of probing;
- Geomorphology: Surveyor observations and aerial photography;
- Drainage: Surveyor observations, mapping, and aerial photography;

- Forestry: Surveyor observations, mapping, and aerial photography;
- Relief (convexity): Topographical mapping; and
- Land use: Surveyor observations, mapping, and aerial photography.

The assessment focuses on the proposed infrastructure locations (turbines including hardstandings, tracks, substation compound, borrow pits and temporary construction compounds).

5.7 Hazard Scoring and Ranking

There is no guidance available on how to combine the hazard scoring for each of the factors used in the assessment. The assessment team have used the methodology set out below, based on a review of case studies and assessments.

With the exception of peat depth and slope angle a score of zero to three has been assigned to each of the contributing factors. Given that peat depth and slope angle are considered to represent the key contributing factors to peat slide risk, additional weighting has been applied to these factors with scores of zero to five assigned. A zero score reflects no contribution to peat slide likelihood, while higher scores indicate a higher peat slide likelihood associated with each particular factor.

The total hazard score is the sum of the eight individual factor scores, with the maximum total hazard score being 28.

5.7.1 Slope Angle

The limiting factor governing the formation of thick peat deposits is topography. In the case of blanket peat, it tends to be deepest in closed depressions, and typically thin as the slope angle increases (Boylan et al. 2008). The Best Practice Guide details that peat slide hazard risk assessment is not needed for blanket bog sites with slopes less than 2° and as such, a score of zero has been assigned for slopes less than 2°. For slopes greater than 2°, scores have been assigned based on the type and nature of peat slides reported for different slope conditions.

A slope angle GIS layer was generated from the DTM at a 5 m cell resolution. The source DTM is also at a 5 m resolution. The slope angle details are illustrated in Figure 2 in Appendix A.

This slope, calculated in degrees, was identified at each proposed infrastructure element and scored as shown in Table 4.

Table 4 – Peat Stability Hazard Scoring (Slope)

Slope (Degrees)	Slope Score	Comments
<=2.0	0	Failure unlikely due to flat ground.
2.1 – 5.0	4	Failure in blanket bog areas would typically occur as peat slides and peaty debris slides, due to low slope angle.
5.1 – 15.0	5	Failure in blanket bog areas would typically occur as peat slides, bog slides or peaty debris slides. This is the key slope range for reported peat failures.
15.1 – 20.0	4	Failure would typically occur as peaty debris slides due to low thickness of peat on steeper slopes.

Slope (Degrees)	Slope Score	Comments
>20.0	3	Failure would typically occur as peaty debris slides due to low thickness of peat on steeper slopes.

5.7.2 Peat Depth

Peat thickness is seen as one of the key factors associated with peat stability. Typically, the deeper the peat the more humified, and therefore potentially weaker and unstable it is. Peat depth surveys have been completed on the site and these data were then interpolated (see Figures 2.a – 2.f in Appendix B).

The highest hazard scores have been assigned to peat depth ranges most frequently associated with peat slides on upland sites (Evans and Warburton, 2007).

The peat depth was identified at each proposed infrastructure element and scored as shown in Table 5.

Table 5 – Peat Stability Hazard Scoring (Peat Depth)

Peat Depth (m)	Depth Score	Comments
Nil	0	No peat / organic soil therefore no potential for peat slide
<0.5	3	Peaty / organic soil rather than peat, therefore failures would be peaty debris slides
0.51 – 1.5	5	Sufficient peat thickness for peaty debris or peat slide
>1.5	4	Sufficient peat thickness for peat slide however less often recorded at this thickness, due to thicker peat generally occurring in areas of shallow gradients

5.7.3 Substrate

The nature of the substrate beneath peat deposits can have a bearing on the likelihood of instability arising, with failure often occurring at the interface between the base of the peat mass and the top of the substrate. A smooth, relatively impermeable substrate surface can result in a 'slippery' interface, accumulation of groundwater and / or low shear strength at the interface, resulting in a higher susceptibility for the overlying peat mass to fail. Conversely, granular substrate such as sand and gravel or permeable bedrock, can provide greater frictional strength, reducing the potential for failure to occur at the peat / substrate interface.

The nature of the substrate was inferred at each proposed infrastructure element, on the basis of BGS geological mapping and surveyor observations in the field and scored as shown in Table 6. It should be noted that observations of exposed bedrock and substrate (poorly sorted, generally granular till and weathered bedrock) could be made at various locations across the site, increasing confidence in identification of the substrate across the site as bedrock (assigned a score of 1 for conservatism and given the likely low permeability) or granular till.

Table 6 – Peat Stability Hazard Scoring (Substrate)

Substrate	Substrate Score	Comments
Permeable Bedrock	0	Peat failure rarely associated with permeable bedrock
Impermeable Bedrock / Granular Till	1	Peat failures sometimes associated with bedrock or granular till substrate
Cohesive (Clay) Till	2	Peat failures often associated with cohesive till substrate
Cohesive (Clay) Till with Iron Pan	3	Peat failures often associated with cohesive till substrate, with impermeable iron pan providing a shear surface (Dykes and Warburton, 2007)

5.7.4 Geomorphology

Geomorphological considerations such as peat erosion, hagging, peat pipes, pools, and evidence of existing instability, can contribute to the potential for instability to arise.

The geomorphological conditions were noted at each proposed infrastructure element, based on surveyor observations, mapping and aerial photography, and scored as shown in Table 7.

Table 7 – Peat Stability Hazard Scoring (Geomorphology)

Geomorphology Description	Geomorphology Score	Comments
Gullied / Dissected / Hagged / Eroded Peat / Bare Peat / Bare Ground	1	Failures rarely recorded in peat fragmented by erosion
Existing Peat Slide	1	Failures typically stabilise after the event
Evidence of Peat Pipes / Collapsed Pipes / Flushes / Pools	2	Failures frequently associated with soil piping and areas of diffuse surface drainage such as flushes and pools
Intact Planar Peat	2	Failures frequently recorded in intact, planar peat
Emerging Instability (Tension Cracks, Compression Ridges, Bulging, Quaking Bog)	3	Failures likely to occur where evidence of emerging/ developing instability is observed
Adjacent / Upslope (<50m) to Existing Instability	3	Failures frequently occur in close proximity to previous failure events

5.7.5 Drainage

The presence and geometry of natural and artificial drainage features can affect the stability of a peat mass, by creating lines of weakness. Where drainage features follow the slope direction, this effect is not likely to be as pronounced as drainage features being either oblique to or perpendicular to the slope direction.

The drainage conditions were noted at and in the vicinity (within ~100 m) of each proposed infrastructure element, based on surveyor observations, mapping and aerial photography and scored as shown in Table 8.

Table 8 – Peat Stability Hazard Scoring (Drainage)

Drainage Feature	Drainage Score	Comments
No Artificial or Natural Drainage Features	0	No impact on likelihood of peat slide
Artificial Drains or Natural Watercourses / Drainage Features Aligned to Slope Direction	1	Peat slides are rarely associated with drainage features aligned to the slope direction
Artificial Drains or Natural Watercourses / Drainage Features Oblique to Slope Direction	3	Peat slides have been reported in areas with drainage features are oblique to or perpendicular to the slope direction

5.7.6 Forestry

The presence of forestry can increase the mass loading and affect the potential for instability. The alignment of forestry rows, and the presence or otherwise of desiccation cracking are factors which can influence stability (Bragg & Lindsay, 2005).

Hazard scores relating to forestry are set out in Table 9.

Table 9 – Peat Stability Hazard Scoring (Forestry)

Forestry Description	Forestry Score	Comments
Not Afforested	0	No impact on likelihood of peat slide
Deforested, Ridge and Furrows Aligned to Slope	2	Likely high-water table, lines of weakness may be present but aligned to slope direction
Deforested, Ridge and Furrows Oblique to Slope	3	Likely high-water table, lines of weakness may be present, oblique to or across slope and therefore may result in instability
Mature Forest, Ridge and Furrows Aligned to Slope	1	Forestry affects loading / mass, but rows aligned to slope direction are less likely to result in instability than rows oblique to or across slope

Forestry Description	Forestry Score	Comments
Mature Forest, Ridge and Furrows Aligned to Slope	2	Forestry affects loading / mass and rows oblique to or across slope direction are more likely to result in instability

5.7.7 Relief

Several references have been made to peat instability initiating at convex and concave slopes. In particular, convex slopes may have thicker peat upslope, with the potential to buckle and fail, with thinner peat further down the slope providing limited support (Dykes & Warburton, 2007; Boylan & Long, 2011).

The relief, specifically the identification of slopes being planar, convex, or concave, was noted at each proposed infrastructure element, based on topographical mapping, and scored as shown in Table 10.

Table 10 – Peat Stability Hazard Scoring (Relief)

Relief / Profile	Relief Score	Comments
Planar Slope	0	No impact on likelihood of peat slide
Concave Slope	2	Peat slides occasionally reported to be associated with concave slopes
Convex Slope	3	Peat slides often reported to be associated with convex slopes

5.7.8 Land Use

Land uses such as moor burning, quarrying, and peat cutting, can impact on the stability of the peat mass.

The nature of the land use was noted at each proposed infrastructure element, based on surveyor observations, mapping and aerial photography, and scored as shown in Table 11.

Table 11 – Peat Stability Hazard Scoring (Land Use)

Land Use Feature	Land Use Score	Comments
Evidence of Burning	1	Burning activities may theoretically create desiccation cracking and allow water to flow to the base of the peat, creating a failure surface (limited evidence in practice)
Quarrying Adjacent to Location	2	Failures have been reported adjacent to quarrying activity, although typically bog bursts or flows rather than peat slides in blanket bog areas
Peat Cutting	3	Peat failures have often been reported associated with peat cutting

Land Use Feature	Land Use Score	Comments
Any Land Use Other Than Noted Above	0	No impact on likelihood of peat slide

5.8 Peat Slide Hazard Scoring Summary

As noted in Section 5.7, the scores assigned for each of the above eight factors were summed to give a total hazard score associated with each proposed infrastructure element.

Hazard (likelihood) category rankings have then been assigned based on the total hazard scores. The hazard rankings reflect the qualitative likelihood of failure, from very low to very high, taking into account the combination of all factors described above. The maximum hazard score is 28.

Table 12 sets out the hazard category ranking system employed in this assessment.

Table 12 – Hazard Ranking

Total Hazard Score	Hazard Ranking	Hazard (Likelihood) Description	Comments
<=6	1	Very Low	Low scores for peat depth, slope angle and other factors
7 – 12	2	Low	Generally low scores for peat depth and slope angle, potentially some moderate or occasional high scores for certain factors
13 – 17	3	Moderate	Moderate to High scores for peat depth and slope angle, some elevated scores for other factors
18 – 22	4	High	High scores for peat depth, slope angle and several other factors
>22	5	Very High	High scores for most or all factors

A judgement was made that for an infrastructure element to have a moderate or higher likelihood of peat landslide, a likelihood score would be required to exceed both the worst-case peat depth and slope angle scores summed (i.e. 10) alongside three scores for other contributory factors. On this basis, it is considered that a likelihood score of 13 or greater would be equivalent to at least a moderate likelihood of a peat landslide. Given that the maximum score attainable is 28, this is considered to be a reasonable approach.

Detailed hazard scoring, showing the scores given to each infrastructure element for each of the above factors, is set out in Appendix D. Table 13 below presents a summary of the Hazard Ranking for each proposed infrastructure element at the site, using the methodology described above.

The access track sections noted below are labelled on Figure 2 in Appendix A.

Table 13 – Hazard Scoring Summary

Infrastructure Element	Total Hazard Score	Hazard Ranking	Hazard (Likelihood) Description
Turbines (Including Crane Pads)			
T1	12	2	Low
T2	11	2	Low
T3	12	2	Low
T4	12	2	Low
T5	11	2	Low
T6	12	2	Low
T7	12	2	Low
T8	12	2	Low
T9	12	2	Low
T10	14	3	Moderate
T11	14	3	Moderate
T12	12	2	Low
T13	12	2	Low
T14	12	2	Low
T15	14	3	Moderate
T16	14	3	Moderate
T17	12	2	Low
T18	14	3	Moderate
T19	12	2	Low
T20	13	3	Moderate
Other Infrastructure			
Substation Compound	14	3	Moderate
Construction Compound	12	2	Low
Borrow Pit 1 (North)	12	2	Low
Borrow Pit 2 (South)	12	2	Low

Infrastructure Element	Total Hazard Score	Hazard Ranking	Hazard (Likelihood) Description
Borrow Pit 3 (West)	12	2	Low
New Access Track Sections			
Track A	12	2	Low
Track B	14	3	Moderate
Track C	12	2	Low
Track D	11	2	Low
Track E	12	2	Low
Track F	12	2	Low
Track G	12	2	Low
Track H	14	3	Moderate
Track I	12	2	Low
Track J	11	2	Low
Track K	13	3	Moderate
Track L	14	3	Moderate
Track M	12	2	Low
Track N	12	2	Low
Track O	12	2	Low
Track P	13	3	Moderate
Track Q	14	3	Moderate
Track R	14	3	Moderate
Track S	12	2	Low
Track T	12	2	Low
Track U	14	3	Moderate
Track V	12	2	Low

As can be seen from Table 13, all of the infrastructure elements have been assigned hazard rankings of low to moderate. The rankings reflect the moderate slopes and peat depths, which have been tempered by other factors such as slope, drainage, a lack of forestry and land uses.

6. PEAT SLIDE HAZARD RISK ASSESSMENT

6.1 Methodology

The level of risk allocated to a particular area relates to the presence of peat, the likelihood of failure occurring (the hazard) and the consequences of such a failure (the exposure). Risk assessment should be based on consideration of the hazard (discussed above) and exposure (consequence of peat failure):

Hazard x Exposure = Risk

6.2 Consequences of Peat Failure (Exposure)

The effects of peat failures are felt locally, both in the long and short term, but they can also have wider off-site implications.

A key part of the risk assessment process is to identify the potential scale of peat failure, should it occur, and identify the potential environmental effects as well as the receptors of such an event.

Predicting the size of a failure and the distance it may travel is very difficult. The high moisture content of peat makes it especially mobile once it fails and the structure of the peat breaks down. If a peat slide enters a watercourse this can mobilise the slide further and have impacts many kilometres beyond the bounds of the site. In many instances, minor slumps are localised and have little or no impact. Other failures may travel 100 – 200 m and those entering watercourses, many miles, as was the case of the Derrybrien failure in Co. Galway, Ireland in 2003 (Bragg & Lindsay 2005).

Peat failure associated with the Development could affect the following receptors:

- The Development itself including associated infrastructure;
- Site workers and plant (risk of injury / death or damage to plant);
- Public roads and other infrastructure;
- Land based ecological effects (damage to habitats e.g. Special Protection Areas (SPA));
- Effects on the quality of onsite and downstream watercourses / features;
- Site drainage (blocked drains / ditches leading to localised flooding and / or erosion);
- Visual amenity (scarring of the landscape).

The surface watercourses on and adjacent to the site and other potentially sensitive receptors are described in Section 4 above and are considered in this assessment. The main sensitive features that are considered to be present include: surface watercourses / features and development infrastructure (principally turbines).

The following approach to analysis of the consequence, or exposure, has been based on a review of PSRA reports undertaken by a range of professionals for different sites across Scotland, together with reference to the guidance and literature noted above, and professional experience. The analysis considers the sensitivity of the receptor, the distance between the potential source of instability and the receptor, and the relative elevation of the source compared to the receptor. This is considered to be a more realistic and suitable analysis than considering distance alone, given that a receptor which is close to a source area but is up-gradient from it, would not be affected by run-out from the resultant failure.

In this assessment, the proposed infrastructure elements are considered to be the potential source areas of instability. The exposure assessment involves identification of sensitive receptors in the

down-gradient direction from each proposed infrastructure element (source area), and assigning scores for sensitivity of receptor, proximity, and relative elevation. The rationale for assigning each of these scores is set out in Tables 14 to 16 below.

Table 14 – Exposure Scoring (Receptor Sensitivity)

Receptor Type	Sensitivity Score
Minor private roads / tracks, including Development tracks	1
Local drainage systems / artificial drains, rural land	2
Watercourses / lochs, local roads and services, proposed turbines, individual dwellings, and business properties	3
High-sensitivity watercourses / lochs (e.g. national or international designations), Protected Ecological Sites (e.g. SSSI, SPA) major infrastructure (major roads, motorways, pipelines), small settlements (up to ~ 10 residents)	4
Communities (more than approximately 10 residents)	5

Table 15 – Exposure Scoring (Proximity)

Proximity of Receptor to Source	Proximity Score
More than 1km	1
100m to 1km	2
50m to 100m	3
10m to 50m	4
Less than 10m	5

Table 16 – Exposure Scoring (Relative Elevation)

Relative Elevation of Source Above Receptor	Elevation Score
Less than 10m	1

Relative Elevation of Source Above Receptor	Elevation Score
10m to 50m	2
50m to 100m	3
100m to 150m	4
More than 150m	5

A total exposure score has been determined for each proposed infrastructure location, by multiplying the three component scores together and taking the cube root of the result. This is considered to provide an appropriate reflection of the overall consequence, or exposure, taking account of receptor sensitivity, proximity, and relative elevation as contributing considerations.

Where more than one receptor was identified down-gradient from a given proposed source area, the process has been repeated for each receptor, and the highest total exposure score has been used in the assessment related to that particular source (proposed infrastructure element).

Table 17 gives a qualitative description of the exposure (impact) associated with the scores determined by the above method.

Table 17 – Peat Slide Exposure Categories

Score	Consequence	Exposure (Impact)
1	Minor restoration of works	Low
2	Blockage of site access roads or local drainage systems	Low to Medium
3	Damage to rural lands and localised pollution of watercourses	Medium
4	Blockage of public roads, short to medium term pollution incident	Medium to High
5	Loss of life, major damage to property, public roads, and major pollution incident to watercourses	High

Table 18 below provides a summary of the exposure assessment at each of the proposed infrastructure elements.

Table 18 – Peat Slide Exposure Scores

Infrastructure Element	Receptor	Sensitivity Score	Proximity Score	Elevation Score	Total Exposure Score (Cube root of S x P x E)
Turbines (Including Crane Pads)					
T1	Watercourse to North (Allt Dearg)	3	2	2	2.29
T2	Watercourse to South (Tributary of Breakachy Burn)	3	2	2	2.29
T3	Watercourse to North (Allt Goibhre)	3	2	4	2.88
T4	Watercourse to South (Allt an Locha Bhallaich)	3	2	2	2.29
T5	Watercourse to North-West (Allt a' Chrochadair)	3	2	3	2.62
T6	Watercourse to South (Allt an Locha Bhallaich)	3	2	3	2.62
T7	Watercourse to South (Allt Liath)	3	2	2	2.29
T8	Watercourse to East (Tributary of Allt an Locha Bhallaich)	3	2	2	2.29
T9	Watercourse to North-West (Allt a' Chrochadair)	3	2	2	2.29
T10	Watercourse to North-East (Allt a' Chrochadair)	3	2	3	2.62
T11	Watercourse to East (Allt a' Chrochadair)	3	2	1	1.82
T12	Watercourse to South (Allt Liath)	3	2	2	2.29

Infrastructure Element	Receptor	Sensitivity Score	Proximity Score	Elevation Score	Total Exposure Score (Cube root of S x P x E)
T13	Watercourse to North (Allt a' Chrochadair)	3	2	3	2.62
T14	Watercourse to South-East (Allt a' Chrochadair)	3	2	2	2.29
T15	Watercourse to North (Allt Goibhre)	3	2	2	2.29
T16	Turbine to North (T17)	3	2	3	2.62
T17	Watercourse to North (Allt Goibhre)	3	2	2	2.29
T18	Watercourse to North (Allt Beinn nam Fitheach)	3	2	2	2.29
T19	Watercourse to North (Allt Creagach)	3	2	2	2.29
T20	Watercourse to North (Allt Goibhre)	3	2	3	2.62
Other Infrastructure					
Substation Compound	Watercourse to South (Allt Liath)	3	2	2	2.29
Construction Compound	Watercourse to South (Allt Liath)	3	2	2	2.29
Borrow Pit 1 (North)	Watercourse to North (Allt Goibhre)	3	2	4	2.88
Borrow Pit 2 (South)	Watercourse to South (Allt an Locha Bhallaich)	3	2	4	2.88
Borrow Pit 3 (West)	Turbine to North (T17)	3	2	3	2.62
New Access Track Sections					
Track A	A831 Road to the South	4	5	2	3.42

Infrastructure Element	Receptor	Sensitivity Score	Proximity Score	Elevation Score	Total Exposure Score (Cube root of S x P x E)
Track B	Watercourse (Allt an Locha Bhallaich) Crossed by Track	3	5	1	2.47
Track C	Watercourse (Allt Liath) Crossed by Track	3	5	1	2.47
Track D	Watercourse to South (Allt an Locha Bhallaich)	3	2	3	2.62
Track E	Watercourse to South (Allt Liach)	3	3	2	2.62
Track F	Watercourse to South (Allt Liach)	3	2	3	2.62
Track G	Watercourse to South (Allt Liach)	3	2	3	2.62
Track H	Turbine to East (T6)	3	2	2	2.29
Track I	Watercourse to South (Allt an Locha Bhallaich)	3	2	3	2.62
Track J	Watercourse (Tributary of Allt an Locha Bhallaich) Crossed by Track	3	5	1	2.47
Track K	Watercourse to South (Tributary of Allt an Locha Bhallaich)	3	2	2	2.29
Track L	Watercourse to West (Allt a' Chrochadair)	3	4	1	2.29
Track M	Watercourse to West (Allt a' Chrochadair)	3	2	2	2.29
Track N	Watercourse (Allt Dearg) Crossed by Track	3	5	1	2.47
Track O	Watercourse (Allt a' Chrochadair) Crossed by Track	3	5	1	2.47

Infrastructure Element	Receptor	Sensitivity Score	Proximity Score	Elevation Score	Total Exposure Score (Cube root of S x P x E)
Track P	Watercourse (Allt a' Chrochadair) Crossed by Track	3	5	1	2.47
Track Q	Watercourse to South (Allt a' Chrochadair)	3	2	2	2.29
Track R	Turbine to North (T15)	3	2	3	2.62
Track S	Watercourse (Allt an Torra Dhuinn) Crossed by Track	3	5	1	2.47
Track T	Watercourse to North (Allt Goibhre)	3	2	2	2.29
Track U	Watercourse (Allt an Torra Dhuinn) Crossed by Track	3	5	1	2.47
Track V	Watercourse (Allt an Torra Dhuinn) Crossed by Track	3	5	1	2.47

As shown in the summary table above, the total exposure scores range from 1.82 to 3.42, reflecting the presence of sensitive receptors, tempered by the distance between receptors and source areas and / or the topography in some areas where infrastructure elements have been sited.

6.3 Peat Slide Hazard Risk Scoring

Following the identification of the above hazards and exposure, it is possible to categorise each proposed infrastructure element (i.e. each potential source location) with a risk score, by multiplying the likelihood of failure (Hazard Ranking) by its potential impact (exposure score). The matrix suggested by the Best Practice Guidance to determine the risk category is presented in Table 19 below.

Table 19 – Peat Slide Risk Categories

Peat Slide Hazard Risk Scoring		Action Suggested
1.00 – 3.99	Negligible	Project should proceed with monitoring and mitigation of peat landslide hazards at these locations as appropriate
4.00 – 7.99	Low	Project may proceed pending further investigation to refine assessment and mitigate hazard through relocation or re-design at these locations
8.00 – 14.99	Medium	Project should not proceed unless risk can be avoided or mitigated at these locations, without significant environmental impact, in order to reduce risk score to low or negligible
>15.00	High	Avoid project development at these locations

Table 20 below presents a summary of the assessment of peat slide risk based on the methodology set out above.

Table 20 – Peat Slide Risk

Infrastructure Element	Hazard Ranking	Exposure Score	Risk Score	Risk Category
Turbines (Including Crane Pads)				
T1	2	2.29	4.58	Low
T2	2	2.29	4.58	Low
T3	2	2.88	5.76	Low
T4	2	2.29	4.58	Low
T5	2	2.62	5.24	Low
T6	2	2.62	5.24	Low
T7	2	2.29	4.58	Low
T8	2	2.29	4.58	Low
T9	2	2.29	4.58	Low
T10	3	2.62	7.86	Low
T11	3	1.82	5.46	Low
T12	2	2.29	4.58	Low
T13	2	2.62	5.24	Low
T14	2	2.29	4.58	Low
T15	3	2.29	6.87	Low
T16	3	2.62	7.86	Low
T17	2	2.29	4.58	Low
T18	3	2.29	6.87	Low
T19	2	2.29	4.58	Low
T20	3	2.62	7.86	Low
Other Infrastructure				
Substation Compound	3	2.29	6.87	Low
Construction Compound	2	2.29	4.58	Low

Infrastructure Element	Hazard Ranking	Exposure Score	Risk Score	Risk Category
Borrow Pit 1 (North)	2	2.88	5.76	Low
Borrow Pit 2 (South)	2	2.88	5.76	Low
Borrow Pit 3 (West)	2	2.62	5.24	Low
New Access Track Sections				
Track A	2	3.42	6.84	Low
Track B	3	2.47	7.41	Low
Track C	2	2.47	4.94	Low
Track D	2	2.62	5.24	Low
Track E	2	2.62	5.24	Low
Track F	2	2.62	5.24	Low
Track G	2	2.62	5.24	Low
Track H	3	2.29	6.87	Low
Track I	2	2.62	5.24	Low
Track J	2	2.47	4.94	Low
Track K	3	2.29	6.87	Low
Track L	3	2.29	6.87	Low
Track M	2	2.29	4.58	Low
Track N	2	2.47	4.94	Low
Track O	2	2.47	4.94	Low
Track P	3	2.47	7.41	Low
Track Q	3	2.29	6.87	Low
Track R	3	2.62	7.86	Low
Track S	2	2.47	4.94	Low
Track T	2	2.29	4.58	Low
Track U	3	2.47	7.41	Low
Track V	2	2.47	4.94	Low

The summary presented in Table 20 indicates that the risk of peat slide at all proposed infrastructure elements is Low.

The assessment has therefore identified that the development, as currently proposed, is suitable for development pending further detailed investigation, which will be required to refine this assessment by way of preparation of a detailed PLHRA (and PMP report) and to further mitigate any potential hazards.

An overall risk plan is provided as Figure 6 in Appendix A.

7. PROPOSED DETAILED DESIGN AND SITE INVESTIGATION

7.1 Detailed Design and Site Investigation

A detailed site investigation would be required to assist detailed design and the information obtained used to update the PSRA report. Intrusive ground investigations would be completed at infrastructure locations prior to construction commencing to ascertain depth to bedrock and suitable founding conditions and obtain samples of peat for laboratory testing.

A detailed stability analysis can then be completed at all infrastructure locations using the increased confidence in shear strength / peat depth data obtained during the investigation work, confirmation of geology underlying the peat and site-specific topographical survey data. This will provide additional robustness to the stability assessment.

7.2 Turbines and Hardstandings

This peat slide hazard risk assessment has identified that all turbines are at low-risk locations. However, a specific construction method statement would be produced which would draw on the findings of further detailed intrusive investigation. The method statement would detail the exact construction methodology to be used, in line with the Detailed Peat Management Plan and taking into account:

- Opportunities for micro-siting turbines to further minimise risk where possible;
- A geotechnical analysis for each turbine base;
- The method of excavation and the location for placing and storing excavated material to ensure that these operations do not give rise to slope or site instability;
- Methodology for storing and watering surface vegetated turves, for re-sodding bare areas;
- Details of how excavated spoil would be stored;
- Avoidance of construction (if possible) on wet areas, flushes and easily eroded soils;
- Adequate drainage design to cater for expected heavy rainfall events; and
- Monitoring of ground movement and water levels.

The Construction Method Statement would also detail how any pumped water from excavated bases would be controlled and monitored to ensure that it is appropriately managed and if directed into or conveyed to existing drains / watercourses, to ensure that all have adequate treatment beforehand and capacity to deal with the volumes of water encountered.

7.3 Access Tracks

Areas of deep peat have been avoided wherever possible with respect to access track routing, as described in Chapter 4: Design Evolution. However, it has not been possible to entirely avoid all areas of deep peat, therefore mitigation measures are set out below.

Some localised thicker peat deposits have been recorded in the area of the proposed turning head and access track situated to south of T5. The requirement for peat excavation at these locations will be minimised, via the construction of floating road, where required. The extent of floating track required will be confirmed, following completion of detailed pre-construction site investigations and

micro-siting. Based on the findings of the peat surveys, it is estimated that approximately 2.01km of the new access tracks would be floated.

Construction of floated roads would be carried out considering the effects of consolidation and the effect loading would have on stability, hydrology, and ecology. Construction would require the placing of a geotextile membrane on existing topsoil and vegetation followed by aggregate layers. Depending on ground conditions identified from further, detailed geotechnical investigations, two or more layers of geotextile would be placed in layers of 300 mm to 500 mm. The access tracks would be capped with layers of Type 1 or similar material. Type 1 is unbound aggregate mixture specified under Clause 803 of the Specification for Highway Works (2016) as suitable for vital load bearing foundation in road construction.

The following additional mitigation measures would be employed to ensure suitable construction of tracks and minimising risk of instability:

- Road alignments would be micro-sited to further reduce risk where possible and appropriate, based on detailed site investigation findings;
- Roads would be constructed to take the required vehicular loadings, having due regard to overall site stability;
- Machinery and vehicles used in track construction would be operated from the already constructed sections of the road as it progresses;
- Conservative design parameters would be used, taking account of potential impacts of localised deforesting and re-planting;
- Good quality rock would be used to construct roads where applicable;
- Ground movement and water level monitoring would be carried out at all times;
- All machinery and construction methods onsite would be selected with a view to minimising impact on the surrounding habitat; and
- All tracks within the main windfarm area would include oversized bottomless arch culverts at the location of each water crossing, flush or other hydrological feature in order to allow the natural flow of water across the site and prevent ponding and the generation of pore pressures which may initiate instability as per Technical Appendix 8.1: Water Crossing Schedule.

7.4 Peat Storage

The principles of temporary peat storage are discussed in Technical Appendix 10.2 Outline Peat Management Plan. Detailed requirements for any appropriate mitigation measures would be set out in the Construction Environmental Management Plan (CEMP).

Best practice measures for temporary and permanent peat storage during construction would be followed, in accordance with guidance including Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012). This includes:

- Selecting suitable temporary storage areas with relatively low ecological value, and low stability risk i.e. not at the crest of a slope or in areas identified as being at higher risk of instability;
- Reuse of temporarily stored peat as soon as possible after excavation;
- Dressing and reinstating peat used for road verges and infrastructure batters (as part of site landscaping works) as soon as practicable after construction; and
- Suitably limiting the angle of reinstated slopes to reduce run-off and erosion.

7.5 Drainage Areas

Design and construction of a suitable drainage system for the Development would follow Sustainable Urban Drainage Systems (SUDS) principles and would ensure natural drainage without significant alteration of the hydrological regime of the local site area.

Any construction activity relating to, or undertaken in the vicinity of watercourses, would be carried out in general accordance with relevant SEPA Pollution Prevention Guidelines, The Water Framework Directive (WFD), The Water Environment and Water Services (Scotland) Act 2003 (WEWS) and the Controlled Activities Regulations (CAR) 2011 (as amended).

7.6 Borrow Pits

Pre-construction site investigation works would be undertaken to further assess the borrow pit search areas and to identify the specific excavation locations and extents within the search areas.

This would be based on peat depth and distribution, with deep peat avoided, and suitability of rock for excavation. These further investigations would also establish the method of extraction, determining whether any blasting is required.

If blasting is required, shock waves that may be created have the potential to travel through the bedrock and may trigger instability in peat areas distant from the borrow pit sites. All borrow pit sites have been located within areas with minimal or no peat, to restrict the potential for induced peat slide adjacent to the borrow pit areas.

If required, all blasting would be completed under the supervision of a qualified and experienced blast engineer. The smallest practicable amount of explosive would be used to minimise shock waves resulting from the blast. Additional pre-drilling of the blast face may be appropriate to provide a higher level of control of the blast, particularly if this allows the use of smaller amounts of explosive. This would be undertaken on the advice of the blast engineer operating within the site.

Significant excavation works would be restricted when blasting for aggregate is planned at each of the borrow pits, with restrictions affecting Turbine T1, T2, T3 and T4 for Borrow Pit 1 (North), T11 for Borrow Pit 2 (Central) and T14 and T15 for Borrow Pit 3 (South). Works would only continue at the locations after appropriate inspections have determined that ground instability has not arisen as a result of the blast.

Visual peat monitoring would be undertaken following blasting, to inspect nearby infrastructure locations for any signs of peat instability. This would include recording any signs of cracking or mounding of peat, which can be the early signs of slippage. It is recommended that infrastructure and peat areas within 500 m of the blasting location are visited, with additional locations if relevant as recommended by the Environmental Clerk of Works.

Blasting may be restricted in periods of significant wet weather, upon the advice of the blast engineer.

7.7 Monitoring and Management

A line of surveyed and levelled pegs and visual monitoring is an acceptable method of monitoring movement adjacent to roads, excavations, and stockpile areas.

Thus, as construction activities commence, the appearance of the area and surrounding land would be monitored visually by installing a line of levelled pegs adjacent to the activity location.

Specifically, the following signs would be looked for:

- An increased rate of sinking or tilting;

- The rising of adjacent peat / peaty soils;
- Cracking and lateral movement of the soil surface; and
- A rise in water levels.

The Principal Contractor would ensure that suitably qualified and experienced construction staff are engaged on the project, including a senior geotechnical engineer with extensive practical knowledge and experience of similar conditions to those at the site. The senior geotechnical engineer would have responsibility for maintaining and actively monitoring a geotechnical risk register for the construction works.

In addition, all staff would undergo a site induction and suitable training relating to construction on peatland sites. This would raise awareness of ground instability indicators, best practice construction techniques, mitigation, and emergency procedures. All staff should be responsible for observational monitoring and reporting.

8. CONCLUSION

Based on an extensive peat survey programme and the findings of habitat surveys undertaken it is considered that parts of the Development site would be best characterised as blanket bog with variable peat depths recorded. The Development layout, including turbines and associated infrastructure, has been designed to avoid the areas of deep peat wherever possible and areas where peat landslide may occur.

Further detailed design would be informed by detailed ground investigations to be undertaken prior to commencement of any works onsite. The peat slide risk assessment will be updated on the basis of the information obtained during these works.

On the basis of the available information at this stage, the peat slide risk assessment has identified that all proposed infrastructure elements represent a low peat slide risk. The outcome of the assessment is considered to correlate with a factor of safety assessment that has also been completed.

Mitigation measures are detailed herein which would assist in reduction of any potential risks associated with construction activities causing ground instability, including undertaking detailed intrusive ground investigations to clarify risks and allow stipulation of specific geotechnical mitigation measures and / or micro-siting as required.

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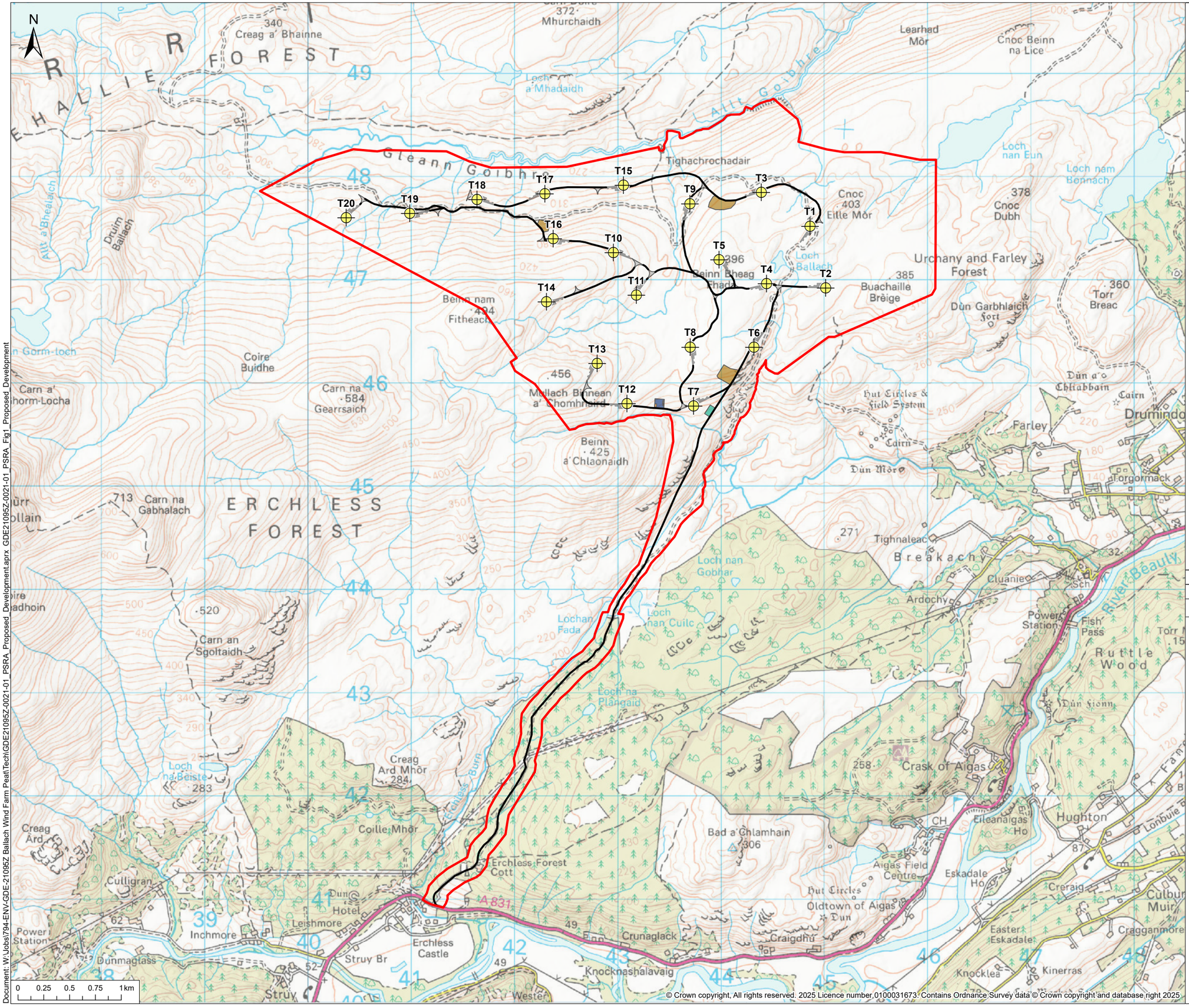
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Appendix A
FIGURES



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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head

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Project: Ballach Wind Farm

Title: Proposed Development Plan

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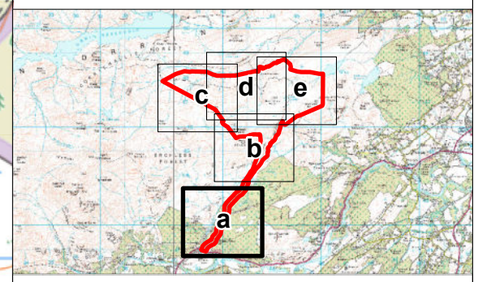
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Legend

- Site Boundary
- Site Access Track
- Track Section Reference

Slope Angle

- <=2 Degrees
- 2 - 5 Degrees
- 5 - 15 Degrees
- 15 - 20 Degrees
- >=20 Degrees



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Title: Slope Angle Plan

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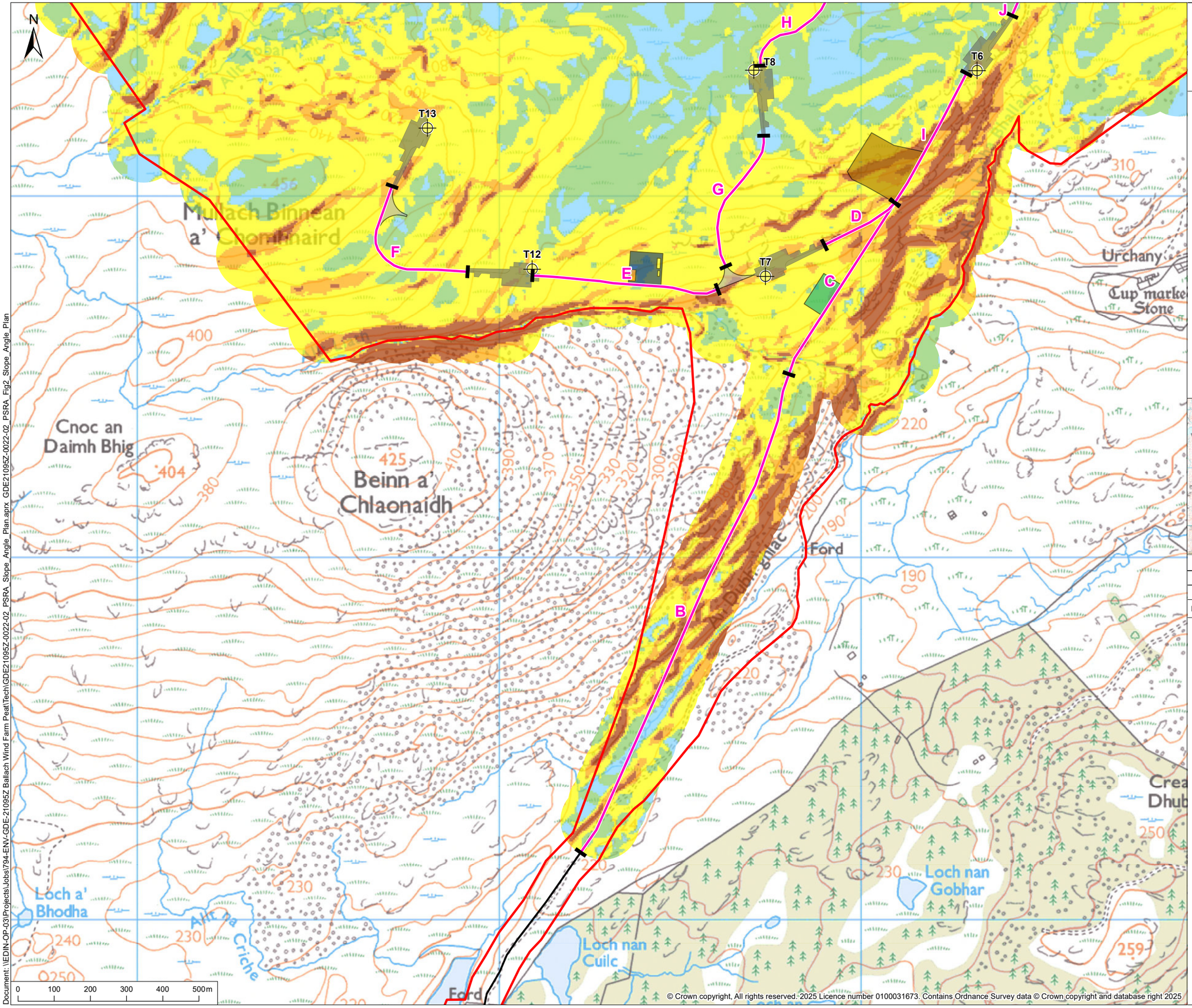
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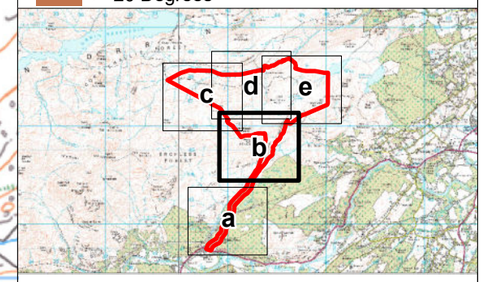
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Track Section Reference
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head

Slope Angle

- <=2 Degrees
- 2 - 5 Degrees
- 5 - 15 Degrees
- 15 - 20 Degrees
- >=20 Degrees



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Title: Slope Angle Plan

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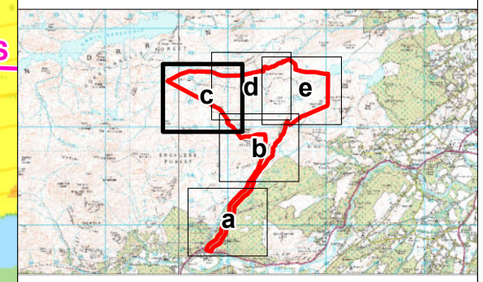
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Track Section Reference
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle

- <=2 Degrees
- 2 - 5 Degrees
- 5 - 15 Degrees
- 15 - 20 Degrees
- >=20 Degrees



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Title: Slope Angle Plan

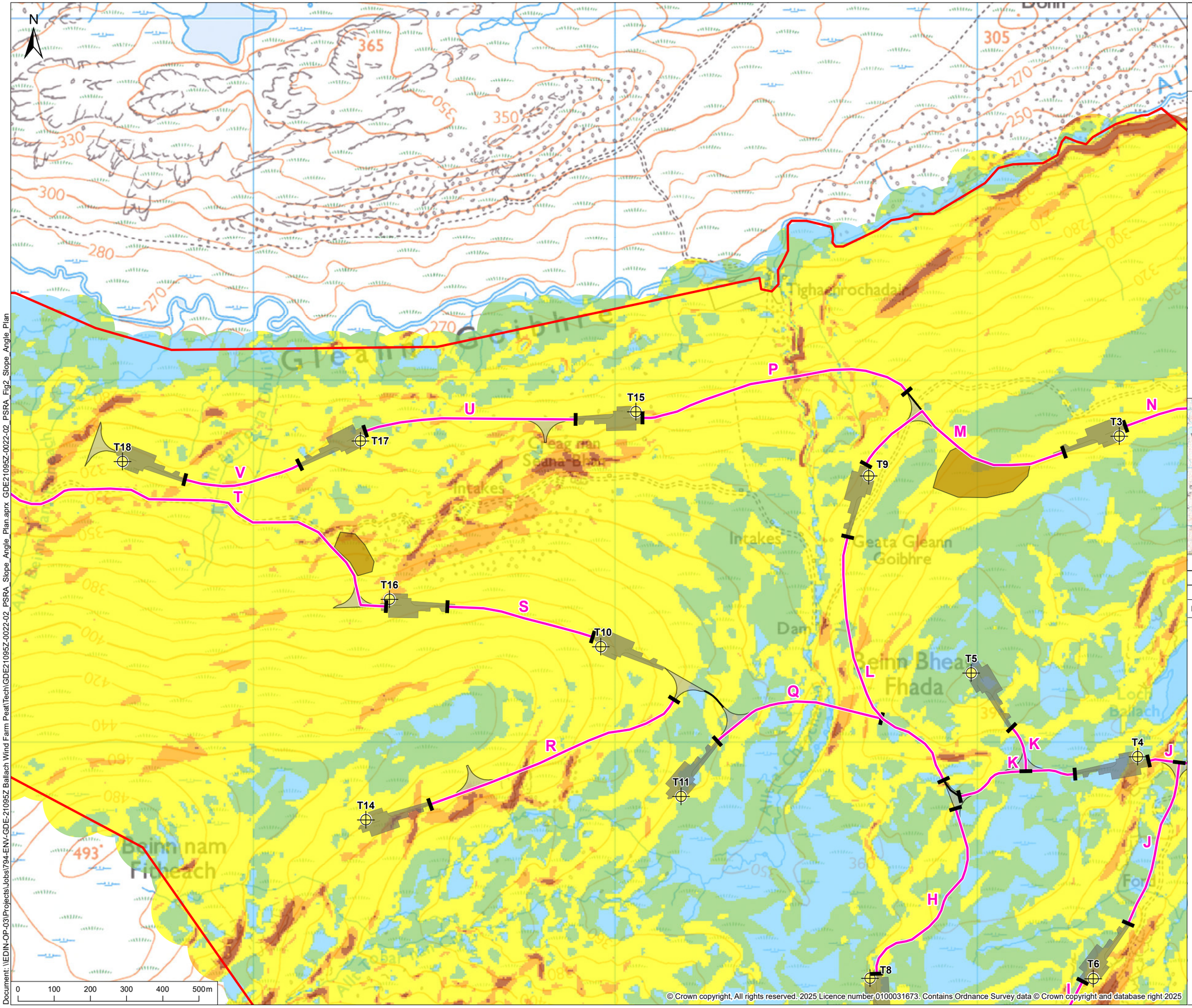
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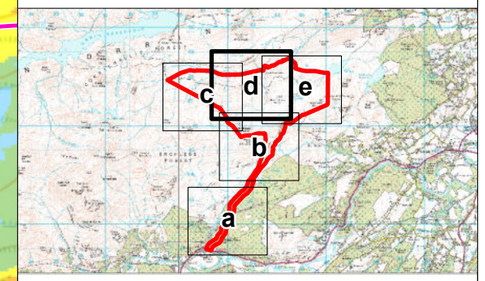
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Track Section Reference
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle

- <=2 Degrees
- 2 - 5 Degrees
- 5 - 15 Degrees
- 15 - 20 Degrees
- >=20 Degrees



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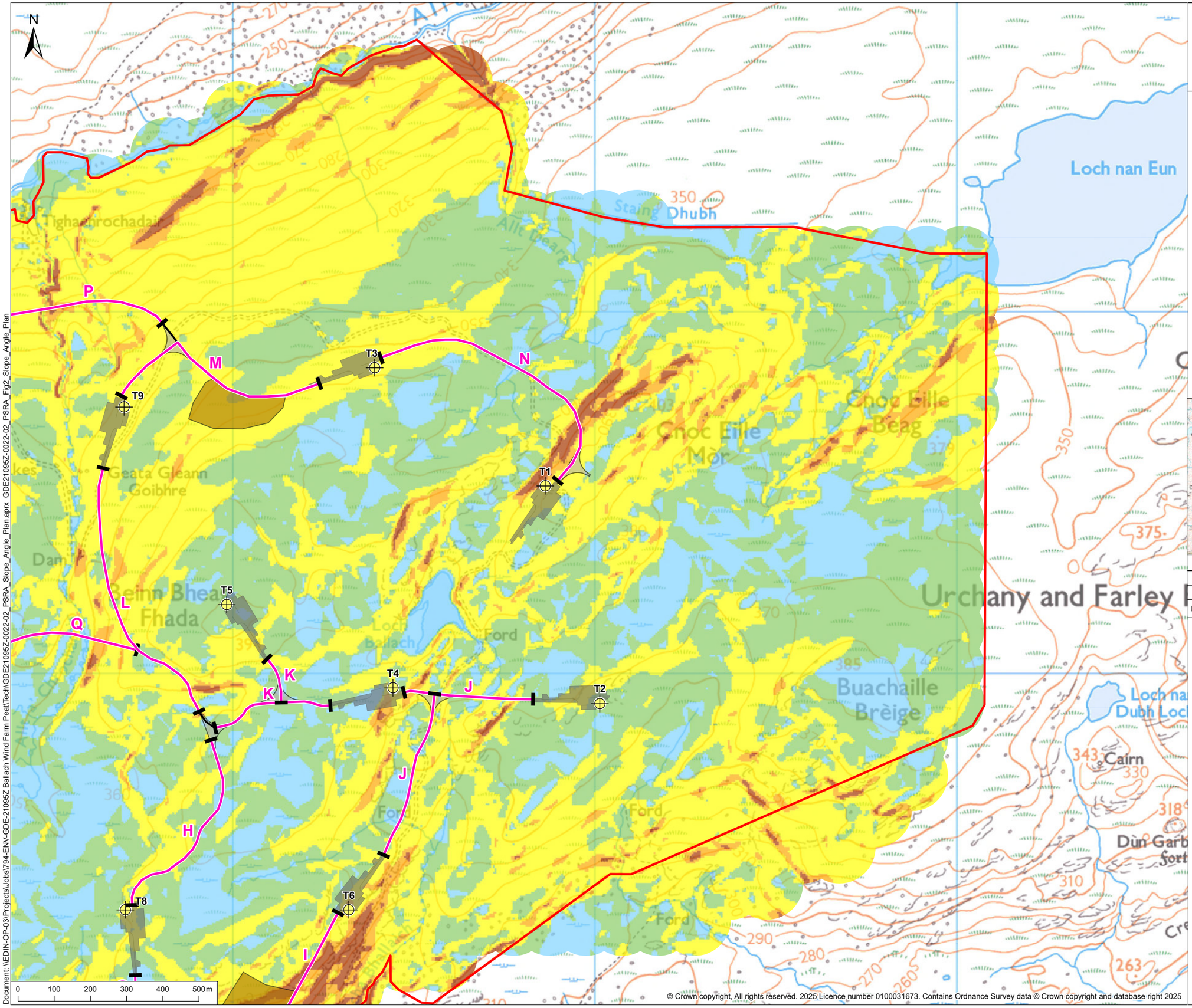
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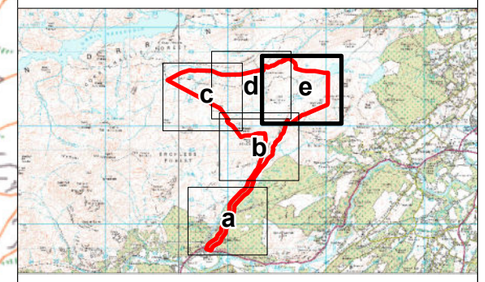
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Track Section Reference
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle

- <=2 Degrees
- 2 - 5 Degrees
- 5 - 15 Degrees
- 15 - 20 Degrees
- >=20 Degrees



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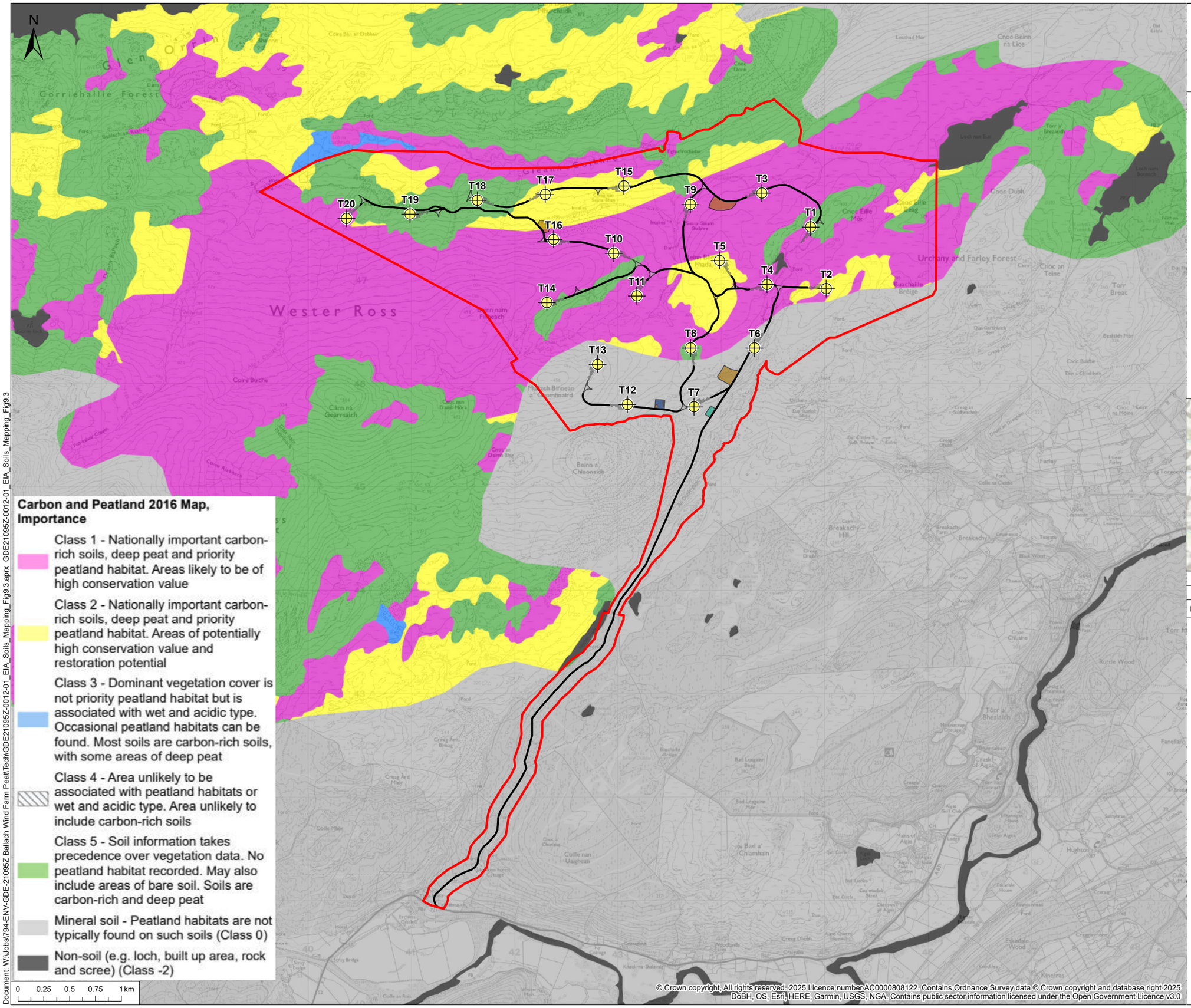
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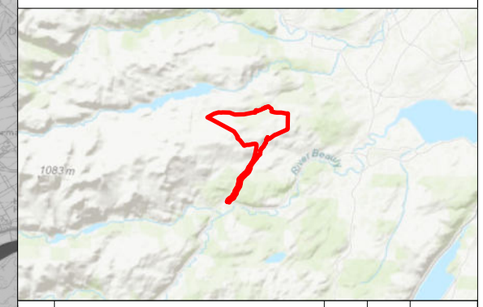
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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head



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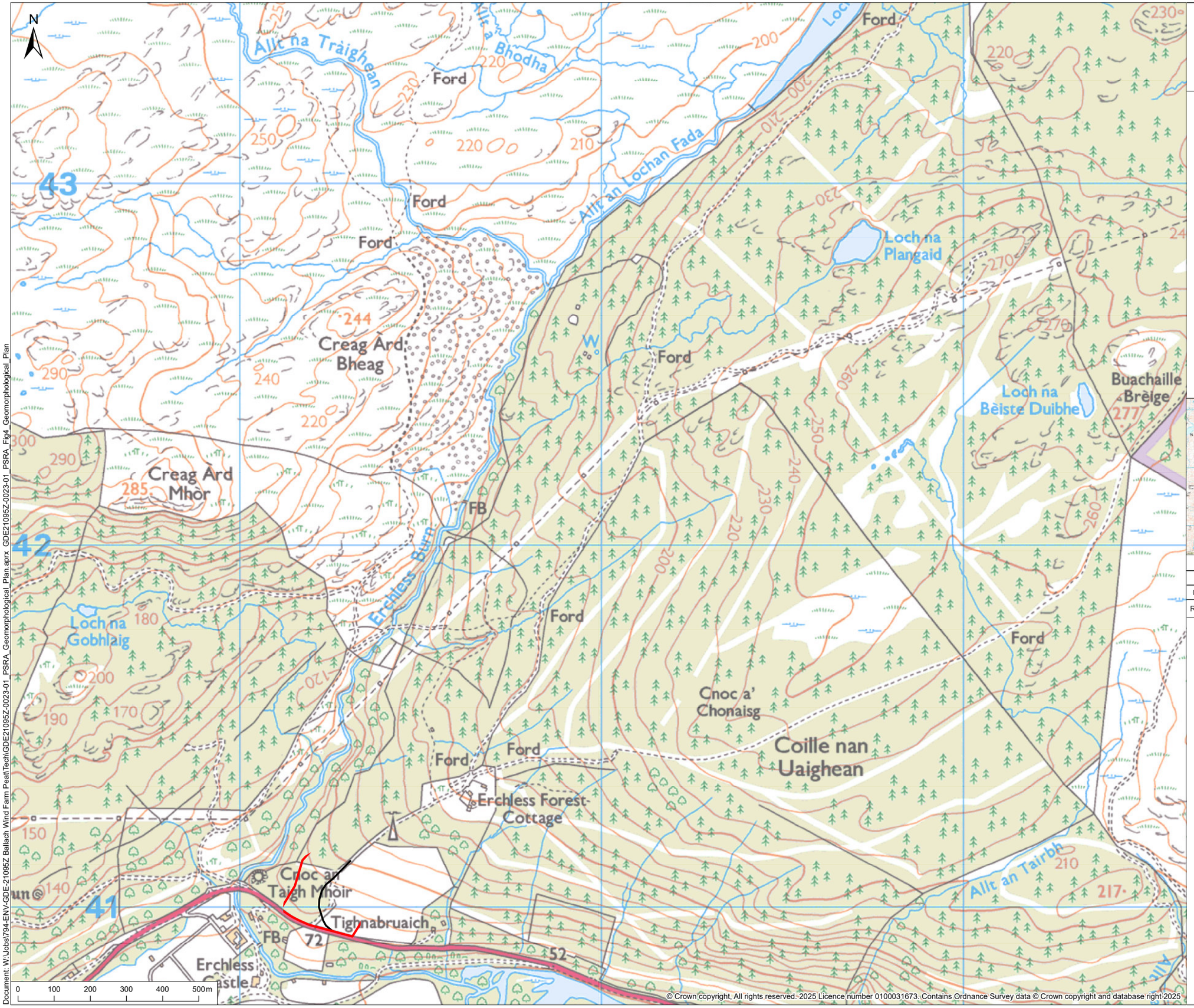
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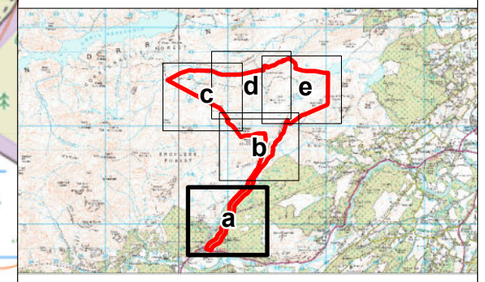
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Legend

- Site Boundary
- Site Access Track

Slope Angle
- >=20 Degrees

Interpolated Peat Depth
- >= 200cm



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Title: Geomorphological Plan

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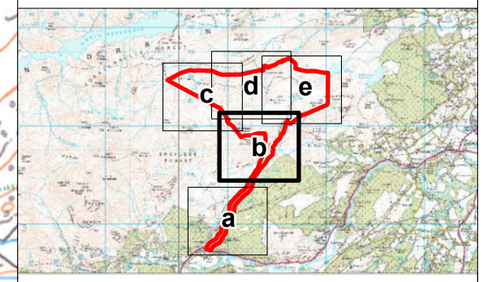
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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head

Slope Angle
- >=20 Degrees

Interpolated Peat Depth
- >= 200cm



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Project: Ballach Wind Farm

Title: Geomorphological Plan

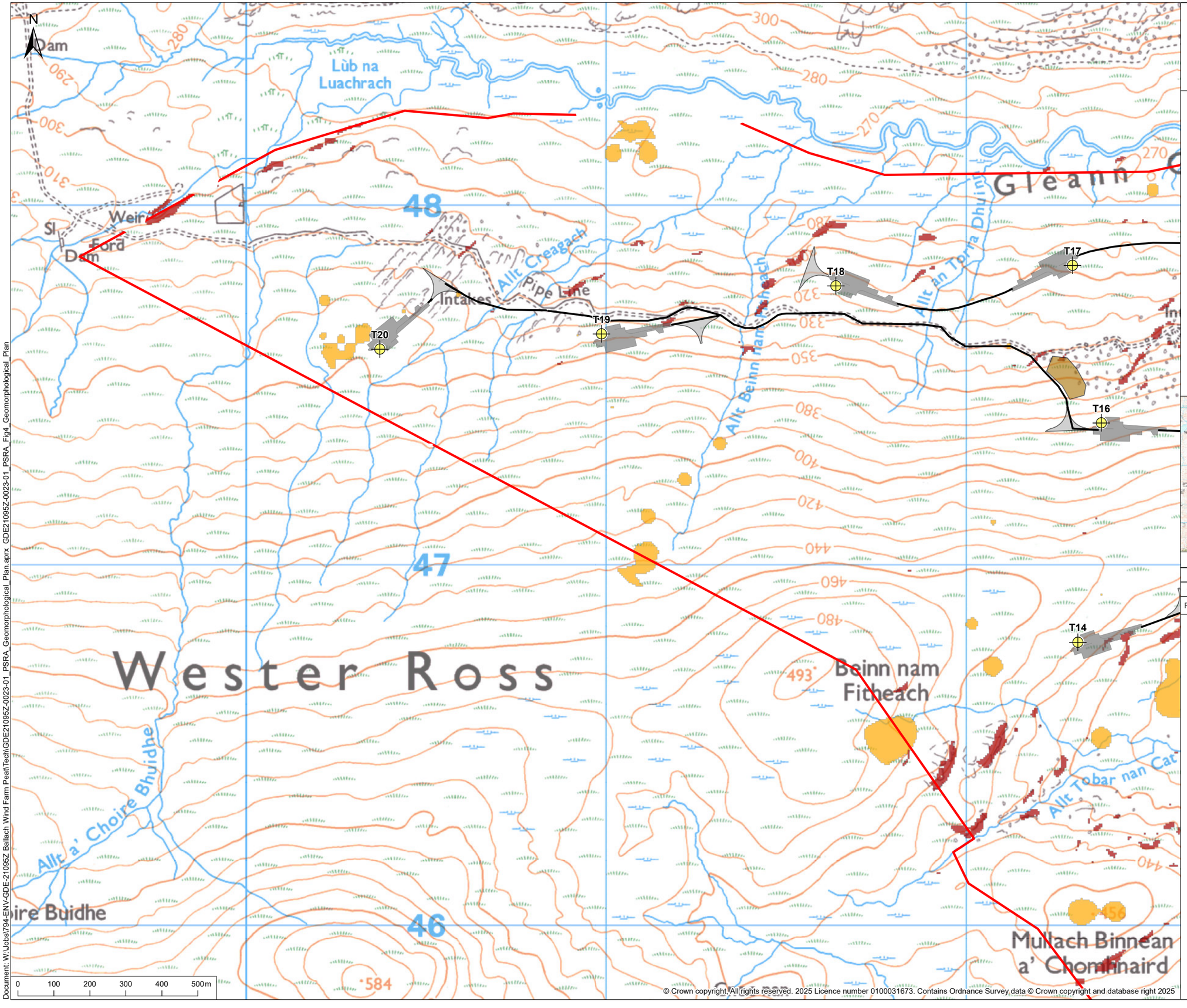
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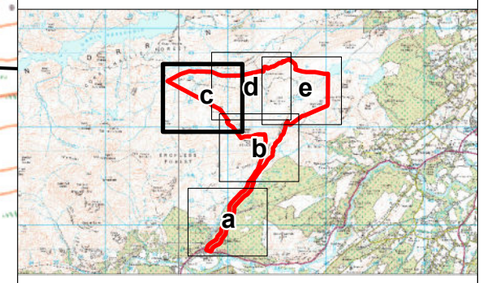
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle
- >=20 Degrees

Interpolated Peat Depth
- >= 200cm



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Project: Ballach Wind Farm

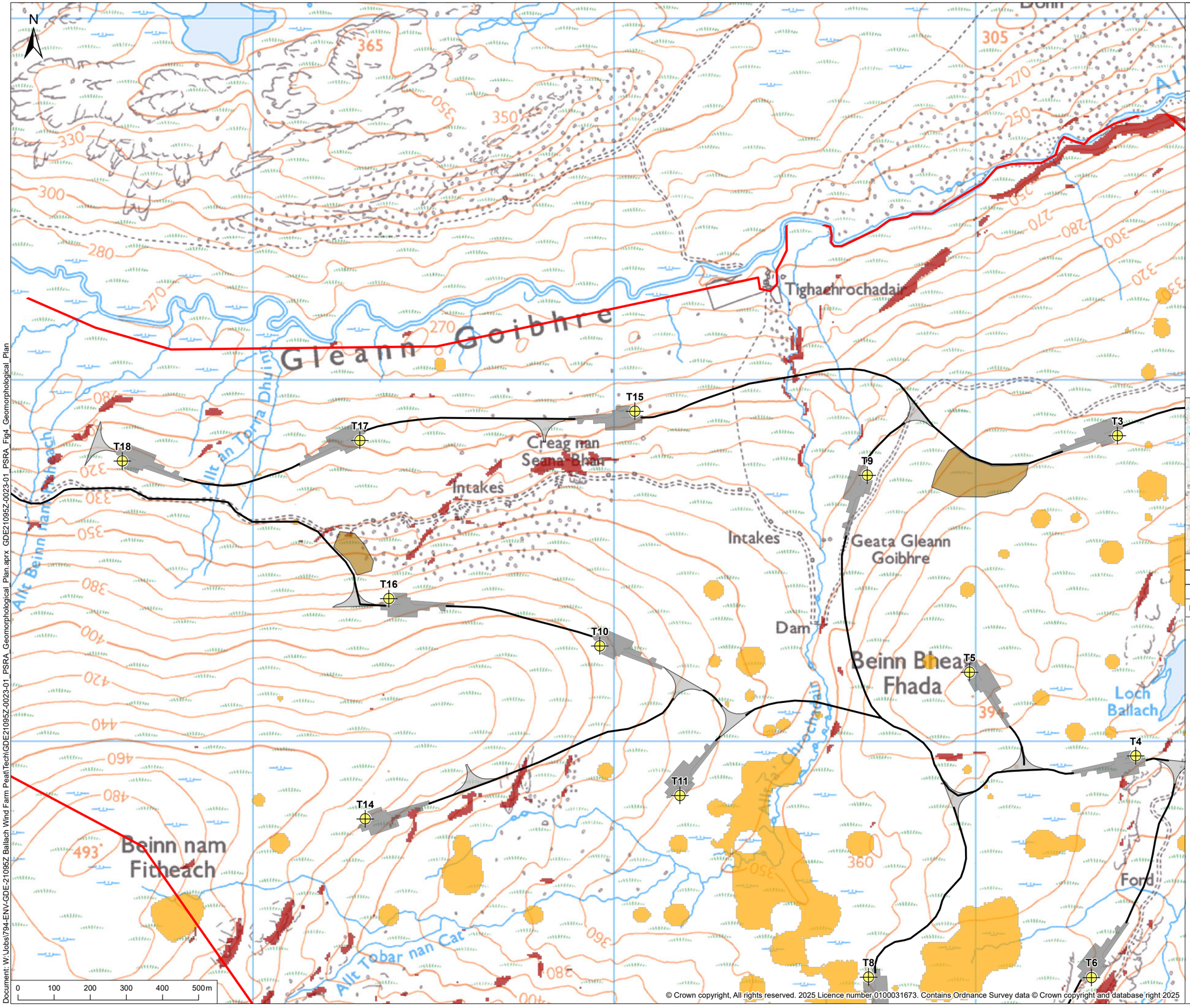
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Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:10,000	16/06/25
Figure Number		**Rev**
4c		**01**

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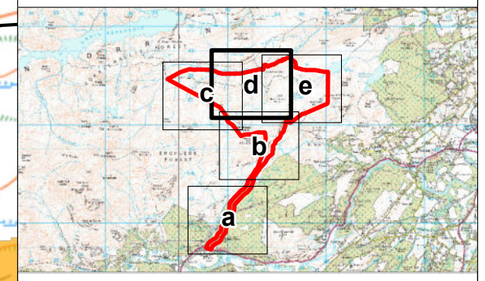
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle
- >=20 Degrees

Interpolated Peat Depth
- >= 200cm



Rev	Description	By	Check	Date
01	First Issue	MP	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

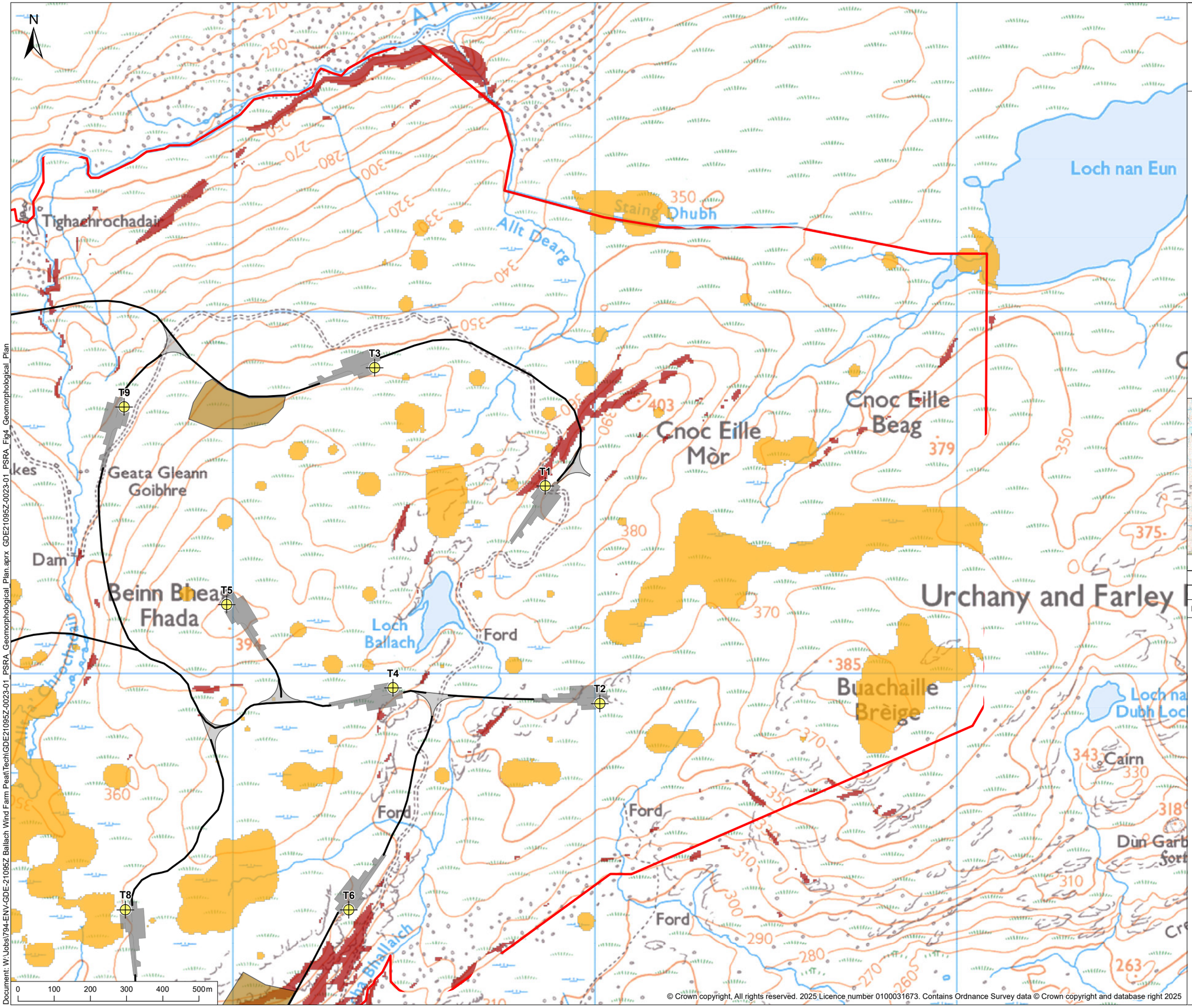
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Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
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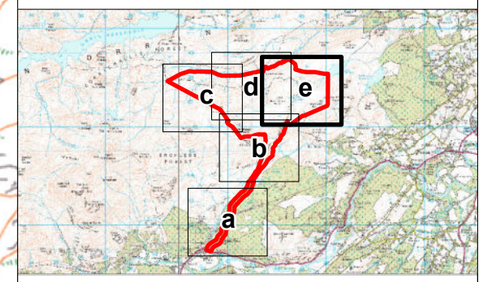
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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head

Slope Angle
- >=20 Degrees

Interpolated Peat Depth
- >= 200cm



Rev	Description	By	CB	Date
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Client: Energiekontor UK

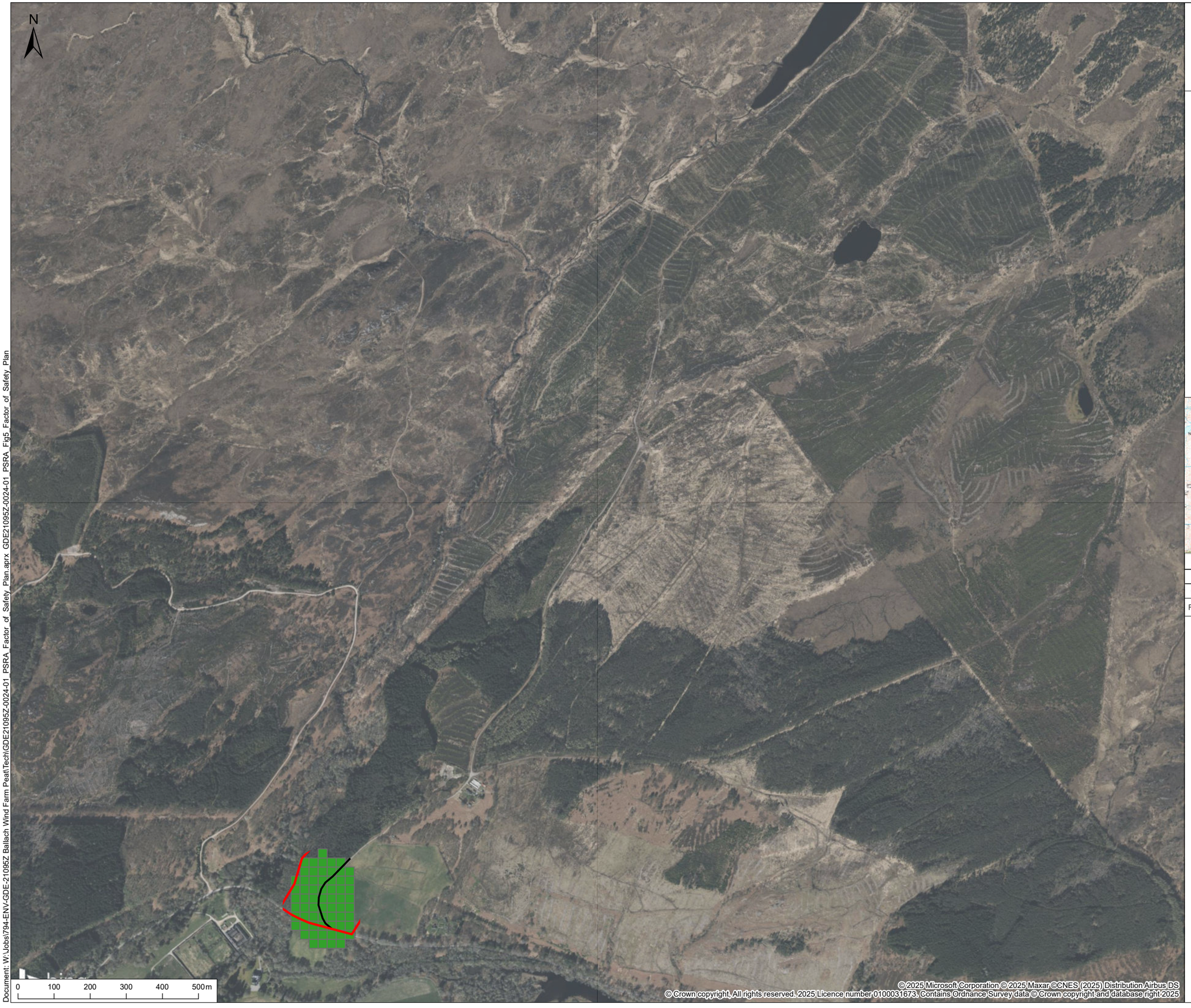
Project: Ballach Wind Farm

Title: Geomorphological Plan

Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
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Figure Number		**Rev**
4e		**01**

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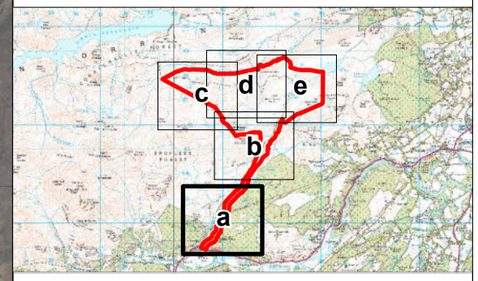
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Legend

- Development Footprint
- Site Access Track

Slope Angle
- >=20 Degrees

Factor of Safety Slope Risk
- Marginally Unstable
- Stable



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Factor of Safety Plan

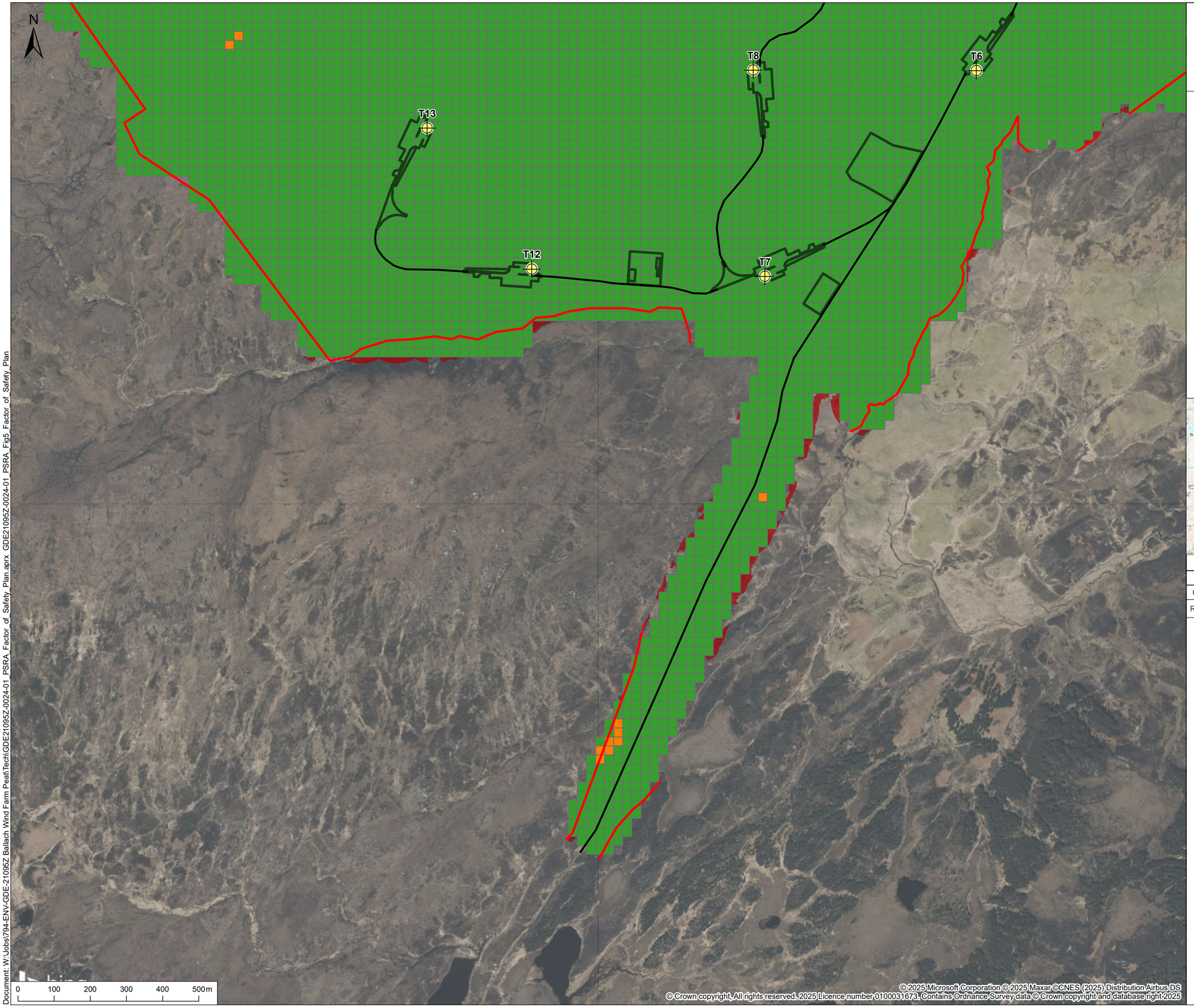
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Project Number	**Scale @ A3**	**Date Created**
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Figure Number: **5a**

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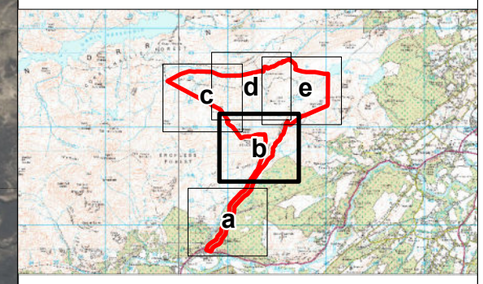
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Legend

- Development Footprint
- Site Access Track

Slope Angle
- >=20 Degrees

Factor of Safety Slope Risk
- Marginally Unstable
- Stable



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Factor of Safety Plan

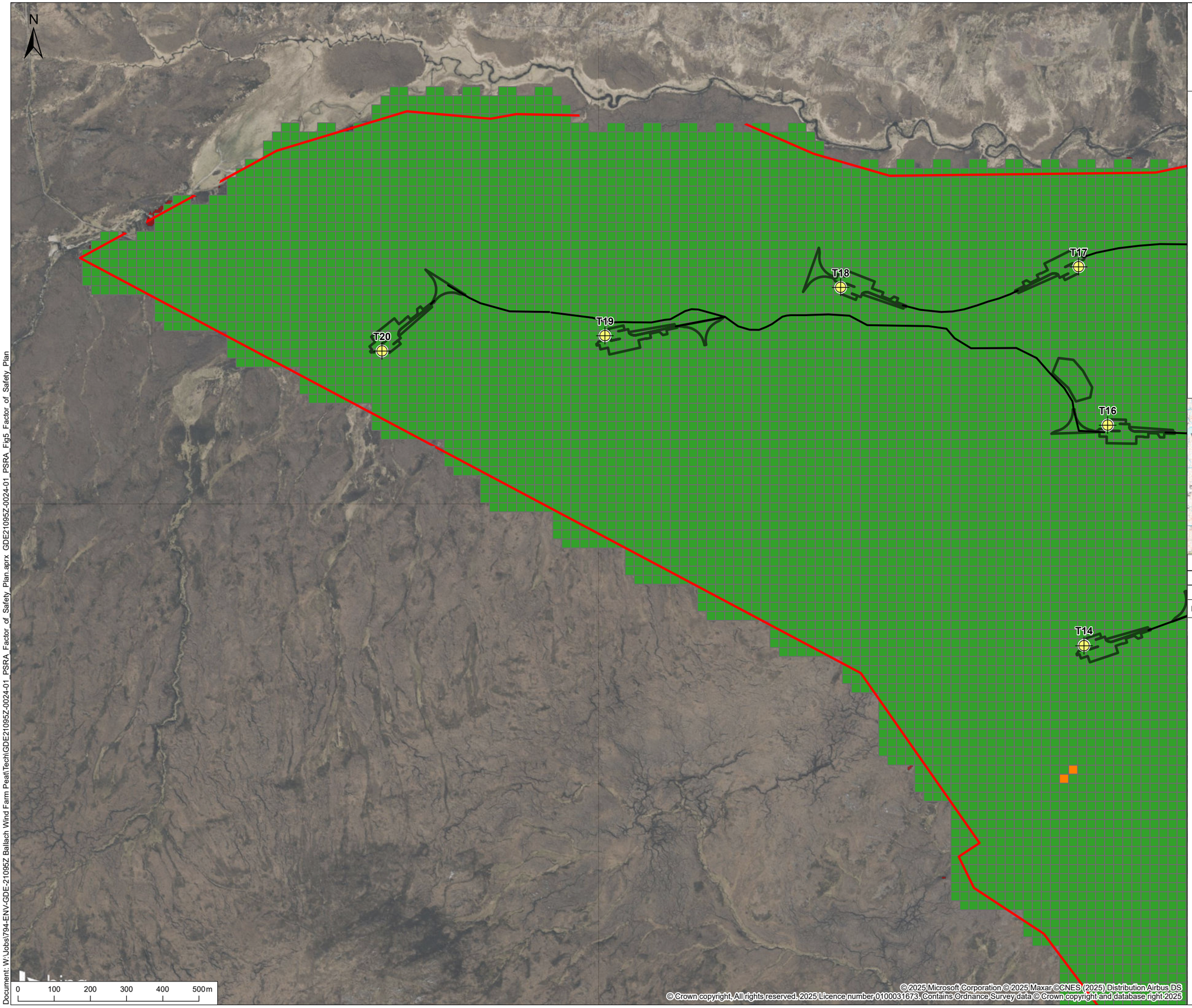
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Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
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Figure Number: **5b**

Rev: **01**

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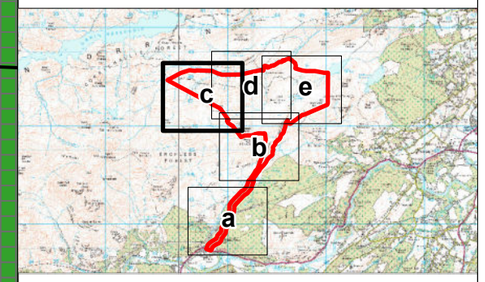
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Legend

- Development Footprint
- Site Access Track

Slope Angle
- >=20 Degrees

Factor of Safety Slope Risk
- Marginally Unstable
- Stable



Rev	Description	By	CB	Date
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Project: Ballach Wind Farm

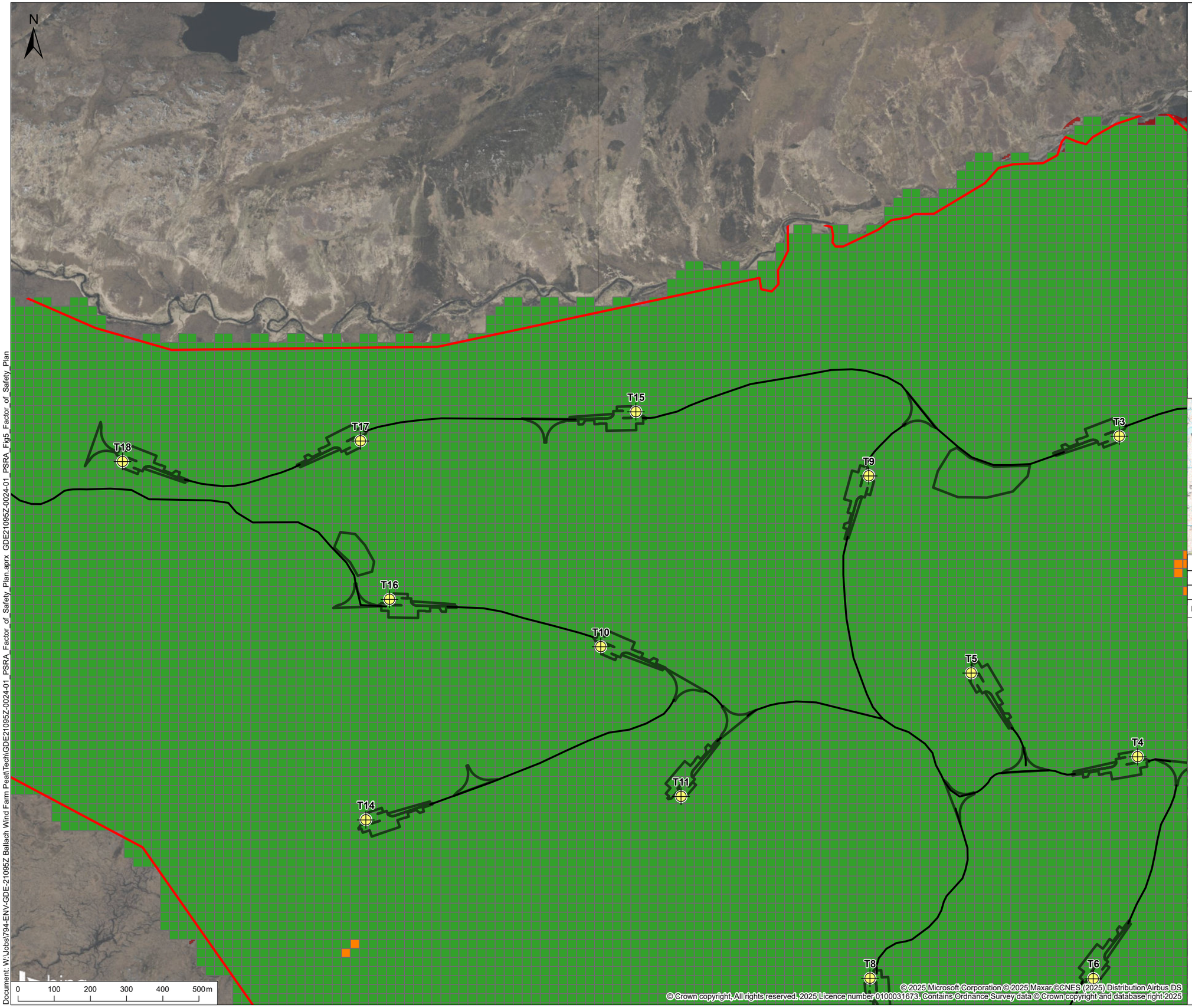
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Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
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Figure Number		**Rev**
5c		**01**

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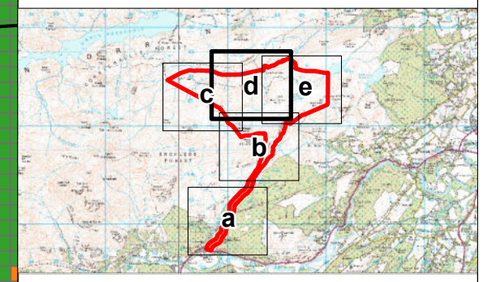
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Legend

- Development Footprint
- Site Access Track

Slope Angle
- >=20 Degrees

Factor of Safety Slope Risk
- Marginally Unstable
- Stable



Rev	Description	By	CB	Date
01	First Issue	MP	DG	16/06/2025

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Project: Ballach Wind Farm

Title: Factor of Safety Plan

Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
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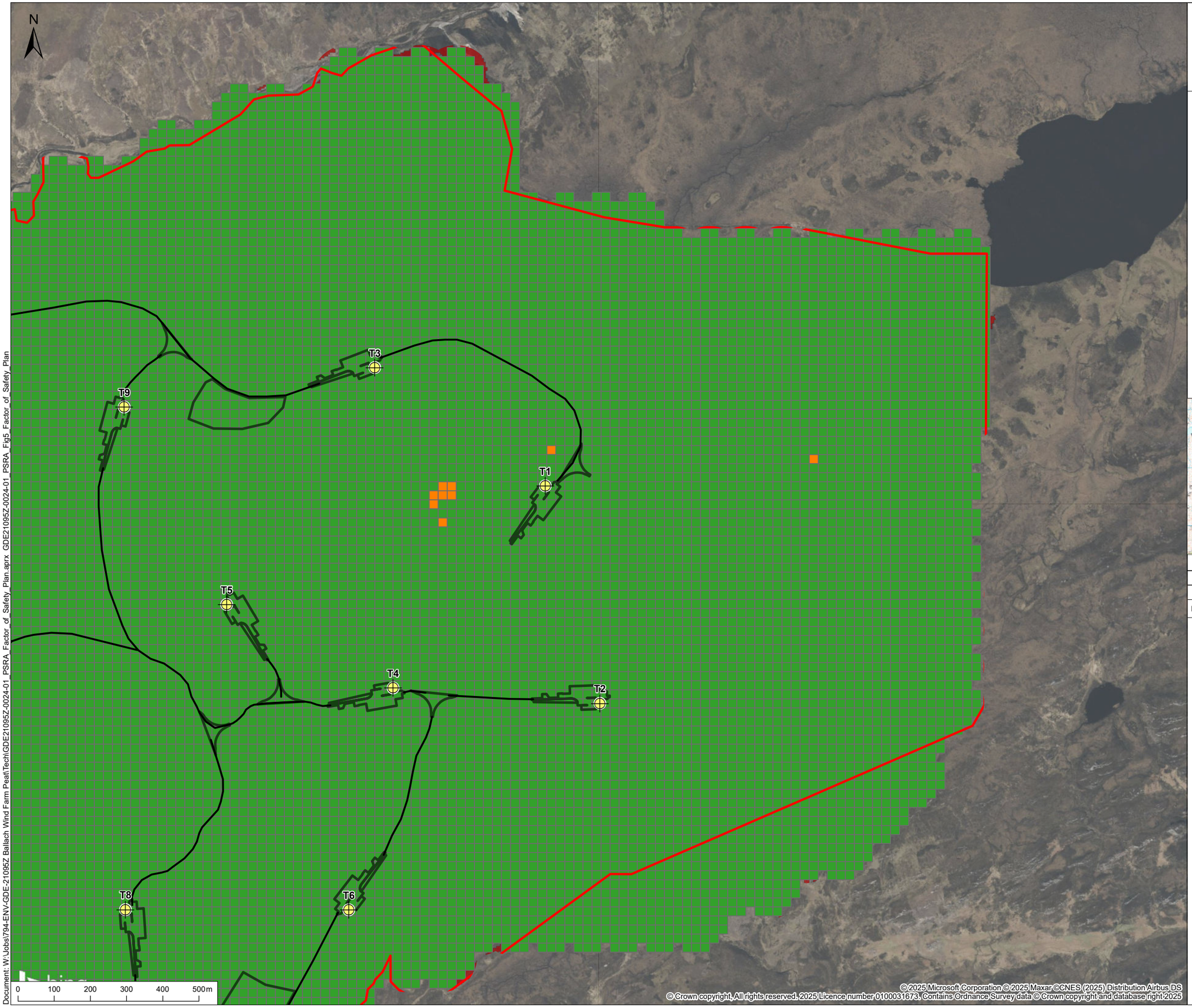
Figure Number: **5d**

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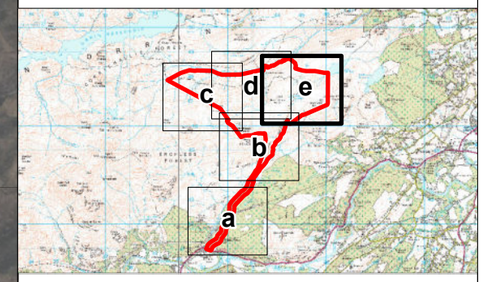
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Legend

- Development Footprint
- Site Access Track

Slope Angle
- >=20 Degrees

Factor of Safety Slope Risk
- Unstable
- Stable



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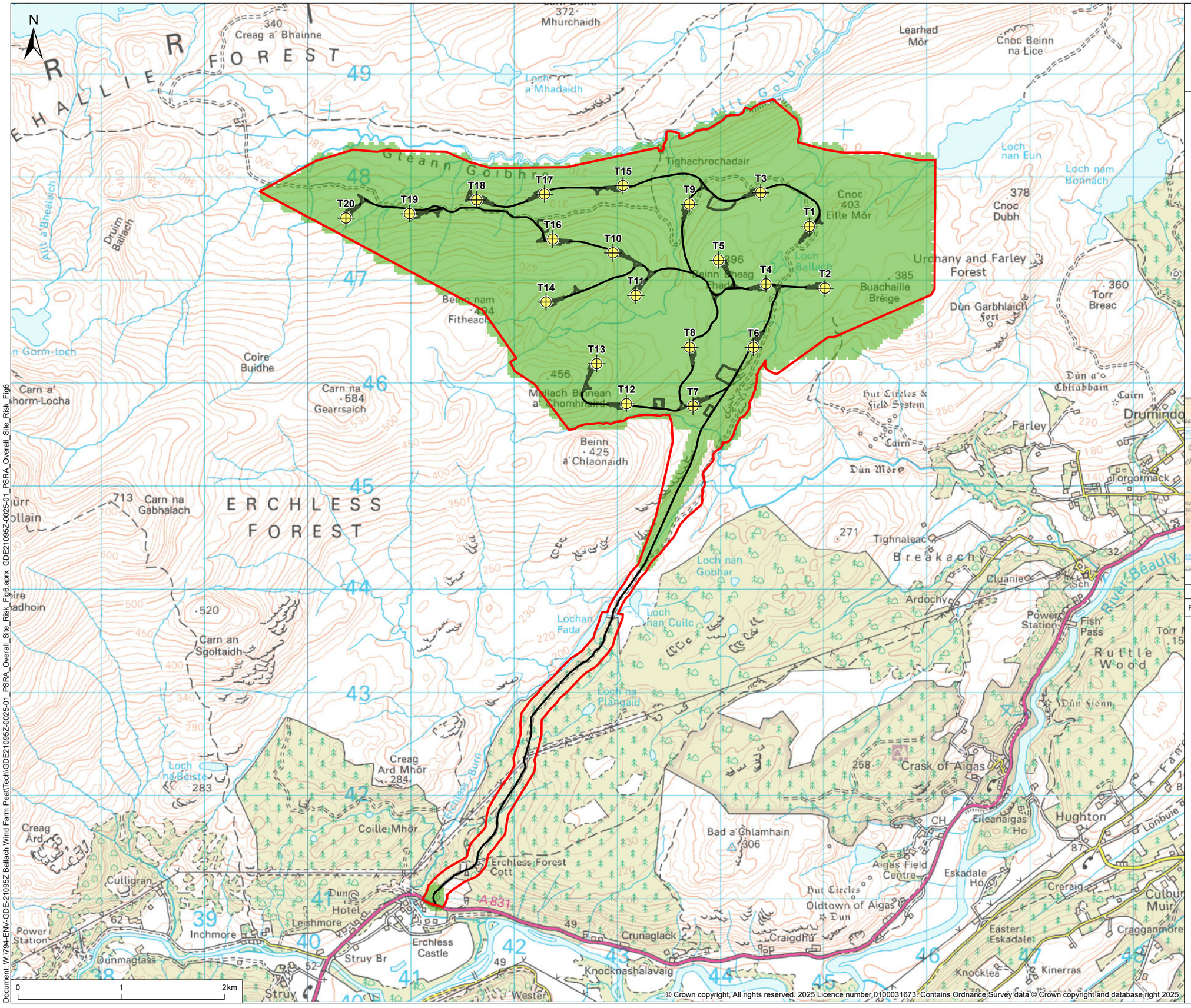
Project: Ballach Wind Farm

Title: Factor of Safety Plan

Status	Drawn By	PM/Checked By
Issue	MP	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:10,000	16/06/25
Figure Number		**Rev**
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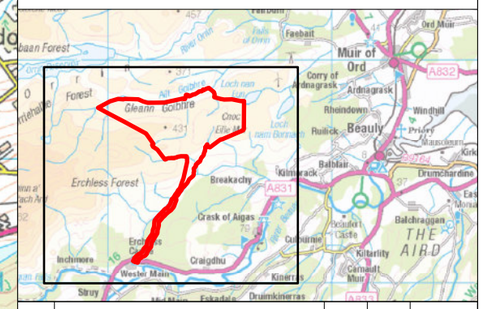


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Legend

- Turbine
- Site Boundary
- Development Footprint
- Site Access Track
- Overall Risk: Low



Rev	Description	By	Check	Date
01	First Issue	LM	SC	21/07/2025

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Project: Ballach Wind Farm

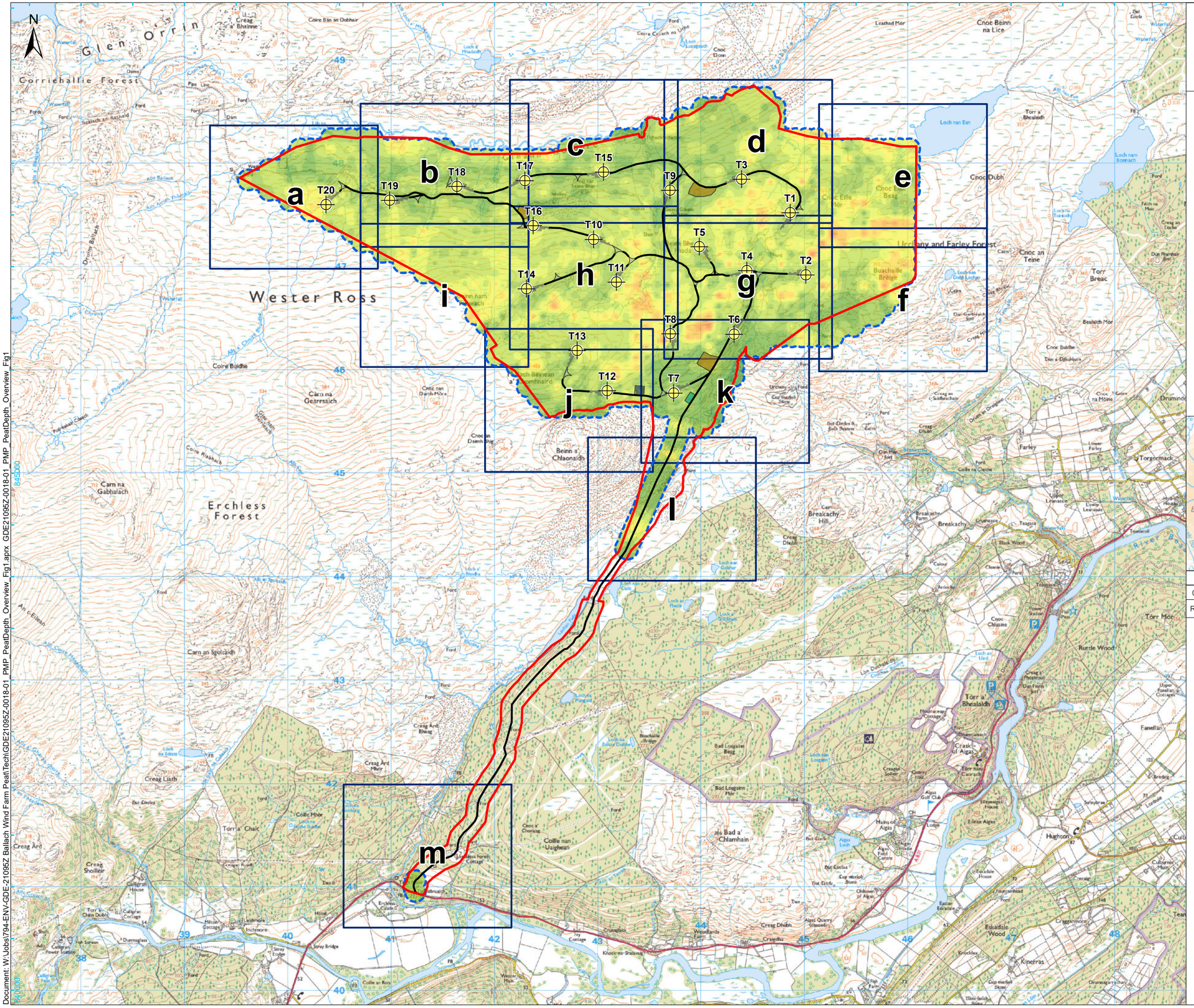
Title: Overall Risk Plan

Status	Drawn By	PM/Checked By
Issue	LM	SC
Project Number	**Scale @ A3**	**Date Created**
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Appendix B
INTERPOLATED PEAT CONTOUR PLANS



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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)
- Tile Extent

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m

Rev	Description	By	CB	Date
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Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
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0 0.25 0.5 0.75 1 Kilometers

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239500 240000 240500

846000 846500 847000

N

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

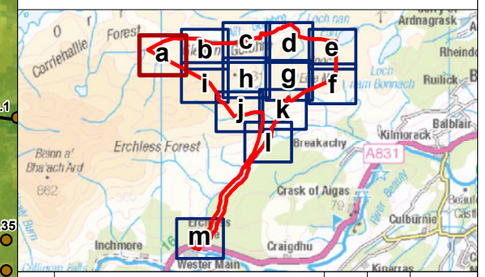
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m



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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
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0 50 100 150 200 Metres

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N

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

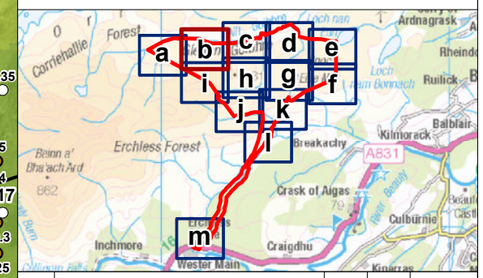
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m



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T: +44(0)131 555 5011 E: RPS.Edinburgh@rps.tetratech.com

Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2b		**01**

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0 50 100 150 200 Metres

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Document: W:\Jobs\794-ENV-GDE-21095Z Ballach Wind Farm PeatTech\GDE21095Z-0019-01_PMP_PeatDepth_Tiles_Fig2_aprx_GDE21095Z-0018-01_PMP_PeatDepth_Tiles_Fig2

242500 243000 243500

N

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

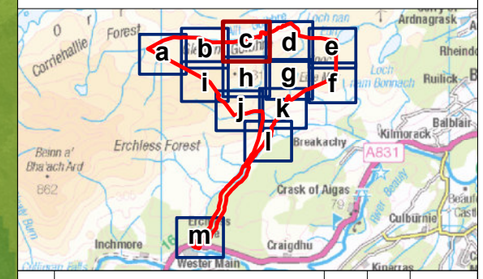
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m



01	First Issue	LNF	DG	16/06/2025
Rev	Description	By	CB	Date

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Project: Ballach Wind Farm

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GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2c		**01**

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0 50 100 150 200 Metres

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244000 244500 245000

N

6450000

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0.05 0.08 0.4 0.34 0.94 0.95 0.07 0.38
0.14 1.31 0.22 0.63 0.38 0.39 0.07 0.69 0.26 0.88
1.99 0.38 0.38 0.21 0.31 0.4 0.18 0.32 0.11 0.86 0.25
0.23 0.15 0.41 0.34 0.35 0.29 0.27 1.07 2.2 2.2 1 0.99 1.88 2.2 2.2
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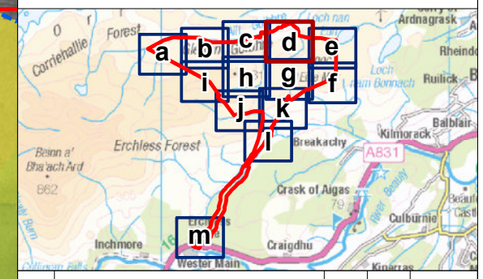
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0.2 0.2 0.1
0.2 0.1 1.5
0.62 0.26 0.67 0.22 0.74 1.65 0.21 0.42 0.56 0.2 0.81 0.2 0.58 1.67 1.89 1.29 2.2 0.17 0.7
0.3 0.1 0.2 0.4 0.4
0.2 0.2 0.1 0.3 0.7
0.1 0.5 1
0.47 0.4 0.54 0.84 0.3 0.3 0.03 0.58 1.07 0.4 0.3 0.5 2.25 0.41 2.87 1.13 0.2 1.65 3.18 0.07 0.74
0.4 0.4 0.4 0.4 0.4 0.3 0.2 0.5 0.2 0.2 0.3 0.3 0.3 0.3 0.6 0.5 0.4 0.4
0.3 0.2 0.2 0.3 0.4 0.3 0.2 0.2 0.5 0.4 0.4 0.4 0.4 0.4 0.2
0.5 0.3 0.1 0.4 1.62 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.5 0.5 0.3 0.3 0.4 0.2 0.4 1.59 0.64 2.81 1.72 0.98 1.36 2.75 0.4 0.08 0.04 2.18
0.48 0.2 0.1 0.3 0.3 0.2 0.26 0.2 0.4 0.4 0.26 0.3 0.4 0.2
0.3 0.1 0.4 0.3 0.3 0.3 0.1 0.2 0.2 0.3 0.3 0.3 0.2 0.4
0.1 0.2 0.2 0.3 0.3 0.5 0.4 0.4
0.1 0.2 0.5 0.15 0.32 0.48 2.87 2.06 1.11 2.02 1.53 2.08 0.47 2.55 1.3 0.29
0.1 0.41
0.2
0.4
0.92 0.19 0.18 0.37 2.12 1.91 0.47 2.68 0.89 2.95 1.68 3.01 0.33 0.75

T9 T3 T1

6447500

bing

0 50 100 150 200 Metres



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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m

Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2d		**01**

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245500 246000 246500

846500 846000 845500 845000

N

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0.37 0.67 2.2 0.21 0.06 0.59 1.84 0.74 1.87
0.7 1.34 0.43 0.13 0.9 0.27 1.11 0.05 0.17
0.74 0.26 0.31 0.34 0.39 0.44 2.2 0.33 1.89 0.08
2.18 0.4 0.26 0.32 0.45 0.79 1.34 1.84 0.28 0.64
0.29 1.96 1.53 2.62 3.18 0.76 1.04 0.08 0.51
0.75 0.22 1.66 1.58 0 1.06 0.54 0.19 0.24
1.56 2.53 1.65 0.57 0.14 2.96 3.41 3.64 2.97
0.35 3.99 2.85 2.43 3.28 2.63 1.8 1.25 1.61
3.67 1.61 3.13 0.49 0.52 0.37 1.38 1.75 1.72

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0 50 100 150 200 Metres

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Legend

Site Boundary

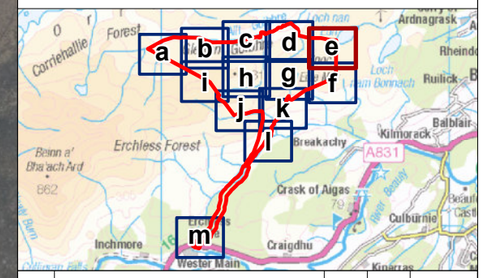
Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

Phase 1

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2e		**01**

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245500
246000
246500
847000
846500
N
0.35 3.99 2.85 2.43 3.28 2.63 1.8 1.25 1.61
3.67 1.61 3.13 0.49 0.52 0.37 1.38 1.75 1.72
1.33 1.25 0.62 0.86 0.54 0.51 0.98 2.64 1.19
0.45 1.62 0.66 0.55 0.31 1.9 2.23 2.1 2.84
0.61 0.77 0.08 0.44 0.31 0.97 3.13 2.65 0.42
3.28 2.44 0.41 0.23 2.06 0.27 3.64 0.25
0.66 0.21 0 0.2 0.35 0.42 0.06 1.98
0.31 0.25 0.09 0.16 0.22 0.4 0.1
0.09 0.11 0.05 0.08 0.44 0.41
0.22 0.51 0.49 0.24
0.04 0.87
bing
0 50 100 150 200 Metres

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Legend

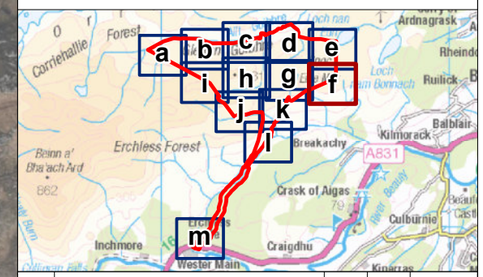
- Site Boundary
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 1

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
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Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2f		01

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244000 244500 245000

N

T5 T4 T6 T8 T2

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

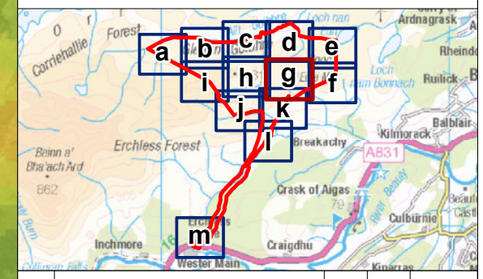
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m



01	First Issue	LNF	DG	16/06/2025
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0 50 100 150 200 Metres

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242500 243000 243500

847000 846500

T16 T10 T14 T11 T8

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Borrow Pit
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

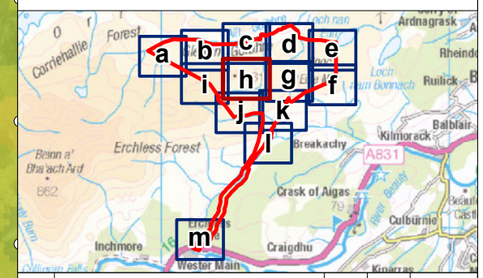
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m



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Title: Interpolated Peat Depth

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2h		**01**

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241000 241500 242000

847000

846500

N

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0.84 1.5 0.7 1.73 0.8 2.2 1.18 0.52 0.94 0.48 1.16 0.8 0.56 0.52 0.37 0.42 0.75

0.26 0.54 2.2 0.24 1.86 0.42 0.34 0.58 0.36 0.4 1.3 1.16 2.05 0.92 0.86

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1.06 1.18 0.92 1.9 0.82 2.2 0.88 0.23 0.11 0.5 0.45 0.3 0.9 T14 0.55 1.8 0.75 0 0.3

1.9 0.98 0.94 1.88 2.37 1.09

0.16 1.7 1.88 1.14 0.41 0.08

3 1.68 1.4 0 0.84 0.83

0.07 0.37 0.6 1.62 1.96

0.66 0.18 0.68 0.91

0.9 0.52 0.92 0.72

0.55 0.72 1.21 0.7

0.12 2.8

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Legend

- Site Boundary
- Turbine
- Site Access Track
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

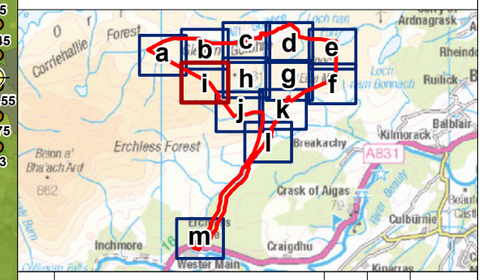
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m



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Project: Ballach Wind Farm

Title: Interpolated Peat Depth

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Issue	LNF	DG
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Figure Number		**Rev**
2i		01

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242000 242500 243000 243500

N

T13 T12

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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- 5MW Battery Storage Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

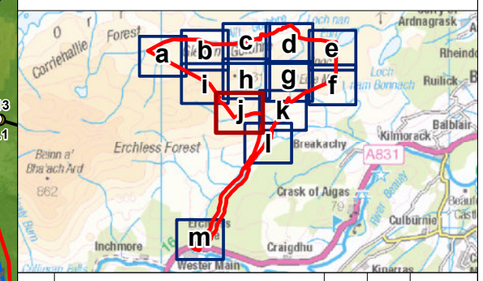
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m



Rev	Description	By	CB	Date
01	First Issue	LNF	DG	16/06/2025

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Client: Energiekontor UK

Project: Ballach Wind Farm

Title: Interpolated Peat Depth

Status	Drawn By	PM/Checked By
Issue	LNF	DG
Project Number	**Scale @ A3**	**Date Created**
GDE21095Z	1:5,000	16/06/25
Figure Number		**Rev**
2j		01

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0 50 100 150 200 Metres

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243500 244000 244500 245000

N

T8 T6 T7

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Legend

- Site Boundary
- Turbine
- Site Access Track
- 135kV Substation
- Borrow Pit
- Construction Compound
- Crane Pad
- Turning Head
- Peat Analysis Boundary (100m)

EKUK Peat Depth Survey Location (Labelled with Depth in Metres)

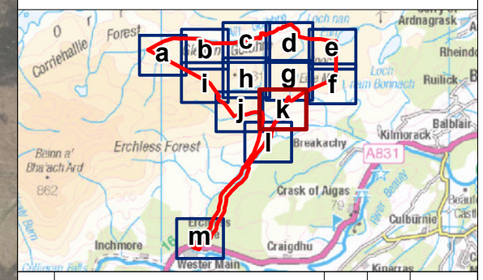
- Phase 1

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)
- Phase 2b (March 2025)

Interpolated Peat Depth

- 0m
- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m
- 2.50 - 2.99m
- 3.00 - 3.49m
- 3.50 - 3.99m
- 4.00 - 4.07m



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2k		**01**

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bing

0 50 100 150 200 Metres

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243000 243500 244000 244500

846000 844500 843000

N

0.25 0.2 0.3 0.05 0.05 0.05 0.1 0.1 0.1 2.25 2.5 2.45 0.1 0.15 0.1 0.6 0.3 0.1 0.05 0.05 0.05 0.25 0.1 0.1 0.05 0.1 0.1 0.2 0.3 0.3 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.4 0.2 0.1 0.1 0.1 0.1 0.1 1.2 0.1 0.1 0.8 1.9 0.3 1.7 2 1.9 2 2 0.3 1.5 1.8 2.4 0.6 1.6 0.1 0.2 0.2 0.2 0.1 0.2 0.2 0.2

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Legend

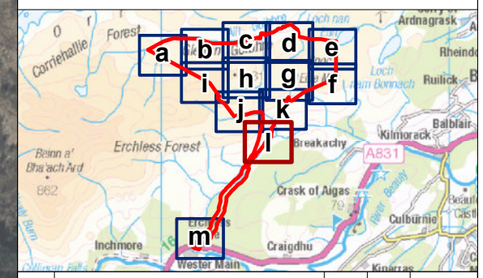
- Site Boundary
- Site Access Track
- Peat Analysis Boundary (100m)

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0.01 - 0.24m
- 0.25 - 0.49m
- 0.50 - 0.99m
- 1.00 - 1.49m
- 1.50 - 1.99m
- 2.00 - 2.49m



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Status	Drawn By	PM/Checked By
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241000
241500
242000
841500
841000
N
0.35
0.3
0.25
bing

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Legend

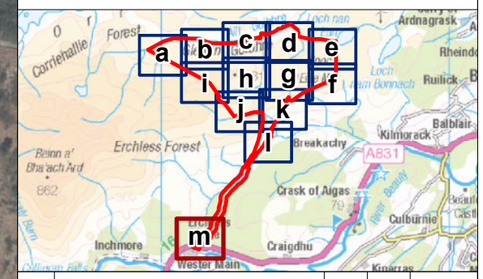
- Site Boundary
- Site Access Track
- Peat Analysis Boundary (100m)

RPS Peat Depth Survey Location (Labelled with Depth in Metres)

- Phase 2a (February 2025)

Interpolated Peat Depth

- 0.25 - 0.49m



Rev	Description	By	CB	Date
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0 50 100 150 200 Metres

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Appendix C
RECORDED PEAT DEPTHS

Point Number	Easting	Northing	Depth
1	244017	845438	50
2	243917	845538	0
3	244017	845538	0
4	244117	845538	0
5	242517	845638	47
6	242617	845638	18
7	242717	845638	15
8	242817	845638	15
9	242917	845638	17
10	243017	845638	4
11	243617	845638	0
12	243717	845638	38
13	243817	845638	22
14	243917	845638	30
15	244017	845638	0
16	244117	845638	0
17	242417	845738	20
18	242517	845738	9
19	242617	845738	58
20	242717	845738	16
21	243117	845738	280
22	243217	845738	63
23	243317	845738	6
24	243417	845738	60
25	243517	845738	13
26	243617	845738	0
27	243717	845738	52
28	243817	845738	45
29	243917	845738	9
30	244017	845738	12
31	244117	845738	22
32	244217	845738	35
33	242317	845838	18
34	242417	845838	42
35	242517	845838	47
36	242617	845838	265
37	243217	845838	8
38	243317	845838	50
39	243417	845838	62
40	243517	845838	9
41	243617	845838	7
42	243717	845838	25
43	243817	845838	0
44	243917	845838	0
45	244017	845838	40
46	244117	845838	0
47	244217	845838	3
48	242317	845938	75
49	242417	845938	30
50	242517	845938	40
51	242617	845938	28
52	243317	845938	77
53	243417	845938	40
54	243517	845938	28
55	243617	845938	28
56	243717	845938	8
57	243817	845938	10
58	243917	845938	6

59	244017	845938	8
60	244117	845938	0
61	244217	845938	0
62	244317	845938	0
63	242217	846038	12
64	242317	846038	280
65	242417	846038	245
66	242517	846038	39
67	242617	846038	14
68	243917	846038	30
69	244017	846038	64
70	244117	846038	15
71	244217	846038	0
72	244317	846038	0
73	242017	846138	55
74	242117	846138	72
75	242217	846138	121
76	242317	846138	70
77	242417	846138	110
78	242517	846138	28
79	242617	846138	107
80	244117	846138	35
81	244217	846138	21
82	244317	846138	0
83	242017	846238	90
84	242117	846238	52
85	242217	846238	92
86	242317	846238	72
87	242017	846338	66
88	242117	846338	18
89	242217	846338	68
90	241917	846438	7
91	242017	846438	37
92	242117	846438	60
93	241817	846538	300
94	241917	846538	168
95	242017	846538	140
96	241817	846638	16
97	241917	846638	170
98	242017	846638	188
99	241717	846738	190
100	241817	846738	98
101	241917	846738	94
102	242017	846738	188
103	241517	846838	106
104	241617	846838	118
105	241717	846838	92
106	241817	846838	190
107	241917	846838	82
108	242017	846838	220
109	241317	846938	110
110	241417	846938	54
111	241517	846938	82
112	241617	846938	42
113	241717	846938	100
114	241817	846938	82
115	241917	846938	98
116	242017	846938	50
117	241117	847038	220

118	241217	847038	116
119	241317	847038	116
120	241417	847038	44
121	241517	847038	68
122	241617	847038	50
123	241717	847038	53
124	241817	847038	112
125	241917	847038	52
126	242017	847038	156
127	240917	847138	26
128	241017	847138	54
129	241117	847138	220
130	241217	847138	24
131	241317	847138	186
132	241417	847138	42
133	241517	847138	34
134	241617	847138	58
135	241717	847138	36
136	241817	847138	40
137	241917	847138	130
138	242017	847138	116
139	240717	847238	84
140	240817	847238	150
141	240917	847238	70
142	241017	847238	173
143	241117	847238	80
144	241217	847238	220
145	241317	847238	118
146	241417	847238	52
147	241517	847238	94
148	241617	847238	48
149	241717	847238	116
150	241817	847238	80
151	241917	847238	56
152	242017	847238	52
153	240617	847338	36
154	240717	847338	88
155	240817	847338	74
156	240917	847338	84
157	241017	847338	138
158	241117	847338	74
159	241217	847338	72
160	241317	847338	220
161	241417	847338	108
162	241517	847338	96
163	241617	847338	38
164	241717	847338	54
165	241817	847338	40
166	241917	847338	48
167	242017	847338	80
168	240417	847438	44
169	240517	847438	54
170	240617	847438	136
171	240717	847438	22
172	240817	847438	88
173	240917	847438	70
174	241017	847438	202
175	241117	847438	52
176	241217	847438	90

177	241317	847438	32
178	241417	847438	86
179	241517	847438	80
180	241617	847438	148
181	241717	847438	46
182	241817	847438	66
183	241917	847438	48
184	242017	847438	38
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186	240317	847538	194
187	240417	847538	50
188	240517	847538	162
189	240617	847538	122
190	240717	847538	22
191	240817	847538	104
192	240917	847538	50
193	241017	847538	178
194	241117	847538	50
195	241217	847538	12
196	241317	847538	24
197	241417	847538	22
198	241517	847538	80
199	241617	847538	62
200	241717	847538	84
201	241817	847538	24
202	241917	847538	8
203	242017	847538	58
204	240017	847638	10
205	240117	847638	186
206	240217	847638	220
207	240317	847638	220
208	240417	847638	78
209	240517	847638	94
210	240617	847638	18
211	240717	847638	106
212	240817	847638	50
213	240917	847638	220
214	241017	847638	16
215	241117	847638	10
216	241217	847638	10
217	241317	847638	22
218	241417	847638	96
219	241517	847638	78
220	241617	847638	10
221	241717	847638	22
222	241817	847638	40
223	241917	847638	4
224	242017	847638	80
225	239817	847738	28
226	239917	847738	66
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243	241617	847738	112
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245	241817	847738	44
246	241917	847738	114
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303	240917	847938	48
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352	240917	848038	37
353	241017	848038	13

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409	241017	848138	220
410	241117	848138	220
411	241217	848138	134
412	241317	848138	103

413	241417	848138	51
414	241517	848138	10
415	242717	848138	30
416	242817	848138	19
417	242917	848138	38
418	243017	848138	98
419	243117	848138	106
420	243217	848138	40
421	243317	848138	45
422	243417	848138	31
423	243517	848138	11
424	243617	848138	7
425	243717	848138	40
426	243817	848138	33
427	243917	848138	89
428	244017	848138	73
429	244117	848138	5
430	244217	848138	38
431	244317	848138	39
432	244417	848138	202
433	244517	848138	220
434	244617	848138	11
435	244717	848138	49
436	244817	848138	136
437	244917	848138	126
438	245017	848138	54
439	245117	848138	96
440	245217	848138	220
441	245317	848138	147
442	245417	848138	11
443	245517	848138	41
444	245617	848138	220
445	245717	848138	152
446	245817	848138	215
447	245917	848138	49
448	246017	848138	220
449	240417	848238	24
450	240517	848238	28
451	240617	848238	20
452	240717	848238	44
453	240817	848238	47
454	243217	848238	9
455	243317	848238	30
456	243417	848238	4
457	243517	848238	51
458	243617	848238	99
459	243717	848238	23
460	243817	848238	15
461	243917	848238	41
462	244017	848238	34
463	244117	848238	35
464	244217	848238	29
465	244317	848238	27
466	244417	848238	107
467	244517	848238	220
468	244617	848238	220
469	244717	848238	100
470	244817	848238	99
471	244917	848238	188

472	245017	848238	220
473	245117	848238	220
474	243517	848338	23
475	243617	848338	83
476	243717	848338	199
477	243817	848338	38
478	243917	848338	38
479	244017	848338	21
480	244117	848338	31
481	244217	848338	40
482	244317	848338	18
483	244417	848338	32
484	244517	848338	11
485	244617	848338	86
486	244717	848338	25
487	243817	848438	14
488	243917	848438	131
489	244017	848438	22
490	244117	848438	63
491	244217	848438	38
492	244317	848438	39
493	244417	848438	7
494	244517	848438	69
495	244617	848438	26
496	244717	848438	88
497	244017	848538	5
498	244117	848538	8
499	244217	848538	40
500	244317	848538	34
501	244417	848538	94
502	244517	848538	95
503	244617	848538	7
504	244717	848538	38
505	244317	848638	56
506	244417	848638	67
507	244517	848638	84
508	244617	848638	76

Label_ID	Easting	Northing	Depth
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A002	243278	844271	0.2
A003	243287	844267	0.2
A004	243289	844321	0.2
A005	243298	844317	0.2
A006	243307	844313	0.1
A007	243310	844367	1.6
A008	243319	844363	0.1
A009	243328	844359	0.2
A010	243330	844412	1.8
A011	243339	844408	2.4
A012	243348	844404	0.6
A013	243350	844458	2
A014	243359	844454	0.3
A015	243368	844450	1.5
A016	243370	844504	2
A017	243379	844499	1.9
A018	243389	844495	2
A019	243390	844550	1.9
A020	243399	844546	0.3
A021	243408	844542	1.7
A022	243411	844595	0.1
A023	243420	844591	0.1
A024	243429	844587	0.8
A025	243431	844641	0.1
A026	243440	844637	0.1
A027	243449	844633	1.2
A028	243452	844686	0.4
A029	243461	844682	0.2
A030	243470	844678	0.1
A031	243472	844732	0.1
A032	243481	844728	0.1
A033	243490	844724	0.1
A034	243492	844778	0.1
A035	243501	844774	0.1
A036	243510	844770	0.1
A037	243512	844824	0.1
A038	243521	844820	0.1
A039	243530	844816	0.1
A040	243532	844870	0.2
A041	243541	844866	0.1
A042	243550	844862	0.1
A043	243552	844916	0.2
A044	243561	844911	0.3
A045	243570	844907	0.3
A046	243573	844961	0.05
A047	243582	844957	0.1
A048	243591	844952	0.1
A049	243596	845006	0.25
A050	243605	845001	0.1
A051	243614	844997	0.1
A052	243619	845050	0.05
A053	243628	845046	0.05
A054	243637	845041	0.05
A055	243641	845095	0.6
A056	243650	845090	0.3
A057	243659	845086	0.1
A058	243664	845139	0.1

A059	243673	845135	0.15
A060	243682	845130	0.1
A061	243687	845183	2.25
A062	243696	845179	2.5
A063	243705	845175	2.45
A064	243706	845228	0.1
A065	243715	845225	0.1
A066	243725	845222	0.1
A067	243722	845276	0.05
A068	243732	845272	0.05
A069	243741	845269	0.05
A070	243739	845323	0.25
A071	243748	845320	0.2
A072	243758	845316	0.3
A073	243755	845369	0.1
A074	243765	845367	0.05
A075	243774	845365	0.3
A076	243766	845417	0.75
A077	243775	845416	1
A078	243785	845414	1.25
A079	243775	845468	2.85
A080	243785	845465	0.8
A081	243794	845461	1.2
A082	243792	845515	0.25
A083	243801	845512	0.1
A084	243810	845508	0.15
A085	243809	845562	0.1
A086	243819	845558	0.15
A087	243828	845555	0.15
A091	243846	845600	0.05
A092	243981	845811	0.1
A093	244008	845853	0.2
A094	244036	845895	0.2
A095	244063	845937	0.2
A096	243519	845737	0.1
A097	243471	845748	0.6
A098	243421	845752	0.6
A099	243371	845756	0.7
A100	243321	845760	0.25
A101	243272	845766	2.55
A102	243222	845771	0.15
A103	243172	845776	0.2
A104	243956	845893	0.2
A105	243999	845919	0.1
A106	244039	845949	0.1
A107	242735	845887	1.2
A108	242765	845847	0.1
A109	242805	845818	0.15
A110	242852	845801	0.5
A111	243662	846110	0.1
A112	243647	846062	0.1
A113	243635	846014	0.1
A114	243617	845967	0.05
A115	243605	845919	0.15
A116	243607	845869	0.1
A117	244540	846853	0.1
A118	244522	846807	0.3
A119	244504	846760	0.2
A120	244494	846712	0.2

A121	244484	846662	0.2
A122	244469	846615	0.2
A123	244448	846570	0.2
A124	244756	846931	0.2
A125	244706	846934	0.2
A126	244656	846937	0.2
A127	244114	846998	0.2
A128	243424	847031	2.65
A129	243471	847048	2.8
A130	243517	847066	0.2
A131	243566	847075	2.55
A132	243616	847077	0.45
A133	243666	847075	0.4
A134	243715	847069	0.1
A135	243105	847064	0.3
A136	243060	847044	0.15
A137	243012	847032	1.1
A138	242963	847020	0.45
A139	242917	847002	1
A140	242871	846981	0.95
A141	242826	846960	0.15
A142	242781	846939	0.2
A143	242734	846921	0.1
A144	242874	847310	1.1
A145	242826	847323	0.7
A146	242777	847336	0.65
A147	242729	847349	0.3
A148	242681	847363	0.3
A149	242632	847371	0.6
A150	244948	847715	0.4
A151	244921	847756	0.3
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A154	244797	847840	0.2
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A156	244709	847887	0.2
A157	244665	847911	0.2
A158	244617	847924	0.2
A159	244567	847923	0.2
A160	244518	847912	0.2
A161	244471	847897	0.3
A162	243621	847488	0.1
A163	243614	847438	0.1
A164	243615	847388	0.1
A165	243623	847339	0.3
A166	243637	847291	0.25
A167	243652	847243	0.2
A168	243670	847197	0.2
A169	243688	847150	0.25
A170	243708	847104	0.5
A171	243739	847065	1.05
A172	243781	847039	0.7
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A193	241830	847670	0.1
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A195	241932	847660	0.05
A196	241970	847625	0.05
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A202	240921	847700	1.2
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A204	240821	847708	0.1
A205	240772	847709	0.3
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A212	241959	847712	0.6
A213	242007	847725	0.3
A214	242055	847740	0.2
A215	243736	847826	0.4
A216	242369	847878	0.7
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A218	242468	847892	0.2
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B0003	243862	845655	0.3

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B0005	243762	845680	0.15
B0006	243787	845680	0.2
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B0008	243837	845680	0.9
B0009	243862	845680	0.25
B0010	243887	845680	0.25
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B0013	243787	845705	0.2
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B0015	243837	845705	0.65
B0016	243862	845705	0.2
B0017	243887	845705	0.2
B0018	243912	845705	0.15
B0019	243012	845730	0.25
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B0021	243062	845730	0.1
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B0023	243562	845730	0.1
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B0025	243612	845730	0.05
B0026	243637	845730	0.05
B0027	243787	845730	0.25
B0028	243812	845730	0.1
B0029	243837	845730	0.5
B0030	243862	845730	0.15
B0031	243887	845730	0.1
B0032	243912	845730	0.35
B0033	243937	845730	0.1
B0034	242937	845755	0.1
B0035	242962	845755	0.2
B0036	242987	845755	0.1
B0037	243012	845755	0.1
B0038	243037	845755	0.05
B0039	243062	845755	0.1
B0040	243087	845755	0.1
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B0044	243637	845755	0.1
B0045	243662	845755	0.05
B0046	243687	845755	0.55
B0047	243712	845755	0.9
B0048	243737	845755	0.25
B0049	243762	845755	1.2
B0050	243787	845755	1.4
B0051	243812	845755	0.7
B0052	243837	845755	0.65
B0053	243862	845755	0.5
B0054	243887	845755	0.25
B0055	243912	845755	0.15
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B0058	242912	845780	0.45
B0059	242937	845780	0.2
B0060	242962	845780	1.2
B0061	242987	845780	0.1
B0062	243012	845780	0.15

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B0064	243062	845780	0.3
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B0073	243737	845780	0.2
B0074	243762	845780	0.1
B0075	243787	845780	0.15
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B0077	243837	845780	0.3
B0078	243862	845780	0.4
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B0081	243937	845780	0.3
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B0084	242912	845805	0.4
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B0092	243112	845805	1.15
B0093	243612	845805	0.15
B0094	243637	845805	0.2
B0095	243662	845805	0.3
B0096	243687	845805	0.3
B0097	243712	845805	0.4
B0098	243737	845805	0.5
B0099	243762	845805	0.4
B0100	243787	845805	0.1
B0101	243812	845805	0.6
B0102	243837	845805	0.2
B0103	243862	845805	0.2
B0104	243887	845805	0.4
B0105	243912	845805	0.4
B0106	243937	845805	0.2
B0107	243037	845830	0.2
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B0109	243087	845830	0.05
B0110	243612	845830	0.15
B0111	243637	845830	0.15
B0112	243712	845830	0.4
B0113	243737	845830	0.5
B0114	243762	845830	0.2
B0115	243787	845830	0.2
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B0125	243862	845855	0.2
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B0127	243912	845855	0.2
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B0130	243887	845880	0.2
B0131	243912	845880	0.1
B0132	242612	845930	0.35
B0133	242637	845930	0.25
B0134	242687	845930	0.2
B0135	242712	845930	0.4
B0136	242612	845955	0.35
B0137	242637	845955	0.3
B0138	242662	845955	0.2
B0139	242687	845955	0.2
B0140	242712	845955	0.55
B0141	242637	845980	1.1
B0142	242662	845980	0.2
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B0144	242712	845980	0.7
B0145	244087	845980	0.4
B0146	242662	846005	0.15
B0147	242687	846005	0.25
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B0156	243962	846030	0.3
B0157	243987	846030	0.4
B0158	244012	846030	0.6
B0159	244037	846030	0.3
B0160	244062	846030	0.4
B0161	244087	846030	0.3
B0162	244112	846030	0.5
B0163	244137	846030	0.6
B0164	242687	846055	0.1
B0165	242712	846055	0.2
B0166	242737	846055	0.25
B0167	242762	846055	0.85
B0168	243962	846055	0.3
B0169	243987	846055	0.3
B0170	244012	846055	0.3
B0171	244037	846055	0.7
B0172	244062	846055	0.4
B0173	244087	846055	0.4
B0174	244112	846055	0.7
B0175	244137	846055	0.6
B0176	242712	846080	0.15
B0177	242737	846080	0.1
B0178	242762	846080	0.2
B0179	242787	846080	0.5
B0180	242812	846080	1.25

B0181	243962	846080	0.3
B0182	243987	846080	0.2
B0183	244012	846080	0.5
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B0185	244062	846080	0.4
B0186	244087	846080	0.4
B0187	244112	846080	0.3
B0188	244137	846080	0.5
B0189	244162	846080	0.4
B0190	242737	846105	0.1
B0191	242762	846105	0.15
B0192	242787	846105	0.15
B0193	242812	846105	1.4
B0194	243987	846105	0.3
B0195	244012	846105	0.4
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B0229	242812	846180	0.2
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B0239	242787	846205	0.2

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B0469	244812	846930	0.2
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B0484	244137	846955	0.3
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B0513	244937	846980	0.5
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B0557	243987	847130	0.6
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B0562	243187	847155	0.6
B0563	243212	847155	1.1
B0564	243237	847155	1.2
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B0566	243962	847155	0.5
B0567	243987	847155	0.3
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B0573	243137	847180	0.45
B0574	243162	847180	0.6
B0575	243187	847180	0.5
B0576	243212	847180	0.55
B0577	243962	847180	0.5
B0578	243987	847180	0.4
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B0580	244037	847180	0.5
B0581	244062	847180	0.3
B0582	243062	847205	0.9
B0583	243087	847205	0.6
B0584	243112	847205	1.1
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B0587	243187	847205	0.55
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B0591	244037	847205	0.6
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B0620	242987	847305	0.7
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B0622	243037	847305	0.3
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B0630	242237	847355	0.6
B0631	242262	847355	0.8
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B0647	242237	847380	0.55
B0648	242262	847380	0.7
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B0651	242337	847380	0.55
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B0658	242512	847380	0.3
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B0662	244787	847380	0.3
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B0676	242537	847405	0.6
B0677	242562	847405	0.7
B0678	244762	847405	0.4
B0679	244787	847405	0.5
B0680	244812	847405	0.4
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B0684	242287	847430	0.8
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B0691	244862	847430	0.6
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B0694	242287	847455	0.7
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B0696	242337	847455	0.2
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B0698	244837	847455	0.3
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B0703	242312	847480	0.5
B0704	242337	847480	0.15
B0705	244812	847480	0.4
B0706	244837	847480	0.4
B0707	244862	847480	0.2
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B0709	244912	847480	0.2
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B0722	242212	847530	0.4
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B0733	244962	847530	0.6
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B0737	240887	847555	0.1
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B0744	242312	847555	0.25
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B0746	243637	847555	0.2
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B0749	244887	847555	0.2
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B0761	240837	847580	0.45
B0762	240862	847580	0.55
B0763	240887	847580	0.1
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B0958	243662	847755	0.3
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B0968	244062	847755	0.4
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B0987	242237	847780	0.3
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B1004	244212	847780	0.3
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B1061	244387	847830	0.2
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B1115	243862	847880	0.3
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C002	240412	847705	0.1
C003	240437	847705	2.45
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C005	240462	847705	0.4
C006	240487	847805	0.1
C007	240487	847730	1.4
C008	240488	847831	0.3
C009	240512	847805	0.2
C010	240512	847780	1.3
C011	240512	847755	0.2
C012	240512	847730	0.1
C013	240513	847831	0.8
C014	240537	847805	0.5
C015	240537	847780	0.1
C016	240537	847755	0.1
C017	240562	847805	0.9
C018	240562	847780	0.2
C019	240562	847755	1.5

C020	240587	847780	1.6
C021	240587	847755	2.5
C022	240620	847743	0.1
C023	240669	847725	0.15
C024	241213	847680	0.3
C025	241213	847655	0.2
C026	241238	847655	0.2
C027	241238	847630	0.35
C028	241263	847705	0.4
C029	241263	847680	0.2
C030	241263	847655	0.35
C031	241263	847630	0.2
C032	241263	847605	0.3
C033	241288	847680	0.3
C034	241288	847655	0.2
C035	241288	847630	0.25
C036	241313	847705	0.1
C037	241313	847680	0.2
C038	242638	845905	0.5
C039	242659	845896	0.5
C040	242662	845930	0.2
C041	242662	845905	0.6
C042	242668	845848	0.2
C043	242687	845905	0.3
C044	242703	845813	0.4
C045	242712	846155	0.2
C046	242712	846130	0.2
C047	242712	846105	0.2
C048	242737	846205	0.2
C049	242737	846005	0.3
C050	242737	845980	0.2
C051	242737	845955	0.1
C052	242737	845930	0.6
C053	242737	846180	0.5
C054	242750	845798	0.3
C055	242762	846230	0.2
C056	242762	845955	0.2
C057	242762	845930	0.7
C058	242787	846230	0.1
C059	242800	845798	0.4
C060	242812	846230	0.1
C061	242850	845796	0.3
C062	242900	845793	0.2
C063	243237	846905	0.2
C064	243262	846980	0.5
C065	243262	846955	1.5
C066	243262	846930	0.4
C067	243287	847005	1.75
C068	243287	846980	0.5
C069	243312	847030	1.6
C070	243312	847005	0.7
C071	243337	847105	0.7
C072	243354	845851	0.2
C073	243354	845826	0.7
C074	243354	845801	1.2
C075	243354	845776	0.7
C076	243354	845751	0.6
C077	243362	847105	1.3
C078	243362	847080	0.9

C079	243379	845851	0.4
C080	243379	845826	0.9
C081	243379	845801	1
C082	243379	845776	0.9
C083	243387	847105	1.2
C084	243387	847080	1.15
C085	243404	845851	0.3
C086	243404	845826	0.2
C087	243404	845801	1.6
C088	243404	845776	1
C089	243404	845751	0.5
C090	243421	847102	1.1
C091	243429	845851	0.2
C092	243429	845826	1
C093	243429	845801	1.3
C094	243429	845776	0.8
C095	243454	845851	0.4
C096	243454	845826	1.2
C097	243454	845801	0.5
C098	243454	845776	0.9
C099	243454	845751	0.6
C100	243470	847111	0.4
C101	243520	847113	0.25
C102	243570	847107	0.3
C103	243618	847095	0.35
C104	243629	847518	0.35
C105	243631	847440	0.4
C106	243634	847390	0.7
C107	243638	847341	2.15
C108	243647	847291	1.3
C109	243665	846038	0.2
C110	243696	846077	0.1
C111	243712	846230	0.6
C112	243712	846205	0.6
C113	243712	846180	0.4
C114	243712	846155	0.3
C115	243722	846388	0.2
C116	243724	846119	0.2
C117	243737	846380	0.1
C118	243737	846355	0.1
C119	243737	846280	0.2
C120	243737	846255	0.2
C121	243737	846230	0.5
C122	243737	846205	0.1
C123	243737	846180	0.2
C124	243737	846155	0.4
C125	243741	846421	0.25
C126	243762	846380	0.3
C127	243762	846355	0.1
C128	243762	846330	0.6
C129	243762	846305	2.1
C130	243762	846280	0.1
C131	243762	846255	0.2
C132	243762	846230	0.4
C133	243762	846205	0.3
C134	243782	846447	0.8
C135	243829	846463	1.2
C136	243868	846493	0.5
C137	243898	846533	0.4

C138	243906	846870	0.5
C139	243906	846845	0.45
C140	243917	846579	0.15
C141	243931	846772	0.45
C142	243931	846895	0.2
C143	243931	846870	0.15
C144	243931	846845	0.6
C145	243931	846820	0.5
C146	243931	846795	0.3
C147	243951	846616	0.95
C148	243956	846870	0.95
C149	243956	846845	0.6
C150	243956	846820	0.2
C151	243956	846795	1.65
C152	243957	846772	1.8
C153	243957	846759	2.2
C154	243969	846661	0.6
C155	243972	846711	0.15
C156	243981	846870	0.65
C157	243981	846845	0.55
C158	244006	846870	1.5
C159	244027	846876	2.1
C160	244059	846879	0.45
C161	244086	846905	1.3
C162	244113	846930	2.35

Appendix D
HAZARD SCORE SUMMARY

794-ENV-GDE-21095Z - Ballach Wind Farm
Peat Slide Risk Assessment - Hazard Scoring Sheet
July 2025

Infrastructure Element	Depth Score	Slope Score	Substrate Score	Geomorphology Score	Drainage Score	Forestry Score	Relief Score	Land Use Score	Total Hazard Score	Hazard Ranking	Hazard (Likelihood)
Turbines (Including Crane Pads)											
T1	3	5	1	2	1	0	0	0	12	2	Low
T2	3	4	1	2	1	0	0	0	11	2	Low
T3	3	5	1	2	1	0	0	0	12	2	Low
T4	3	5	1	2	1	0	0	0	12	2	Low
T5	3	4	1	2	1	0	0	0	11	2	Low
T6	3	5	1	2	1	0	0	0	12	2	Low
T7	3	5	1	2	1	0	0	0	12	2	Low
T8	3	5	1	2	1	0	0	0	12	2	Low
T9	3	5	1	2	1	0	0	0	12	2	Low
T10	5	5	1	2	1	0	0	0	14	3	Moderate
T11	5	5	1	2	1	0	0	0	14	3	Moderate
T12	3	5	1	2	1	0	0	0	12	2	Low
T13	3	5	1	2	1	0	0	0	12	2	Low
T14	3	5	1	2	1	0	0	0	12	2	Low
T15	5	5	1	2	1	0	0	0	14	3	Moderate
T16	5	5	1	2	1	0	0	0	14	3	Moderate
T17	3	5	1	2	1	0	0	0	12	2	Low
T18	5	5	1	2	1	0	0	0	14	3	Moderate
T19	3	5	1	2	1	0	0	0	12	2	Low
T20	5	4	1	2	1	0	0	0	13	3	Moderate
Other Infrastructure											
Substation Compound	5	5	1	2	1	0	0	0	14	3	Moderate
Construction Compound	3	5	1	2	1	0	0	0	12	2	Low
Borrow Pit 1 (North)	3	5	1	2	1	0	0	0	12	2	Low
Borrow Pit 2 (South)	3	5	1	2	1	0	0	0	12	2	Low
Borrow Pit 3 (West)	3	5	1	2	1	0	0	0	12	2	Low
New Access Track Sections											
Track A	3	5	1	2	1	0	0	0	12	2	Low
Track B	5	5	1	2	1	0	0	0	14	3	Moderate
Track C	3	5	1	2	1	0	0	0	12	2	Low
Track D	3	4	1	2	1	0	0	0	11	2	Low
Track E	3	5	1	2	1	0	0	0	12	2	Low
Track F	3	5	1	2	1	0	0	0	12	2	Low
Track G	3	5	1	2	1	0	0	0	12	2	Low
Track H	5	5	1	2	1	0	0	0	14	3	Moderate
Track I	3	5	1	2	1	0	0	0	12	2	Low
Track J	3	4	1	2	1	0	0	0	11	2	Low
Track K	5	4	1	2	1	0	0	0	13	3	Moderate
Track L	5	5	1	2	1	0	0	0	14	3	Moderate
Track M	3	5	1	2	1	0	0	0	12	2	Low
Track N	3	5	1	2	1	0	0	0	12	2	Low
Track O	3	5	1	2	1	0	0	0	12	2	Low
Track P	5	4	1	2	1	0	0	0	13	3	Moderate
Track Q	5	5	1	2	1	0	0	0	14	3	Moderate
Track R	5	5	1	2	1	0	0	0	14	3	Moderate
Track S	3	5	1	2	1	0	0	0	12	2	Low
Track T	3	5	1	2	1	0	0	0	12	2	Low
Track U	5	5	1	2	1	0	0	0	14	3	Moderate
Track V	3	5	1	2	1	0	0	0	12	2	Low

TECHNICAL APPENDIX 10.3 - OUTLINE PEAT SLIDE RISK ASSESSMENT

Ballach Wind Farm

2025-07-24

794-ENV-GDE-21095Z

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Contact

3rd Floor, Quay 2, 139 Fountainbridge,
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Core input data

ENTER INPUT DATA HERE! VALUES SHOULD ONLY BE CHANGED ON THIS SHEET. **DO NOT USE EXAMPLE VALUES AS DEFAULTS!** ENTER YOUR OWN VALUES THAT ARE SPECIFIC TO YOUR PARTICULAR SITE.

Note: The input parameters include some variables that can be specified by default values, but others that must be site specific. Variables that can be taken from defaults are marked with purple tags on left hand side.

Click here to move to Payback Time Click here

Click here to return to Instructions Click here

Input data	Expected values: Enter expected value here	Expected values: Record source of data	Possible range of values: Enter minimum value here	Possible range of values: Record source of data	Possible range of values: Enter maximum value here	Possible range of values: Record source of data
Windfarm characteristics						
Dimensions						
No. of turbines	20	Chapter 3	20	Chapter 3	20	Chapter 3
Lifetime of windfarm (years)	35	Chapter 3	35	Chapter 3	35	Chapter 3
Performance						
Power rating of turbines (turbine capacity) (MW)	7	140MW / 20 turbines	7	140MW / 20 turbines	7	140MW / 20 turbines
Capacity factor	Direct input of capacity fa		Direct input of capacity fa		Direct input of capacity fa	
Enter estimated capacity factor (percentage efficiency)	42.1	Site specific Value from site modelling	42.0	Site specific Value from site modelling	42.2	Site specific Value from site modelling
Backup						
Extra capacity required for backup (%)	5	Standard Value	5	Standard Value	5	Standard Value
Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10	Fixed	10	Fixed	10	Fixed
Carbon dioxide emissions from turbine life - (eg. manufacture, construction, decommissioning)	Calculate wrt installed cap		Calculate wrt installed cap		Calculate wrt installed cap	
Characteristics of peatland before windfarm development						
Type of peatland	Acid b		Acid b		Acid b	
Average annual air temperature at site (°C)	9.17	Annual Met Station Data	5.66	Annual Met Station Data	12.68	Annual Met Station Data
Average depth of peat at site (m)	0.80	Appendix 10.2 PMP	0.00	Appendix 10.2 PMP	4.07	Appendix 10.2 PMP
C Content of dry peat (% by weight)	45.6	Asssumed Value	37.8	Asssumed Value	50.7	Asssumed Value
Average extent of drainage around drainage features at site (m)	10.00	Assumed Value	9.00	Assumed Value	11.00	Assumed Value
Average water table depth at site (m)	0.50	Assumed water table depth based on survey observations	0.05	Assumed water table depth based on survey observations	1.00	Assumed water table depth based on survey observations
Dry soil bulk density (g cm^{-3})	0.20	Estimated value based on survey observations	0.10	Estimated value based on survey observations	0.21	Estimated value based on survey observations
Characteristics of bog plants						
Time required for regeneration of bog plants after restoration (years)	10	Standard Value	5	Standard Value	15	Standard Value
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha^{-1} yr^{-1})	0.25	Standard Value	0.12	Standard Value	0.31	Standard Value
Forestry Plantation Characteristics						
Method used to calculate CO_2 loss from forest felling	Enter simple data		Enter simple data		Enter simple data	
Area of forestry plantation to be felled (ha)		N/A		N/A		N/A
Average rate of carbon sequestration in timber (tC ha-1 yr-1)						

Note: Capacity factor. The capacity factor of any power plant is the proportion of energy produced during a given period with respect to the energy that would have been produced had the wind farm been running continually and at maximum output (DECC (2004); see also www.bwea.com/ref/capacityfactors.html).
Capacity Factor = Electricity generated during the period [kWh]/ (Installed capacity [kW] x number of hours in the period [h])
We recommend that a site-specific capacity factor ~~site~~ should be used (as measured during planning stage), and should represent the average emission factor expected over the lifetime of the windfarm, accounting for decline in efficiency with age (Hughes, 2012). The 5 year average capacity factor (or "load factor") for UK onshore wind between 2010 and 2014, based on average beginning and end of year capacity, was 29.2% (DUKES, 2015).

Note: Extra capacity required for backup. If 20% of national electricity is generated by wind energy, the extra capacity required for backup is 5% of the rated capacity of the wind plant (Dale et al 2004). We suggest this should be 5% of the actual output. If it is assumed that less than 20% of national electricity is generated by wind energy, a lower percentage should be entered (0%). The House of Lords Economic Affairs Committee report on The Economics of Renewable Energy (Parliamentary Business, 2008) notes that to cover peak demand a '20% margin of extra capacity has been sufficient to keep the risk of a power cut due to insufficient generation at a very low level.' The estimate provided by BERR was a range of 10% to 20% of installed capacity of wind energy. E.ON is reported as proposing that the capacity credit of wind power should be 8%, and The Renewable Energy Foundation proposed the use of the square root of the wind capacity (in GW) as conventional capacity (e.g. 36 GW of wind plant to match 6 GW of conventional plant).

Note: Extra emissions due to reduced thermal efficiency of the reserve power generation ≈ 10% (Dale et al 2004).

Note: Emissions from turbine life. If total emissions for the windfarm are unknown, emissions should be calculated according to turbine capacity. The normal range of CO_2 emissions is 394 to 8147 t CO_2 MW (White & Kulcinski, 2000; White, 2007).

Note: Type of peatland An 'acid bog' is fed primarily by rainwater and often inhabited by sphagnum moss, thus making it acidic (Stoneman & Brooks,1997).
A 'fen' is a type of wetland fed by surface and/or groundwater (McBride et al., 2011).

Note: Time required for regeneration of previous habitat. Loss of fixation should be assumed to be over lifetime of windfarm only. This time could be longer if plants do not regenerate. The requirements for after-use planning include the provision of suitable refugia for peat-forming vegetation, the removal of structures, or an assessment of the impact of leaving them in situ. Methods used to reinstate the site will affect the likely time for regeneration of the previous habitat. This time could also be shorter if plants regenerate during lifetime of windfarm. If so, enter number of years estimated for regeneration.

Note: Carbon fixation by bog plants
Apparent C accumulation rate in peatland is 0.12 to 0.31 t C ha^{-1} yr^{-1} (Turunen et al., 2001; Botch et al., 1995). The SNH guidance uses a value of 0.25 t C ha^{-1} yr^{-1}.

Counterfactual emission factors						
To update counterfactual emission factors from the web Click here (not yet operational)						
Coal-fired plant emission factor (t CO_2 MWh^{-1})	1.002	Standard Value	1.002	Standard Value	1.002	Standard Value
Grid-mix emission factor (t CO_2 MWh^{-1})	0.19338	Standard Value	0.19338	Standard Value	0.19338	Standard Value
Fossil fuel-mix emission factor (t CO_2 MWh^{-1})	0.432	Standard Value	0.432	Standard Value	0.432	Standard Value
Borrow pits						
Number of borrow pits	3	Chapter 3	3	Chapter 3	3	Chapter 3
Average length of pits (m)	76	Borrow Pit Area	76	Borrow Pit Area	76	Borrow Pit Area
Average width of pits (m)	76	Borrow Pit Area	76	Borrow Pit Area	76	Borrow Pit Area
Average depth of peat removed from pit (m)	0.38	Appendix 10.2 PMP	0.38	Appendix 10.2 PMP	0.38	Appendix 10.2 PMP
Foundations and hard-standing area associated with each turbine						
Method used to calculate CO_2 loss from foundations and hard-standing	Enter detailed information		Enter detailed information		Enter detailed information	
Please enter construction data in sheet: Construction input data						
Average depth of peat removed from turbine foundations (m)	0.39	Appendix 10.2 PMP	0.39	Appendix 10.2 PMP	0.39	Appendix 10.2 PMP
Average depth of peat removed from hard-standing (m)	0.76	Appendix 10.2 PMP	0.76	Appendix 10.2 PMP	0.76	Appendix 10.2 PMP
Access tracks						
Total length of access track (m)	10760	Chapter 3	10,760	Chapter 3	10,760	Chapter 3
Existing track length (m)	0	Chapter 3	0	Chapter 3	0	Chapter 3
Length of access track that is floating road (m)	2010	Chapter 3	2010	Chapter 3	2010	Chapter 3
Floating road width (m)	6	Chapter 3	6	Chapter 3	6	Chapter 3
Floating road depth (m)						
Length of floating road that is drained (m)						
Average depth of drains associated with floating roads (m)						
Length of access track that is excavated road (m)	8750	Chapter 3	8750	Chapter 3	8750	Chapter 3
Excavated road width (m)	6	Chapter 3	6	Chapter 3	6	Chapter 3
Average depth of peat excavated for road (m)	0.35	Appendix 10.2 PMP	0.35	Appendix 10.2 PMP	0.35	Appendix 10.2 PMP
Length of access track that is rock filled road (m)		N/A		N/A		N/A
Rock filled road width (m)						
Rock filled road depth (m)						
Length of rock filled road that is drained (m)						
Average depth of drains associated with rock filled roads (m)						
Cable Trenches						
Length of any cable trench on peat that does not follow access tracks and is lined with a permeable medium (eg. sand) (m)		N/A		N/A		N/A
Average depth of peat cut for cable trenches (m)						
Additional peat excavated (not already accounted for above)						
Volume of additional peat excavated (m^3)	6321	Appendix 10.2 PMP - Substation Area	6321	Appendix 10.2 PMP - Substation Area	6321	Appendix 10.2 PMP - Substation Area
Area of additional peat excavated (m^2)	7730.0	Appendix 10.2 PMP - Substation Area	7730.0	Appendix 10.2 PMP - Substation Area	7730.0	Appendix 10.2 PMP - Substation Area
Peat Landslide Hazard						
Weblink: Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments	negligible	Fixed	negligible	Fixed	negligible	Fixed

Note: Area of forestry plantation to be felled. If the forestry was planned to be removed, with no further rotations planted, before the windfarm development, the area to be felled should be entered as zero.

Note: Plantation carbon sequestration. This is dependent on the yield class of the forestry. The SNH technical guidance assumed yield class of 16 m^3 ha^{-1} yr^{-1}, compared to the value of 14 m^3 ha^{-1} yr^{-1} provided by the Forestry Commission. Carbon sequestered for yield class 16 m^3 ha^{-1} y^{-1} = 3.6 tC ha^{-1} yr^{-1} (Cannell, 1999).

Note: Coal-Fired Plant and Grid Mix Emission Factors. Coal-fired plant emission factor (EF) from electricity supplied in 2014 = 0.093 t CO_2 MWh^{-1}. Grid-Mix EF for 2014 = 0.394 t CO_2 MWh^{-1}. Source = DUKES, 2015b.

Note: Fossil Fuel-Mix Emission Factor. The emission factor from electricity supplied in 2014 from all fossil fuels = 0.642 t CO_2 MWh^{-1}. Source = DUKES, 2015b.

Note: Total length of access track. If areas of access track overlap with hardstanding area, exclude these from the total length of access track to avoid double counting of land area lost.

Note: Floating road depth. Accounts for sinking of floating road. Should be entered as the average depth of the road expected over the lifetime of the windfarm. If no sinking is expected, enter as zero.

Note: Length of floating road that is drained. Refers to any drains running along the length of the road.

Note: Rock filled roads. Rock filled roads are assumed to be roads where no peat has been removed and rock has been placed on the surface and allowed to settle.

Note: Depth of peat cut for cable trenches. In shallow peats, the cable trenches may be cut below the peat. To avoid overestimating the depth of peat affected by the cable trenches, only enter the depth of the peat that is cut.

Note: Peat Landslide Hazard. It is assumed that measures have been taken to limit damage (Scottish Executive, 2006, Peat Landslide Hazard and Risk Assessments. Best Practice Guide for Proposed Electricity Generation Developments. Scottish Executive, Edinburgh. pp. 34-35) so that C losses due to peat landslide can be assumed to be negligible. Link: http://www.scotland.gov.uk/Publications/2006/12/21162303/1.

Improvement of C sequestration at site by blocking drains, restoration of habitat etc						
Improvement of degraded bog						
Area of degraded bog to be improved (ha)	552	HMP	552	HMP	552	HMP
Water table depth in degraded bog before improvement (m)	0.10	Assumption based on site visit observations	0.05	Assumption	0.30	Assumption
Water table depth in degraded bog after improvement (m)	0.09	Assumption based on site visit observations	0.04	Assumption	0.29	Assumption
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	10	Standard Value	5	Standard Value	15	Standard Value
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	35	Chapter 3	35	Chapter 3	35	Chapter 3
Improvement of felled plantation land						
Area of felled plantation to be improved (ha)		N/A		N/A		N/A
Water table depth in felled area before improvement (m)						
Water table depth in felled area after improvement (m)						
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)						
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)						
Restoration of peat removed from borrow pits						
Area of borrow pits to be restored (ha)	5	Appendix 10.2 PMP - Substation Area	5.18	Appendix 10.2 PMP - Substation Area	5.18	Appendix 10.2 PMP - Substation Area
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0.10	Assumption based on site visit observations	0.05	Assumption based on site visit observations	0.30	Assumption based on site visit observations
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0.09	Assumption based on site visit observations	0.04	Assumption based on site visit observations	0.29	Assumption based on site visit observations
Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	10	Standard Value	5	Standard Value	15	Standard Value
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	35	Chapter 3	35	Chapter 3	35	Chapter 3
Early removal of drainage from foundations and hardstanding						
Water table depth around foundations and hardstanding before restoration (m)						
Water table depth around foundations and hardstanding after restoration (m)						
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	2	Chapter 3	2	Chapter 3	2	Chapter 3
Restoration of site after decomissioning						
Will the hydrology of the site be restored on decommissioning?	Yes		Yes		Yes	
Will you attempt to block any gullies that have formed due to the windfarm?	Yes	HMP	Yes	HMP	Yes	HMP
Will you attempt to block all artificial ditches and facilitate rewetting?	Yes	HMP	Yes	HMP	Yes	HMP
Will the habitat of the site be restored on decommissioning?	Yes		Yes		Yes	
Will you control grazing on degraded areas?	Yes	HMP	Yes	HMP	Yes	HMP
Will you manage areas to favour reintroduction of species	Yes	HMP	Yes	HMP	Yes	HMP

Choice of methodology for calculating emission factors	Site specific (required for planning applications)

Core input data

ENTER INPUT DATA HERE! VALUES SHOULD ONLY BE CHANGED ON THIS SHEET. **DO NOT USE EXAMPLE VALUES AS DEFAULTS!** ENTER YOUR OWN VALUES THAT ARE SPECIFIC TO YOUR PARTICULAR SITE.

Note: The input parameters include some variables that can be specified by default values, but others that must be site specific. Variables that can be taken from defaults are marked with purple tags on left hand side.

Note: Period of time when improvement can be guaranteed. This guarantee should be absolute. Therefore, if you enter a value beyond the lifetime of the windfarm you should provide strong supporting evidence that this improvement can be guaranteed for the full period given. This includes the time requirement for the improvement to become effective. For example if time required for hydrology and habitat to return to its previous state is 10 years and the restoration can be guaranteed over the lifetime of the windfarm (25 years), the period of time when the improvement can be guaranteed should be entered as 25 years, and the improvement will be effective for (25 -10) = 15 years.

Note: Period of time when improvement can be guaranteed. This guarantee should be absolute. Therefore, if you enter a value beyond the lifetime of the windfarm you should provide strong supporting evidence that this improvement can be guaranteed for the full period given. This includes the time requirement for the improvement to become effective. For example if time required for hydrology and habitat to return to its previous state is 10 years and the restoration can be guaranteed over the lifetime of the windfarm (25 years), the period of time when the improvement can be guaranteed should be entered as 25 years, and the improvement will be effective for (25 -10) = 15 years.

Note: Period of time when improvement can be guaranteed. This guarantee should be absolute. Therefore, if you enter a value beyond the lifetime of the windfarm you should provide strong supporting evidence that this improvement can be guaranteed for the full period given. This includes the time requirement for the improvement to become effective. For example if time required for hydrology and habitat to return to its previous state is 10 years and the restoration can be guaranteed over the lifetime of the windfarm (25 years), the period of time when the improvement can be guaranteed should be entered as 25 years, and the improvement will be effective for (25 -10) = 15 years.

Note: Period of time when improvement can be guaranteed. This is assumed to be the lifetime of the windfarm as restoration after windfarm decommissioning is already accounted for in restoration of the site

Note: Restoration of site. If the water table at the site is returned to its original level or higher on decommissioning, and habitat at the site is restored, it is assumed that C losses continue only over the lifetime of the windfarm. Otherwise, C losses from drained peat are assumed to be 100%.

Note: Choice of methodology for calculating emission factors. The IPCC default methodology is the internationally accepted standard (IPCC, 1997). However, it is stated in IPCC (1997) that these are rough estimates, and "these rates and production periods can be used if countries do not have more appropriate estimates". Therefore, we have developed more site specific estimates for use here based on work from the Scottish Government funded ECOSSE project (Smith et al, 2007. ECOSSE: Estimating Carbon in Organic Soils - Sequestration and Emissions. Final Report. SEERAD Report. ISBN 978 0 7559 1498 2. 166pp.).

Construction input data

ENTER DETAILS OFCONSTRUCTION HERE!

Note: This data only used in the calculation if the selection "**Enter detailed information**" is made in cell C50 of the Core input data sheet.

Click here to move to Payback Time — Click here

Click here to return to Core input data — Click here

Input data	Expected values: Enter expected value here	Expected values: Record source of data	Possible range of values: Enter minimum value here	Possible range of values: Record source of data	Possible range of values: Enter maximum value here	Possible range of values: Record source of data
Construction design						
Note - total number of turbines already specified:	**20**		**20**		**20**	
AREA 1						
Number of turbines in this area	20	Chapter 3	20	Chapter 3	20	Chapter 3
Turbine foundations						
Average depth of peat removed when constructing foundations (m)	0.4	Appendix 10.2 - PMP	0.4	Appendix 10.2 - PMP	0.4	Appendix 10.2 - PMP
	Rectangular		Rectangular	Chapter 3 - Dimensions calculated based on turbine area	Rectangular	Chapter 3 - Dimensions calculated based on turbine area
Approximate geometric shape of whole dug when constructing foundations	1	Chapter 3 - Dimensions calculated based on turbine area				
Length at surface (m)	38		38		38	
Width at surface (m)	10		10		10	
Length at bottom (m)	38		38		38	
Width at bottom (m)	10		10		10	
Hardstanding						
Average depth of peat removed when constructing hardstanding (m)	0.8	Appendix 10.2 - PMP	0.8	Appendix 10.2 - Chapter 3 - Dimensions calculated based on hardstanding area	0.8	Appendix 10.2 - Chapter 3 - Dimensions calculated based on hardstanding area
	Rectangular		Rectangular		Rectangular	
Approximate geometric shape of whole dug when constructing hardstanding	1	Chapter 3 - Dimensions calculated based on hardstanding area				
Length at surface (m)	100		100		100	
Width at surface (m)	72		72		72	
Length at bottom (m)	100		100		100	
Width at bottom (m)	72		72		72	
Piling						
Is piling used?	No	Chapter 3	No	Chapter 3	No	Chapter 3
Volume of Concrete						
Volume of concrete used (m^3)	15000	750m3 x 20 turbines	15000	750m3 x 20 turbines	15000	750m3 x 20 turbines

Results

PAYBACK TIME AND CO_2 EMISSIONS

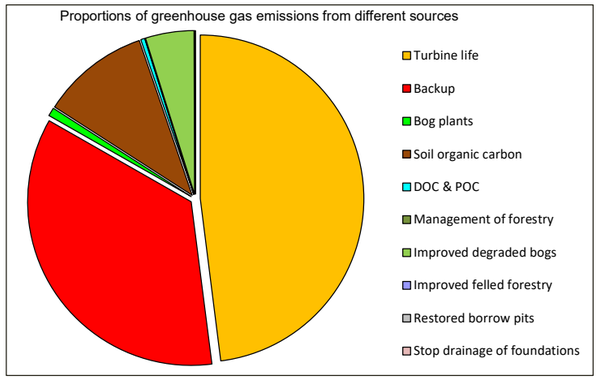
Note: The carbon payback time of the windfarm is calculated by comparing the loss of C from the site due to windfarm development with the carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

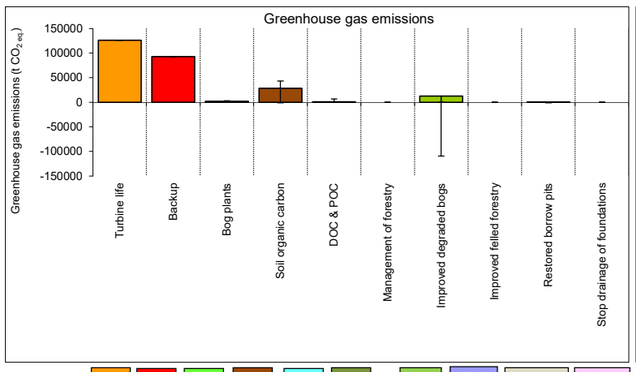
Click here to return to Input data Click here

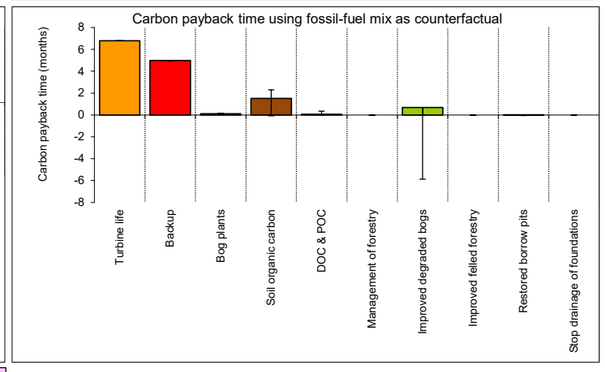
Click here to return to Instructions Click here

	Exp.	*Min.*	*Max.*
1. Windfarm CO_2 emission saving over…			
…coal-fired electricity generation (tCO_2 yr^{-1})	517347	516118	518576
…grid-mix of electricity generation (tCO_2 yr^{-1})	99845	99608	100082
…fossil fuel - mix of electricity generation (tCO_2 yr^{-1})	223048	222518	223578
Energy output from windfarm over lifetime (MWh)	18071004	18028080	18113928
Total CO_2 losses due to wind farm (t CO_2 eq.)			
2. Losses due to turbine life (eg. manufacture, construction, decomissioning)	126198	126198	126198
3. Losses due to backup	92716	92716	92716
4. Losses due to reduced carbon fixing potential	2170	874	3157
5. Losses from soil organic matter	28106	-1465	42931
6. Losses due to DOC & POC leaching	1017	0	6550
7. Losses due to felling forestry	0	0	0
Total losses of carbon dioxide	250206	218323	271552
8. Total CO_2 gains due to improvement of site (t CO_2 eq.)			
8a. Change in emissions due to improvement of degraded bogs	12670	0	-109380
8b. Change in emissions due to improvement of felled forestry	0	0	0
8c. Change in emissions due to restoration of peat from borrow pits	119	0	-1026
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	0
Total change in emissions due to improvements	12789	0	-110407

RESULTS	*Exp.*	*Min.*	*Max.*
Net emissions of carbon dioxide (t $CO_{2\ eq.}$)	**262995**	**107916**	**271552**
Carbon Payback Time			
…coal-fired electricity generation (years)	0.5	0.2	0.5
…grid-mix of electricity generation (years)	2.6	1.1	2.7
…fossil fuel - mix of electricity generation (years)	**1.2**	**0.5**	**1.2**
Ratio of soil carbon loss to gain by restoration (TARGET ratio (Natural Resources Wales) < 1.0)	**2.3**	**No gains!**	**No gains!**
Ratio of CO_2 eq. emissions to power generation (g / kWh) (TARGET ratio by 2030 (electricity generation) < 50 g /kWh)	**15**	**6**	**15**







Check Check Check Check Check Check Check Check Check Check

Results

PAYBACK TIME AND CO_2 EMISSIONS

Note: The carbon payback time of the windfarm is calculated by comparing the loss of C from the site due to windfarm development with the carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

Click here to return to Input data Click here

Click here to return to Instructions Click here

Data used in barchart of carbon payback time using fossil-fuel mix as counterfactual

Greenhouse gas emissions

	Exp.	*Min*	*Max*
Turbine life	126198	0	0
Backup	92716	0	0
Bog plants	2170	1296	988
Soil organic carbon	28106	29571	14826
DOC & POC	1017	1017	5533
Management of forestry	0	0	0
Improved degraded bogs	12670	12670	0
Improved felled forestry	0	0	0
Restored borrow pits	119	119	0
Stop drainage of foundations	0	0	0

Data used in barchart of carbon payback time using fossil-fuel mix as counterfactual

Greenhouse gas emissions				Carbon payback time (months)		
	Exp.	*Min.*	*Max.*	*Exp.*	*Min.*	*Max.*
Turbine life	126198	0	0	7	0	0
Backup	92716	0	0	5	0	0
Bog plants	2170	1296	988	0	0	0
Soil organic carbon	28106	29571	14826	2	2	1
DOC & POC	1017	1017	5533	0	0	0
Management of forestry	0	0	0	0	0	0
Improved degraded bogs	12670	12670	-122050	1	1	-7
Improved felled forestry	0	0	0	0	0	0
Restored borrow pits	119	119	-1145	0	0	0
Stop drainage of foundations	0	0	0	0	0	0
	262995			14		

Ballach Wind Farm

Noise Technical Appendices

Client: Energiekontor UK Ltd
Reference: N6584-293
Version 1.0

June 2025

Report Prepared for:
Energiekontor UK Ltd

Author:
Kira Marshall

Version	Reviewed by (Date)	Approved by (Date)	Date of Issue	Details
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1 Technical Appendix 11.1

1.1 Topographic Corrections

Certain topographic characteristics have the potential to either reinforce or attenuate the propagation of sound between two locations.

Where concave topographic profiles exist, referred to as a 'valley' in the IoA Good Practice Guide, a +3dB correction should be added to predictions.

No adjustments for directivity were applied to predicted levels – therefore, a worst-case downwind assessment is provided.

Line of sight visibility was checked between the turbines and each NAL at 4m height. Where no part of a turbine is visible from any particular assessment position (at 4m height) a -2dB adjustment to the predicted level from the screened turbine(s) has been applied.

Table 1.1 provides details of all corrections applied to each NAL for both the Proposed Development and third-party developments.

Table 1.1: Topographic Corrections (dB)

NAL	NAL 1	NAL 2	NAL 3	NAL 4	NAL 5
Turbine ID	Ballach Wind Farm				
T1					-2
T2					-2
T3		-2			-2
T4					-2
T5					-2
T6					-2
T7				-2	-2
T8					-2
T9		-2			-2
T10	-2				-2
T11	-2				-2
T12	-2				-2
T13	-2				-2
T14	-2				-2
T15	-2	-2	-2		-2
T16	-2	-2			-2
T17	-2	-2		-2	-2
T18	-2	-2		-2	-2

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T19	-2	-2		-2	-2
T20	-2	-2		-2	-2
	Fairburn Wind Farm				
T1	-2	-2	-2	-2	-2
T2	-2	-2	-2	-2	-2
T3	-2	-2	-2	-2	-2
T4	-2	-2	-2	-2	-2
T5	-2	-2	-2	-2	-2
T6	-2	-2	-2	-2	-2
T7	-2	-2	-2	-2	-2
T8	-2	-2	-2	-2	-2
T9	-2	-2	-2	-2	-2
T10	-2	-2	-2	-2	-2
T11	-2	-2	-2	-2	-2
T12	-2	-2	-2	-2	-2
T13	-2	-2	-2	-2	-2
T14	-2	-2	-2	-2	-2
T15	-2	-2	-2	-2	-2
T16	-2	-2	-2	-2	-2
T17	-2	-2	-2	-2	-2
T18	-2	-2	-2	-2	-2
T19	-2	-2	-2	-2	-2
T20	-2	-2	-2	-2	
	Auchmore Wind Farm				
T1	-2	-2	-2	3	-2
T2	-2	-2	-2	-2	-2

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2 Technical Appendix 11.2

2.1 Cumulative Sound Power Levels

Fairburn Wind Farm has been modelled with the sound power level details for the Senvion MM82 2050kW machine. In the absence of manufacturer specific uncertainty, an uncertainty level of 2dB has been included. The sound power values were obtained from the manufacturer's sound power report, doc ref: SD-2.5-WT.PC.02-B-F-EN, dated 2014-01-20, as given in Table 2.1.

Table 2.1: Octave band sound power level for the Senvion MM82

Octave Band (Hz)	Standardised V10 wind speed (m/s)								
	4	5	6	7	8	9	10	11	12
	Sound Power Level (L_{WA}) for a hub height of 60m [dB(A)]								
63	76.3	81.9	85.8	86.2	86.2	86.2	86.2	86.2	86.2
125	82.3	87.9	91.8	92.2	92.2	92.2	92.2	92.2	92.2
250	86.5	92.1	96.0	96.4	96.4	96.4	96.4	96.4	96.4
500	89.0	94.6	98.5	98.9	98.9	98.9	98.9	98.9	98.9
1000	88.7	94.3	98.2	98.6	98.6	98.6	98.6	98.6	98.6
2000	84.5	90.1	94.0	94.4	94.4	94.4	94.4	94.4	94.4
4000	79.6	85.2	89.1	89.5	89.5	89.5	89.5	89.5	89.5
8000	66.4	72.0	75.9	76.3	76.3	76.3	76.3	76.3	76.3
Total	94.1	99.7	103.6	104.0	104.0	104.0	104.0	104.0	104.0
Uncertainty	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
IoA Total	96.1	101.7	105.6	106.0	106.0	106.0	106.0	106.0	106.0

Auchmore 1 and 2 have been modelled with the sound power level details for the Enercon E48 800kW machine. As specified in the manufacturer's sound power report, doc ref: SIAS-04-SPL E48 OM I Rev3_0-eng, dated 2011-2-4, an uncertainty margin of 1dB has been applied to the data, as given in Table 2.2.

Table 2.2: Octave band sound power level for the Enercon E48 800kW

Octave Band (Hz)	Standardised V10 wind speed (m/s)								
	4	5	6	7	8	9	10	11	12
	Sound Power Level (L_{WA}) for a hub height of 55m [dB(A)]								
63	70.5	75.0	79.2	82.0	83.0	83.8	83.8	83.8	83.8
125	75.2	79.7	83.9	86.7	87.7	88.5	88.5	88.5	88.5
250	82.7	87.2	91.4	94.2	95.2	96.0	96.0	96.0	96.0
500	84.6	89.1	93.3	96.1	97.1	97.9	97.9	97.9	97.9
1000	83.0	87.5	91.7	94.5	95.5	96.3	96.3	96.3	96.3

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Octave Band (Hz)	Standardised V10 wind speed (m/s)								
	4	5	6	7	8	9	10	11	12
	Sound Power Level (L_{WA}) for a hub height of 55m [dB(A)]								
2000	77.9	82.4	86.6	89.4	90.4	91.2	91.2	91.2	91.2
4000	75.0	79.5	83.7	86.5	87.5	88.3	88.3	88.3	88.3
8000	72.5	77.0	81.2	84.0	85.0	85.8	85.8	85.8	85.8
Total	89.2	93.7	97.9	100.7	101.7	102.5	102.5	102.5	102.5
Uncertainty	1	1	1	1	1	1	1	1	1
IoA Total	90.2	94.7	98.9	101.7	102.7	103.5	103.5	103.5	103.5

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3 Technical Appendix 11.3

3.1 Proposed Development Noise Limits

Should the development gain consent, it is proposed that site specific noise limits reference predictions (EIAR Chapter 11: Table 11.7) plus 2dB as a margin of headroom. The resulting values are presented below in Table 3.1.

Table 3.1: Proposed Development Noise Limits

L90	dB(A)	V10 wind speed (ms^{-1})								
Location	Name	4	5	6	7	8	9	10	11	12
NAL1	Breakachy Farm	23.3	28.1	32.5	33.1	33.1	33.1	33.1	33.1	33.1
NAL2	2 Farley, Beauly	23.2	28.1	32.4	33.1	33.1	33.1	33.1	33.1	33.1
NAL3	6 Farley, Beauly	21.9	26.8	31.1	31.8	31.8	31.8	31.8	31.8	31.8
NAL4	Auchederson	19.3	24.1	28.5	29.1	29.1	29.1	29.1	29.1	29.1
NAL5	Orrin Cottage	15.5	20.4	24.7	25.3	25.3	25.3	25.3	25.3	25.3

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Pell Frischmann

Ballach Wind Farm

Technical Annex 12.1: Abnormal Indivisible Load Route Survey Report

July 2025

10109882

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Report Ref.		**250131 Ballach Rsr N163_Eia**				
File Path		**https://pellf.sharepoint.com/sites/EdinburghOfficeTeam/Shared Documents/General/Projects/10109882 EnergieKontor Ballach/01 - WIP/Reports/250131 Ballach RSR N163_EIA .docx**				
Rev	**Suit**	**Description**	**Date**	**Originator**	**Checker**	**Approver**
1		Draft	31-01-2025	T Otchereh	J Stirrat	S McGarva
2		Inverness Route added	20-03-2025	T Otchereh	J Stirrat	S McGarva
3		EIA update	02-07-2025	T Otchereh	J Stirrat	S McGarva

Ref. reference. Rev revision. Suit suitability.

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1 Introduction

1.1 Purpose of the Report

Pell Frischmann Consultants Ltd. (PF) has been commissioned by Energiekontor UK Ltd. (the Applicant) to undertake a Route Survey Review (RSR) to examine the issues associated with the transport of wind turbine Abnormal Indivisible Loads (AIL) in relation to the construction and development of the proposed Ballach Wind Farm, located approximately 4 kilometres (km) north-west of Kilmorack and 10km west of Beauly in The Highland Council (THC) administrative area.

This report has been prepared to help inform the Applicant on the likely issues associated with the development of the Site with regards to off-site transport and access for AIL traffic. The report is based on both a desktop study and Site visit of the available access options and identifies the key issues associated with AIL deliveries, noting what remedial works, either in the form of physical works or as traffic management interventions will be required to accommodate the predicted loads.

The detailed assessment and subsequent designs of any remedial works are beyond the agreed scope of works between PF and the Applicant at this point in time.

It is the responsibility of the turbine supplier to ensure that the entirety of the proposed access route is suitable and meets with their satisfaction (depending upon contract). The turbine supplier will be responsible for ensuring that the finalised proposals meet with the appropriate levels of health and safety consideration for all road users and are in line with the relevant legislation at the time of delivery.

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2 Definitions & Terminology

2.1 Definition of Abnormal Indivisible Load

The Department for Transport (DfT), of which the National Highways (NH) and Transport Scotland (TS) are executive agencies, state that the strict definition of an AIL refers to a load which cannot, without undue expense or risk of damage, be divided into two or more loads for the purpose of carriage on roads which, owing to its dimensions or weight, cannot be carried on a vehicle which complies with the 'standard vehicle regulations' as follows:

- The Road Vehicles (Construction and Use) Regulations 1986 (as amended);
- The Road Vehicles (Authorised Weight) Regulations 1998 (as amended); and
- The Road Vehicles Lighting Regulations 1989 (as amended).

All equipment should be stripped of their ancillaries before they are transported. The NH will only accept that further dismantling is not required where it cannot be economically achieved due to the requirement for its construction within factory environments or where extremely high tolerances have to be maintained.

2.2 Legislation

Conventional Heavy Goods Vehicles (HGVs) have an operating weight limit of 44 tonnes. The category known as AIL covers those vehicles where the gross weight exceeds 44 tonnes. An AIL is defined as that which cannot be carried under Construction and Use (C&U) Regulations. Items which, when loaded on the load carrying vehicle exceed the weights encompassed by the C&U Regulations, but do not exceed Special Order Permission Limits are governed by Special Types General Order (STGO) Categories 1 to 3 depending on size.

Where dimensions exceed 6,100 millimetres (mm) in width, 30,000 mm in rigid length or 150 tonnes gross weight, Special Order from NH is required.

Special Order category AIL movements are authorised by the NH Abnormal Loads team, an executive agency of the DfT, based in Birmingham.

2.3 Water Preferred Policy

The DfT has adopted a ‘water-preferred’ policy for the transport of AILs. This means that, where an application is sought for the movement of a Special Order or VR1 category load (more than 5.0 metres (m) width) by road, the Department, via NH and TS, will turn down the application where it is feasible for a coastal or inland waterway route to be used instead of road.

NH advise that this decision is based on a number of factors including whether the load is divisible, the availability of a suitable route, the amount of traffic congestion that is likely to be caused and the justification for the load to be moved.

The NH Abnormal Loads Team is the department responsible for the authorisation of Special Order AILs and government policy is that the closest available port of access should be used for the delivery of such oversized items.

2.4 Abbreviations

- AIL Abnormal Indivisible Load
- C&U Construction and Use
- ESDAL Electronic Service Delivery for Abnormal Loads

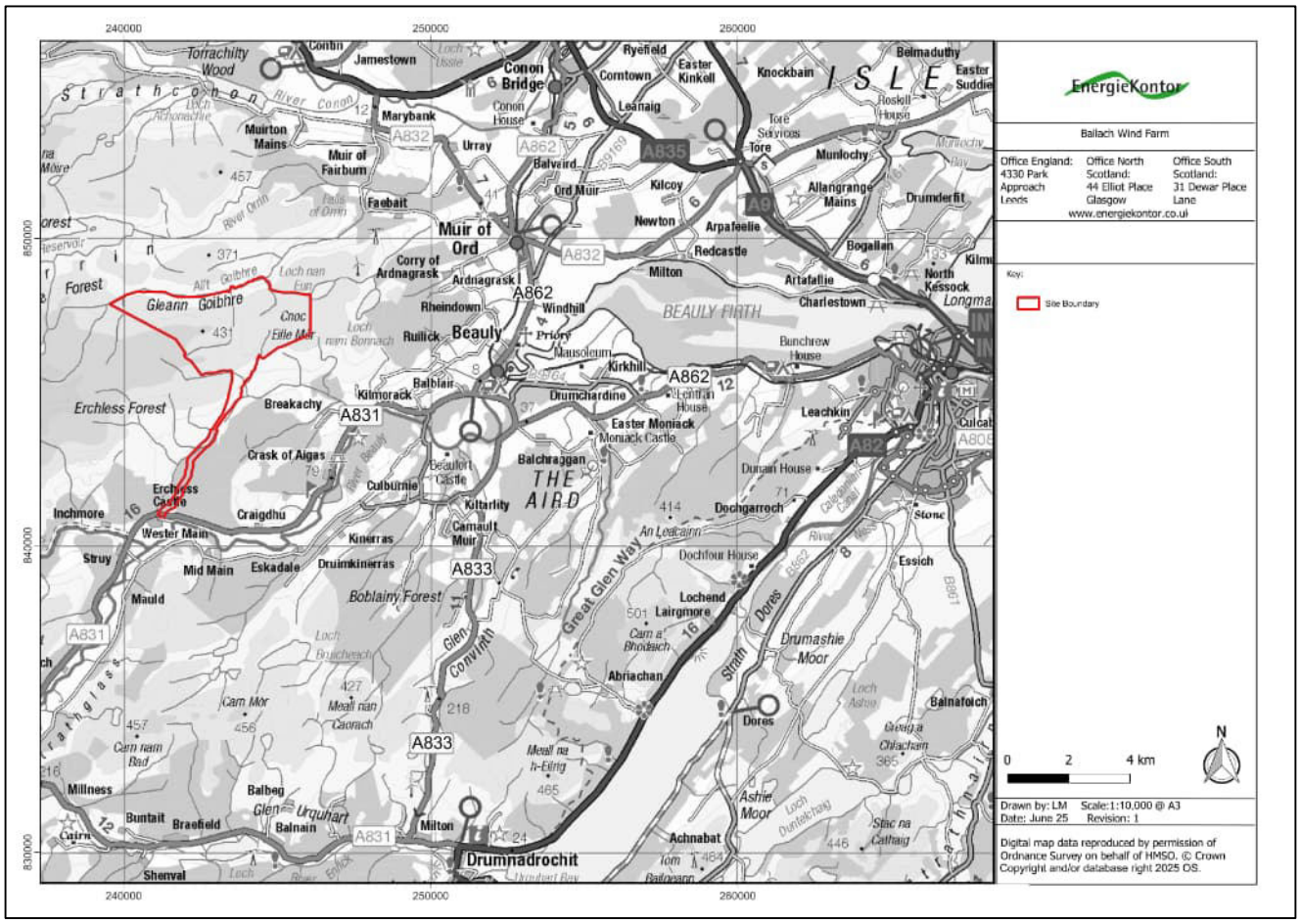
- NH National Highways
- OS Ordnance Survey
- POE Port of Entry
- RSR Route Survey Review
- SPA Swept Path Assessment
- STGO Special Types General Order
- SWC Super Wing Carrier
- TS Transport Scotland
- POI Point of Interest

3 Project Background

3.1 Site Location

The proposed development Site is located approximately 4km north-west of Kilmorack and 10km west of Beauly. The Site currently comprises open moorland with limited forestry found within the Site boundary. **Figure 3-1** illustrates the Site location.

Figure 3-1: Site Location Plan



3.2 Candidate Turbine

The Applicant have indicated they wish to use the Nordex N163 turbine, with proposed tip heights of 200m and 230m. However, TS148 sections for this setup would exceed 5m in diameter, requiring extensive overhead utility diversion efforts and raising concerns regarding bridge clearances (B817, Dalmore). Therefore, the worst-case achievable tower has been assessed measuring approximately 30m x 4.3m x 4.3m transported in a 4+7 clamp trailer.

The details of the components used in this review are detailed below.

Table 3-1: Turbine Components Summary – TS 118

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	79.75	4.395	4.11	17.533
Top Tower	35.000	3.26	4.27	60.57
Mid Tower 3	29.97	4.27	4.28	82.56
Mid Tower 2	21.12	4.28	4.29	81.40

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Mid Tower 1	16.43	4.29	4.29	82.39
Bottom Tower	11.56	4.29	4.30	81.32

Table 3-2: Turbine Components Summary – TS 148, 5X

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	79.75	4.395	4.11	17.533
Top Tower	29.30	3.26	4.10	51.71
Mid Tower 4	29.94	4.10	4.97	75.00
Mid Tower 3	29.50	4.97	4.98	99.35
Mid Tower 2	23.36	4.98	4.99	97.16
Mid Tower 1	19.28	4.99	4.99	97.05
Bottom Tower	13.41	4.99	5.00	97.84

Table 3-3: Turbine Components Summary – TS 148, 6X

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	79.75	4.395	4.11	17.533
Top Tower	33.91	3.26	4.27	61.85
Mid Tower 4	30.00	4.27	4.77	83.60
Mid Tower 3	27.05	4.77	5.27	98.48
Mid Tower 2	22.15	5.27	5.28	98.49
Mid Tower 1	18.29	5.28	5.29	98.49
Bottom Tower	13.38	5.29	5.30	102.67

3.3 Proposed Delivery Equipment

To provide a robust assessment scenario based upon the known issues along the access route, it has been assumed that all blades would be carried on a Superwing carrier trailer to reduce the need for mitigation in constrained sections of the route.

There will also be a requirement to make use of a Blade Lifting Trailer to provide access to the proposed development Site. As detailed in the following sections, two port options are currently under consideration, namely the Port of Nigg and the Port of Inverness. Should the Port of Nigg be progressed, the blade loads would require to be transferred onto a Blade Lifting trailer at Wester Balblair to reduce the need for extensive reprofiling mitigation in constrained sections of the route, between this location and the proposed Site access. With regards to the Port of Inverness, blade loads would require to make use of the Blade Lifting Trailer from the port, to allow the loads to negotiate further constrained sections of that route through Inverness.

The lifting trailer has the ability to lift blades up to a maximum angle of 60 degrees, lifting blades over potential constraints and therefore reducing the need for off-site mitigation works on the public road network.

The blade lifting trailer tends not to be used for the whole route as it has speed restrictions and requires substantial counterbalancing weights which increase its axle loads. In use, the blade lifter is only used for short sections, with a standard road trailer being used for the majority of the route. The blade would then be transferred to the lifting trailer at an off-road location.

When the blade is in the raised position, all overhead restrictions will need to be removed. This includes overhanging tree canopies and all utility lines.

The base and mid towers would be carried on a 4+7 clamp trailer. The hub, nacelle housing, and top towers would be carried on a six-axle step frame trailer.

Figure 3-2: Superwing Carrier Trailer



Figure 3-3: Blade Lifter



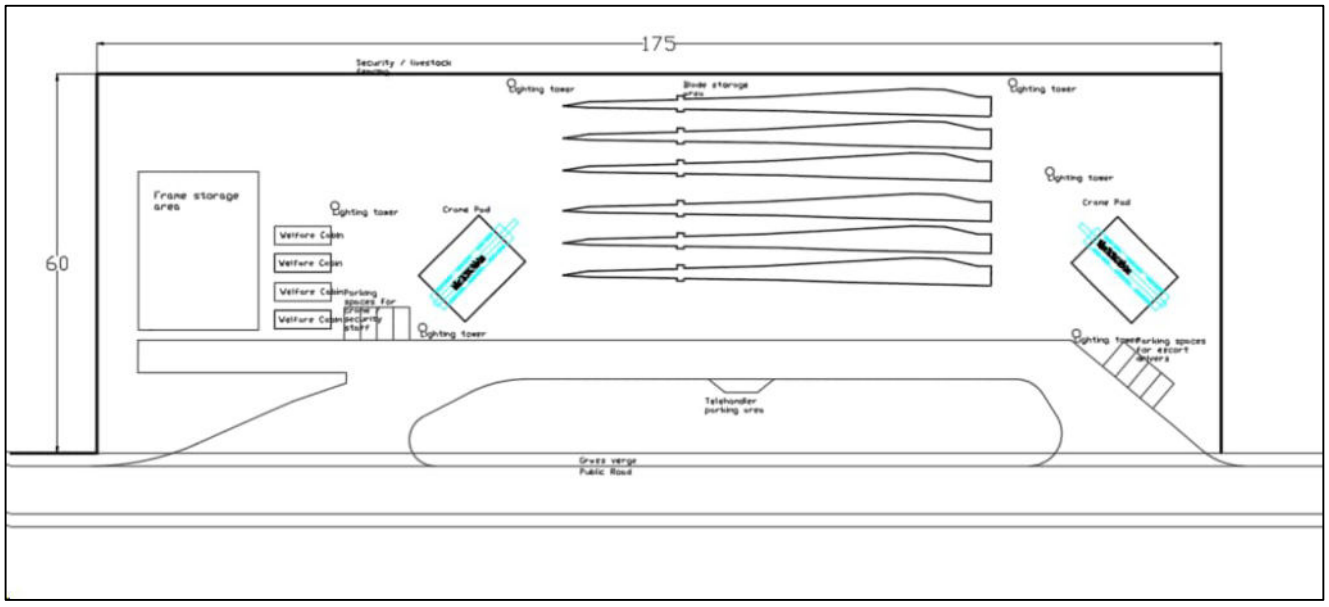
Figure 3-4: Tower Clamp Trailer



As highlighted, it is proposed that blade loads are transferred to the blade lifting trailer to the west of Wester Balblair, subject to necessary land agreements. The preferred option would be determined post consent and in full consultation with the Local Authority.

The blade transfer area will need to be circa 200m x 60m and will need to include an access junction and two crane pads. Storage for up to six blades should also be available, with all infrastructure designed in accordance with turbine supplier standards. Details of the indicative transfer station are provided below in **Figure 3-5**.

Figure 3-5: Indicative Blade Transfer Station



All vehicle configurations are subject to confirmation by the chosen haulier at the time of their commissioning.

As the loads are classified as Special Order, due to a rigid length in excess of 30m, a full Police Escort would be required along the full length of the route.

4 Access Route Review

4.1 Port of Entry

Two ports are currently under consideration as the Port of Entry (POE) for the proposed development, namely the Port of Nigg and the Port of Inverness.

The Port of Nigg is strategically located within the sheltered deep waters of the Cromarty Firth, servicing the offshore wind, oil & gas, and nuclear sectors. As the largest port in the Cromarty Firth, it offers a unique value proposition for major energy infrastructure projects across the UK. Within the Port, loads can be offloaded by geared vessel or onshore mobile cranes and this port has been used for the delivery of components for a number of wind farms and is therefore well-proven as being capable of dealing with AILs.

The Port of Inverness Lying 11km south-west of Chanonry Point in the Inverness Firth and is of Scotland's most sheltered natural harbours. The port has been used by renewables deliveries in the past for a large number of wind farms, including Tom nan Clach, and has sufficient quay and storage space and is well located for the strategic trunk road network.

The location of both ports in relation to the proposed development can be seen in **Figure 4-1**.

Figure 4-1: POE Location Plan



4.2 Proposed Access Routes

Two primary access routes are currently under consideration for the proposed development, one from each of the aforementioned POE's at Nigg and Inverness. The two route options are detailed below for each of the ports.

Port of Nigg

There are a number of routing options within the route from the Port of Nigg through to the proposed development Site access, which are as follows:

Route Option 1

- For Route Option 1, the loads would exit the Port of Nigg and join the B9175 northbound;
- Loads would take the first exit at Nigg Roundabout to join the A9 heading southwest;
- Loads would take the first exit at Ardullie Roundabout to continue on the A9 southbound;
- Loads would take the third exit at Tore Roundabout to join the A832 heading southwest;
- Loads would turn off A832 to join the B9169 southbound;
- Loads would turn off B9169 to join the A862 southbound;
- Loads would turn off A862 to join A831 heading southwest; and
- Loads would continue on the A831 westbound to the proposed Site access location.

The above route option can be seen in **Figure 4-2**.

Figure 4-2: Port of Nigg Route Option 1



Route Option 2

The proposed Route Option 2 access route to the Site is detailed below:

- For Route Option 2, the loads would use the same route as detailed for Route Option 1 from the Port, until the Tore Roundabout, where they will take the fourth exit at to join the A835 heading northwest;
- Loads would take the first exit at Maryburgh Roundabout to join the A862 heading south;
- Loads would join the A832; and
- Loads would turn right at the A832 / B9169 Junction to rejoin Route Option 1, continuing through to the Proposed Site access location on the A862 and A831.

The above route option can be seen in **Figure 4-3**.

Figure 4-3: Port of Nigg Route Option 2



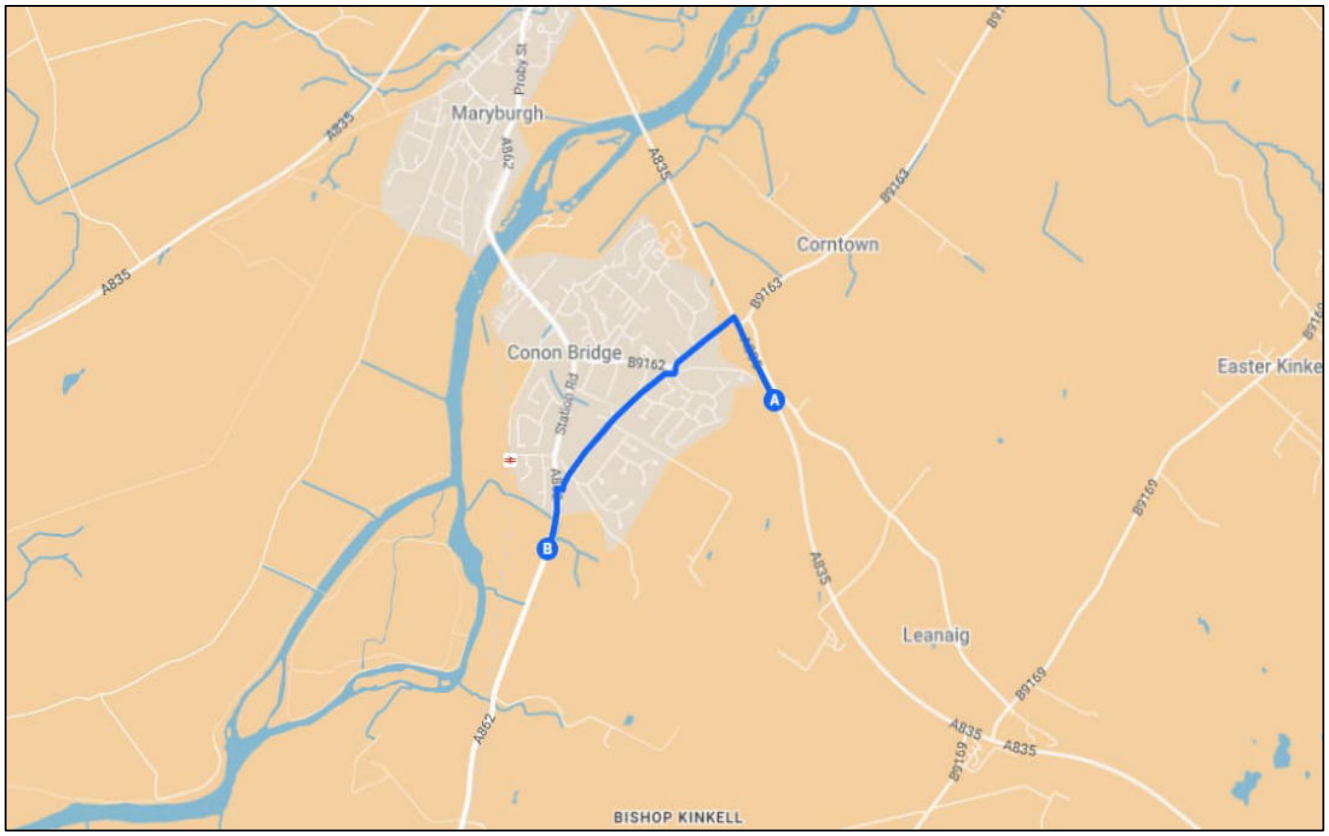
Route Option 3

The proposed Route Option 3 access route to the is detailed below:

- For Route Option 3, the loads would use the same route as detailed for Route Option 2, but rather than travel through to the Maryburgh Roundabout at the north of Conon Bridge, they will turn left onto the B9163 heading southwest;
- At the B9163 / B9162 / School Road Roundabout, they will take the third exit and continue southwest bound on School Road; and
- Loads would then turn left joining the A862 to rejoin Route Option 2 and then Route Option 1, continuing through to the Proposed Site access location on the A862 and A831.

The above route option can be seen in **Figure 4-4**.

Figure 4-4: Port of Nigg Route Option 3



Port of Inverness

There is only one route option currently being considered from the Port of Inverness, which is as follows:

- Loads would exit the harbour onto Stadium Road eastbound;
- Loads would travel straight on at Longman Roundabout to join the A82 westbound;
- Loads would turn right at Telford Roundabout to join the A862 westbound;
- Loads would then continue on the A862 to its junction with the A831 at Wester Balblair; and
- Loads would continue on the A831 westbound to the proposed Site access location.

The above route option can be seen in **Figure 4-5**.

Figure 4-5: Port of Inverness Route Option



4.3 Route Constraints

The constraints noted during the on-site review are provided in the tables below. These cover all constraints from the port access gates through to the proposed Site access junction. No consideration of the transport issues within either POE or within the proposed development Site have been undertaken within this report.

Where loads are carried on the blade lifting trailer in the raised position all overhead utilities and tree canopies should be cleared. A full review of height clearances with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations).

Plans illustrating the location of the constraints are provided in **Annex A**.

Table 4-1: Constraint Points and Details – Port of Nigg: Route Option 1

POI	Key Constraint	Details
1	**Exit from Port of Nigg** 	Loads will exit the Port of Nigg and turn left to join the B9175 northbound. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the areas of land to the south of the exiting junction. Load bearing surfaces should be laid and trees cleared. The chain-link fence should be removed. Port authority to be consulted regarding feasibility of port car park use. All street furniture to be cleared including signs and lighting columns. Swept path assessment SK01 is included in Annex B.
2	**B9175 North of Port of Nigg** 	Loads will continue north on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge, but no works are required. Swept path assessment SK02 is included in Annex B.
3	**B9175, Tigh na Mara** 	Loads will continue north on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway, but no works are required. Swept path assessment SK03 is included in Annex B.
4	**B9175, North of Tigh na Mara** 	Loads will continue north on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway, but no works are required. Swept path assessment SK04 is included in Annex B.

POI	Key Constraint	Details
5	**B9175 Pitcalnie** 	Loads will continue north on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail the western verge, but no works are required. Swept path assessment SK05 is included in Annex B.
6	**B9175, North of Pitcalnie** 	Loads will continue north on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail the western verge, but no works are required. Swept path assessment SK06 is included in Annex B.
7	**B9175, Ankerville** 	Loads will continue northwest on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway, but no works are required. Swept path assessment SK07 is included in Annex B.
8	**B9175, Arabella** 	Loads will continue northwest on the B9175. A swept path assessment has been undertaken and indicates that loads will oversail the southwestern verge where one road sign should be removed. Vegetation and trees should be trimmed. Swept path assessment SK08 is included in Annex B.

POI	Key Constraint	Details
9	**B9175 Railway Crossing** 	Loads will cross a railway crossing at this location. Early consultation with Network Rail is recommended.
10	**B9175 Nigg Roundabout** 	Loads will take the first exit at the roundabout to join the A9 heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail the northeastern verge on approach where trees and vegetation should be trimmed. A load bearing surface should be laid in the southwestern verge on approach where two lighting columns and one road sign should be removed. Loads will oversail the approach road splitter island where two bollards will be oversailed. A load bearing surface should be laid in the central island where two sets of lit chevron signs should be removed. Trees and vegetation should be cleared. One road sign and two bollards should be removed from the exit arm splitter island. Swept path assessment SK09 is included in Annex B.
11	**A9 Ardullie Roundabout** 	Loads will take the first exit at the roundabout to continue on the A9 heading south. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway on approach, but no works are required. A load bearing surface should be laid in the central island where the land should be reprofiled and trees should be cleared. One road sign and two bollards should be removed from the exit arm splitter island. Swept path assessment SK10 is included in Annex B.

POI	Key Constraint	Details
12	**A9 Tore Roundabout** 	Loads will contraflow the roundabout to take the A832 exit heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge on approach where two lighting columns and one road sign should be removed. Vegetation should be trimmed. One lighting column and a section of guardrail should be removed from the western verge on approach. Trees and vegetation should be trimmed. A load bearing surface should be laid in the western verge of the central island where one lighting column, one set of lit chevron signs and two private advertisement signs should be removed. Vegetation should be trimmed. Loads will oversail the western verge on exit where one lighting column should be removed and vegetation should be trimmed. Swept path assessment SK11 is included in Annex B.
13, 14	**A832 West of Garguston**  	Loads will continue on the A832 at this location. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway through the bends where vegetation and trees should be trimmed. Bollards will be oversailed. Trees should be cleared in the northeastern verge through the second bend. Swept path assessment SK12 is included in Annex B.
15	**A832 / B1969 Junction** 	Loads will turn left onto the B9169 at this location. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the inside verge through the junction where a load bearing surface should be laid. One road sign, one advertisement sign, gate, fence, stone wall, and one utility pole should be removed. Vegetation should be cleared. Existing utilities should be protected. **Third party land** is required. Swept path assessment SK13 is included in Annex B.

POI	Key Constraint	Details
16	**B9169, Northeast of Windhill** 	Loads will continue on the B9169 heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway through the bend where one utility pole should be removed on the eastern verge and vegetation should be trimmed. Swept path assessment SK14 is included in Annex B.
17	**B169 / A862 Junction** 	Load will turn left onto the A862 heading south. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the inside verge through the junction where a load bearing surface should be laid. One road sign, one 'to let' sign, fence and stone wall should be removed. Trees and vegetation should be cleared. Existing utilities should be protected. **Third party land** is required. Swept path assessment SK15 is included in Annex B.
18	**A862, Beauly** 	Parking should be suspended during movements through the High Street.

POI	Key Constraint	Details
19	**A862, Farlie House**  	Throughout the entire route, the tree canopy needs to be trimmed to provide a clear 5m head height. The clearances to overhead power lines through the entire route should be reviewed with the utility provider prior to loads moving to ensure that there is sufficient head height and flashover protection for all temperature ranges.
20	**A862 / A831 Junction** 	Loads will utilise the eastern field to turn right onto the A831. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the eastern field on approach where a load bearing surface should be laid. Six road signs and the fence should be removed. Trees and vegetation should be cleared. **Third party land** is required. A load bearing surface should be laid in the junction splitter island where one road signs and three bollards should be removed. One utility pole, one road sign and three bollards should be removed from the inside verge at the junction. Vegetation should be trimmed. Swept path assessment SK16 is included in Annex B.
21	**A831, Southwest of Beauly** 	Loads will continue on the A831 heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail the southern verge, but no works are required. Throughout the entire route, the tree canopy needs to be trimmed to provide a clear 5m head height. Swept path assessment SK17 is included in Annex B.

POI	Key Constraint	Details
TP	**Proposed Transfer Location** 	Blade loads are proposed to be transferred to a blade lifting trailer at this location to navigate constrained sections through the following section of the route. **Third party** landowners should be consulted at an early stage to confirm a suitable transfer location. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter.
22	**A831, Northeast of Kilmorack** 	Loads will continue on the A831 heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail the southeastern verge where vegetation should be trimmed. A topographical survey is required to confirm clearance to the fence. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK18 is included in Annex B.
23	**A831, Kilmorack** 	Loads will continue on the A831 heading west. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where vegetation should be trimmed in the northern verge. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK19 is included in Annex B.

POI	Key Constraint	Details
24, 25	**A831, Caulternich Farm**  	Loads will continue on the A831 heading west. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the southern verge through the bends where a load bearing surface should be laid. The fence and gate should be removed. Vegetation should be cleared and **third party land** is required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK20 is included in Annex B.
26, 27	**A831, West of Kilmorack**  	Loads will continue on the A831. A swept path assessment has been undertaken and indicates that loads will oversail the southern verge on approach to the right bend where the blade tip will oversail the trees and embankment. The land in the northern verge through the right bend should be reprofiled. Trees and vegetation should be cleared. **Third party land** is required. Reprofiling works are required in the southern verge through the left bend. Trees and vegetation should be cleared. Two utility poles, stone wall and one road sign should be removed. **Third party land** is required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK21 is included in Annex B.

POI	Key Constraint	Details
28	**A831, Kilmorack Hall** 	Loads will continue west on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the initial right bend where trees should be trimmed in the southern verge and two utility poles should be oversailed. Vegetation should be trimmed in the northern verge. Loads will oversail the southern verge through the following left bends where three utility poles, fence and gate should be removed. Trees should be cleared, and vegetation should be trimmed. Loads should be set to their highest suspension setting to oversail the safety barrier and bridge parapet. **Third party land** is required. A wooden post should be removed in the northern verge and one bollard will be oversailed. Trees should be trimmed. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK22 is included in Annex B.
29	**A831, Teanacoil** 	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway at this location, but no works are required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK23 is included in Annex B.
30	**A831, North of Teanassie** 	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail the southeastern verge where vegetation should be trimmed. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK24 is included in Annex B.

POI	Key Constraint	Details
31, 32	**A831, Power Station** 	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway through the initial right bend where trees and vegetation should be trimmed in the western verge. Loads should be raised to their highest suspension setting to oversailed the embankment. Clearance to the cliff edge in the northwestern verge through the left bend should be confirmed on a topographical survey. Trees should be cleared in the eastern verge through the left bend. Loads should be set to their highest suspension setting to oversail the safety barrier. **Third party land** is required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK25 is included in Annex B.
33	**A831, North of Crask of Aigas**  	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail the western verge where trees and vegetation should be trimmed. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK26 is included in Annex B.
34	**A831, Torr a Bhealaidh** 	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where two road signs should be removed from the eastern verge through the final left bend. Trees should be trimmed. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK27 is included in Annex B.

POI	Key Constraint	Details
35	**A831, Crask of Aigas** 	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway, but no works are required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK28 is included in Annex B.
36, 37	**A831, Torr nan Caorach**  	Loads will continue southwest on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway through the bends where loads should be raised to their highest suspension setting to oversail the safety barrier in the inside verge through the left bend. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK29 is included in Annex B.
38	**A831, Crunaglack** 	Loads will continue west on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway. There is minimal clearance in both verges to third party fence and wall through the right bend section. A topographical survey is required to confirm clearances. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK30 is included in Annex B.

POI	Key Constraint	Details
39, 40	**A831, West of Crunaglack**  	Loads will continue west on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where trees should be cleared. Proximity to the stone wall in the northern verge should be confirmed on a topographical survey. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK31 is included in Annex B.
41	**A831, East of Tighnabruaich** 	Loads will continue west on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where trees should be trimmed in the northern verge. Trees should be cleared and vegetation should be trimmed in the southern verge. Fence posts should be removed and **third party land** is required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK32 is included in Annex B.

POI	Key Constraint	Details
42, 43	**A831, Tighnabruaich**  	Loads will continue west on the A831. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where trees and vegetation should be trimmed. A stone wall should be removed in the southern verge and **third party land** is required. Loads should be set to their highest suspension setting to oversail the embankment in the northern verge. Two bollards should be removed. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK33 is included in Annex B.
44	**A831, Site Access** 	Loads will turn right into the proposed Site access junction. A new access junction should be designed. A load bearing surface should be laid. Trees and vegetation should be cleared. The stone wall and fence should be removed. **Third party land** is required. All overhead utilities and tree canopies should be cleared to accommodate the raised blade lifter. Swept path assessment SK34 is included in Annex B.

Table 4-2: Constraint Points and Details – Port of Nigg: Route Option 2

POI	Key Constraint	Details
12	**A9 Tore Roundabout** 	Loads will contraflow the roundabout to take the A835 exit heading west. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge on approach where one lighting column should be removed. Vegetation should be trimmed. A load bearing surface should be laid in the entry arm splitter island where tow bollards and one road sign should be removed. Loads will overrun and oversail the central island where a load bearing surface should be laid. Two lit chevron signs, two lighting columns, one private advertisement sign and two sets of wooden posts should be removed. A load bearing surface should be laid in the exit arm splitter island. One road sign and one bollard should be removed. Swept path assessment SK11b is included in Annex B.
45	**Maryburgh Roundabout** 	Loads will take the first exit at the roundabout to join the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge on approach where the safety barrier should be oversailed. Three road signs and one lighting column should be removed. Trees should be cleared. A load bearing surface should be laid in the entry arm splitter island where one road sign, one lighting column and one bollard should be removed. One bollard will be oversailed. Loads should be set to their highest suspension setting to oversail the safety barrier in the southwestern verge on approach. Two lighting columns should be removed and trees should be cleared. Loads will overrun and oversail the central island where a load bearing surface should be laid. Trees and vegetation should be cleared. One set of lit chevron signs should be removed. A load bearing surface should be laid in the exit arm splitter island. One road sign, one lighting column and two bollards should be removed. Swept path assessment SK35 is included in Annex B.

POI	Key Constraint	Details
46	**A862, Maryburgh**  	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway on approach to the first right bend where one lighting column should be removed from the eastern verge. A topographical survey is required to confirm clearances to third party boundaries. A load bearing surface should be laid in the eastern verge through the initial right bend where detailed design is required. Three lighting columns and the fence should be removed. Trees and vegetation should be cleared. **Third party land** is required. Loads will oversail the western verge through the initial right bend and following left bend where a one utility box and three lighting columns should be removed. Loads should be set to their highest suspension setting to oversail the safety barrier. A load bearing surface should be laid in the traffic island. Two bollards should be removed. A topographical survey is required to confirm the clearance to the bridge parapet. A load bearing surface should be laid in the western verge through the final right bend. The fence and pedestrian guardrail should be removed. Swept path assessment SK36 is included in Annex B.
47	**A862, Conon Bridge** 	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will overrun the two traffic islands on approach to the left bend where load bearing surfaces should be laid and four bollards should be removed. Loads will oversail both verges of the carriageway through the left bend where one lighting column and one road sign should be removed from the western verge. Trees should be cleared. Swept path assessment SK37 is included in Annex B.
48	**Station Rd, Conon Bridge** 	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge through the initial section of the right bend where two lighting columns should be removed. A topographical survey is required to confirm mitigation and clearance to buildings. A load bearing surface should be laid in the eastern verge. Loads will overrun the traffic buildout south of the right bend where a load bearing surface should be laid. Two bollards should be removed. Swept path assessment SK38 is included in Annex B.

POI	Key Constraint	Details
49	**A862, South of Conon Bridge** 	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge where trees and vegetation should be trimmed. One lighting column and wooden post should be removed. A load bearing surface should be laid in the western verge where one lighting column should be removed. Swept path assessment SK39 is included in Annex B.
50	**A862, Northwest of Bishop Kinkell** 	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway, but no works are required. Swept path assessment SK40 is included in Annex B.
51, 52	**A862, West of Balvaird**  	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway where one utility pole and one chevron sign should be removed. One bollard will be oversailed. Swept path assessment SK41 is included in Annex B.

POI	Key Constraint	Details
53	**Great N Rd, Muir of Ord**  	Loads will continue south on the A862 heading south. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway through the initial right bend, but no works are required. Loads will oversail the inside verge through the left bend where one traffic signal should be removed. A load bearing surface should be laid in the southwestern verge. Existing utilities should be protected. One traffic signal and two road signs should be removed. Swept path assessment SK42 is included in Annex B.
54	**A832, Muir of Ord Library** 	Loads would join the A832 heading southeast. A swept path assessment has been undertaken and indicates that loads will oversail both verges of the carriageway an overrun the southern verge where a load bearing surface should be laid. Two bollards, pedestrian guardrail, stone wall and fence should be removed from the southern verge. Swept path assessment SK43 is included in Annex B.
15	**A832 / B1969 Junction** 	Loads would turn right at the junction to join the B9169. A swept path assessment has been undertaken and indicates that loads will oversail both verges on approach where four road signs should be removed from the southern verge of the A832 and one metal pole from the northern verge. Loads will overrun into the field east of the existing junction where a load bearing surface should be laid. One road sign, one advertisement sign, gate, fence, stone wall and one utility pole should be removed. Vegetation should be cleared. Existing utilities should be protected. **Third party land** is required. Swept path assessment SK44 is included in Annex B.

Table 4-3: Constraint Points and Details – Port of Nigg: Route Option 3

POI	Key Constraint	Details
55	**A835 / B9163 Junction** 	Loads will turn left into the junction to join the B9163. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge of the A835 where two road signs should be removed. Two bollards will be oversailed on both B9163 junction splitter islands. Loads will oversail into **third party land** in the inside verge of the junction where vegetation should be cleared. Three road signs and the fence should be removed. A load bearing surface should be laid in the northern verge of the B9163 on entry. Swept path assessment SK45 is included in Annex B.
56	**B9163/B162 Roundabout** 	Loads will join School Road at the roundabout heading southwest. A swept path assessment has been undertaken and indicates that loads will overrun the entry arm splitter island where a load bearing surface should be laid. Two bollards and one road sign should be removed. A load bearing surface should be laid in the central island where loads should be raised to oversail the raise section of the central island. Loads will overrun the exit arm splitter island where a load bearing surface should be laid. Two bollard and one road sign should be removed. A load bearing surface should be laid in the traffic island following the roundabout where two bollards should be removed. Swept path assessment SK46 is included in Annex B.
57	**School Road, Conon Bridge** 	Loads will join School Road at the roundabout heading southwest. A swept path assessment has been undertaken and indicates that loads will oversail the southeastern verge, but no works are required. A load bearing surface should be laid in two traffic islands where four bollards should be removed. Swept path assessment SK47 is included in Annex B.

POI	Key Constraint	Details
58	**School Rd/A862 Junction**  	Loads will join the A862 at the junction heading south. A swept path assessment has been undertaken and indicates that loads will oversail the eastern verge of School Road where one lighting column should be removed. Loads will overrun and oversail both verges of the narrow road south of the existing junction where load bearing surfaces should be laid. Vegetation should be trimmed. One lighting column, stone wall, stone sign and two flowerpots should be removed. Swept path assessment SK48 is included in Annex B.

Table 4-4: Constraint Points and Details – Port of Inverness

POI	Key Constraint	Details
SR01	**Inverness Harbour Exit** 	Loads will turn left onto the A831 heading west. Note blade loads would need to make use of the Blade Lifting Trailer for this port option, to negotiate constrained sections of the route through Inverness, in addition to the route section between Wester Balblair and the proposed Site access junction. A swept path assessment has been undertaken and indicates that loads will overrun the southwestern footway on exiting the harbour where a load bearing surface should be laid and one lighting column should be removed. Loads will oversail into **third party land** on the inside of the left turn where a section of fencing and one lighting column should be removed. Swept path assessment SK50 is included in Annex B.
SR02	**Longman Roundabout** 	Loads will continue straight onto A82 at Longman Roundabout heading westbound. Use of the bus lane is required. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the entry splitter island and central roundabout island. A load bearing surface is to be laid to accommodate the vehicle track. Two traffic signals, four road signs and five plastic bollards to be removed. Swept path assessment SK51 is included in Annex B.
SR03	**Harbour Road Roundabout** 	Loads will continue straight at Harbour Road Roundabout remaining on A82 heading westbound. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the central roundabout island. A load bearing surface is to be laid to accommodate the vehicle track. Two lamp posts and four road signs to be removed. Loads will also oversail the eastern pavement on exit from the roundabout with no mitigation required to accommodate. Swept path assessment SK52 is included in Annex B.
SR04	**Rose Street Roundabout** 	Loads will continue straight at Rose Street Roundabout remaining on A82 heading westbound. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the central roundabout island. A load bearing surface is to be laid to accommodate the vehicle track. Two road signs and two keep left bollards to be removed. Loads will also oversail the central splitter island on exit from the roundabout with no mitigation required to accommodate. Swept path assessment SK53 is included in Annex B.

POI	Key Constraint	Details
SR05	**Shore Street Roundabout** 	Loads will continue straight at Shore Street Roundabout remaining on A82 heading westbound. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the central roundabout island. A load bearing surface is to be laid to accommodate the vehicle track. Loads will also oversail the southern pavement on entry and exit from the roundabout with one traffic signal and sections of steel railing to be removed. Swept path assessment SK54 is included in Annex B.
SR06	**Telford Roundabout** 	Loads will turn right at Telford Roundabout onto A862 heading westbound. A swept path assessment has been undertaken and indicates that loads will need to negotiate the roundabout in contraflow. Overrun and oversail will be required on the entry splitter island with a load bearing surface to be laid to accommodate the vehicle track. Two traffic signals, one road sign, one keep left bollard and sections of steel railing are also to be removed. Loads will oversail the northern pavement of A862 on exit from the roundabout with one road sign and sections of steel railing to be removed. A review of the limits of road adoption should be undertaken at this location. Swept path assessment SK55 is included in Annex B.
SR07	**A862 Telford Street Pedestrian Crossing** 	Loads will continue westbound on A862 through a pedestrian crossing. A swept path assessment has not been undertaken but it is likely that loads will oversail the central splitter island. Three traffic signals, two keep left bollards and sections of steel railing to be removed to accommodate.
SR08	**A862 Telford Street / Carsegate Road Roundabout** 	Loads will continue straight at A862 Telford Street / Carsegate Road roundabout remaining on Telford Street heading westbound. A swept path assessment has been undertaken and indicates that loads will overrun and oversail the central roundabout island. A load bearing surface should be laid to accommodate the vehicle track, and four road signs are to be removed. Loads will also overrun and oversail the southern pavement on exit from the roundabout. A load bearing surface should be laid to accommodate. Swept path assessment SK56 is included in Annex B.

POI	Key Constraint	Details
SR09	**A862 Muirtown Swing Bridge** 	Loads will continue westbound on A862 over Muirtown Swing Bridge. A historic weight limit has been in place on this structure in previous years. Consultation to be made with Highland Council and Scottish Canals to confirm the structural feasibility of the bridge considerate of the loads, once the haulier has been selected.
SR010	**A862 / King Brude Road Junction** 	Loads will continue along the A862 heading north bound. A swept path assessment has been undertaken and indicates that loads will need to contraflow the junction and will Oversail on central splitter islands and eastern footway. One lamp post, three traffic signals, four bollards and two sections of steel railing to be removed. Swept path assessment SK57 is included in Annex B.
SR011	**A862 Clachnaharry Rd/ Rail Bridge** 	Loads will continue on the A862 heading over the rail bridge. A swept path assessment has been undertaken and indicates that loads Oversail of wall and traffic signals. Earthworks embankment will be oversailed but the trees within the area will need to be removed for the blade to pass on the south of the bend. **Third Party Land** Required. Oversail of wall and Vehicle Restraint Barrier / parapet for railway bridge. These will need to be lowered to allow delivery of the tower to pass on the north side of the bridge. **Third Party Land** Required. Oversail of Vehicle Restraint Barrier and traffic lights / streetlights on the north once over the bridge. **Third Party Land** Required. Oversail of wall and Vehicle Restraint Barrier / abutments for railway bridge. These will need to be lowered to allow delivery of the tower to pass on the west side of the bridge. **Third Party Land** Required. No weight limit was observed but this will need to be confirmed Swept path assessment SK58 is included in Annex B.
SR012	**A862 Clachnaharry Rd Rail Bridge** 	Loads will continue westbound on A862 under the railway bridge. No height limit is specified but from the desktop study suggests this should be checked to confirm loads can safely travel under the bridge.

POI	Key Constraint	Details
SR013	**A862 Lovat Bridge** 	Loads will continue on the A862 to the Lovat Bridge. A swept path assessment has been undertaken and indicates that Both loads are too close to the bridge parapet on OS Mapping to confidently advise on whether they could pass safely. A topographical survey is required to confirm this. A vertical swept path of the middle of the bridge is also required. No weight limit was observed but this will need to be confirmed. Swept path assessment SK59 is included in Annex B.

4.4 Swept Path Assessment Results and Summary

The detailed swept path drawings for the locations assessed are provided in **Annex B** for review. The drawings illustrate tracking undertaken for the worst case-loads at each location. The colours illustrated on the swept paths are:

- **Grey / Black** – Ordnance Survey (OS) / topographical base mapping;
- **Green** – vehicle body outline (body swept path);
- **Red** – tracked pathway of the wheels (wheel swept path); and
- **Magenta** – the oversail tracked path of the load where it encroaches out with the trailer (load swept path).

Where mitigation works are required, the extents of the overrun and oversail areas are illustrated and fully detailed on the SPA drawings. Additional land areas to those indicated in the SPA drawings may be required to facilitate the construction of the proposed physical mitigation measures depending on the Site conditions and topography. The extent of any additional areas required to construct the mitigation works highlighted within this study and the detailed design of said mitigation works is beyond the scope of this study and should be confirmed on detailed topographical survey data.

Please note that where SPA have been undertaken using OS base mapping, AutoCAD based aerial mapping and historic topographical data, there can be errors in these data sources.

Where provided by the client, topographical data has been utilised. Please note that PF cannot accept liability for errors on the data source, be that OS base mapping, aerial mapping, historic topographical surveys or client supplied data. Where applicable, mapping has been augmented with aerial imagery for illustration only. The accuracy of this mapping cannot be confirmed by PF.

Please note that turbine supplier guidance suggests that the minimum road width for the safe transport of AIL components is 4.5m. All public roads and on-site access tracks should comply with this standard unless a relaxation has been agreed with suppliers.

The need to widen public roads will require engagement with the relevant road authority and may constitute permanent or temporary surfacing.

4.5 Access Junction Considerations

The access junction into the Site will need to be built to accommodate the proposed physical size of loads and the number of trips predicted during the construction phase.

The design and form of the junction will need to be discussed with the local road authority. The design of the junction should take into account the requirement for provision of visibility splays which should be confirmed with the road authority.

The junction will also need to be built in accordance with the turbine supplier design criteria.

4.6 Third Party Land & Land Ownership

A review of third-party land should be undertaken by the Applicant to ensure that no additional land rights are required to enable deliveries or mitigation works. PF accepts no responsibility for the accuracy of land ownership assumptions, all of which should be confirmed across the entire access route by a qualified land agent.

The limits of road adoption can vary depending upon the location of the Site and the history of the road agencies involved. The adopted area is generally defined as land contained within a defined boundary where the road agency holds the maintenance rights for the land. In urban areas, this is usually defined as the area from the edge of the footway across the road to the opposing footway back edge.

In rural areas, the area of adoption can be open to greater interpretation as defined boundaries may not be readily visible. In these locations, the general rule is that the area of adoption is between established field boundary lines or a maximum 3m from the road edge. This can vary between area and location.

4.7 Weight Review

A weight review has been undertaken via the ESDAL (Electronic Service Delivery for Abnormal Loads) contacts database using the Highways Agency website www.esdal.com.

All of the relevant ESDAL contacts are noted in **Table 4-5** and all have been contacted to ascertain if there are any relevant constraints that should be noted.

Table 4-5: ESDAL Contacts

Organisation	Email Address
Police Scotland	OSDAbnormalLoadsScotland@scotland.police.uk
Network Rail	AbnormalLoadsEnquiries@networkrail.co.uk
Historic Rail Estate	rsgbrb@jacobs.com
Scottish Canals	SCAbnormal.Loads@scottishcanals.co.uk
Transport Scotland	AbnormalLoads@transport.gov.scot
Scotland Transerv	abnormalloadrouting@scotlandtranserv.co.uk
Bear North West	NWAbnormalLoad@bearscotland.co.uk
The Highland Council	abnormal.loads@highland.gov.uk

Where responses have been received from the ESDAL search, these are contained in **Annex C**. If this is not included then no response has been received.

5 Summary

5.1 Summary of Access Review

Pell Frischmann Consultants Ltd. has been commissioned by EnergieKontor UK Ltd. (the Applicant) to undertake a Route Survey Review to examine the issues associated with the transport of wind turbine AILs for the construction and development of the proposed Ballach wind Farm, located approximately 4km north-west of Kilmorack and 10km west of Beauly in The Highland Council administrative area.

This report identifies the key points and issues associated with the proposed routes and outlines the issues that will need to be considered for successful delivery of the components.

Two port options have been considered, namely the Port of Nigg and the Port of Inverness. The access review has been based upon Nordex N163 turbine components and has been undertaken on the basis of a Superwing Carrier, Blade Lifting Trailer and a tower clamp trailer. A combination of trailer types will be required for each port / route option.

The report is presented to the Applicant for consideration. Various road modifications and interventions are required to successfully access the Site from each of the port options assessed. If these are assessed, approved and undertaken, access to the Site is considered feasible. It should be noted however that the route from the Port of Inverness is heavily constrained for towers and further assessment is recommended using topographical survey data to confirm the results of the assessment undertaken using OS mapping.

5.2 Further Actions

The following actions are recommended to pursue the transport and access issues further:

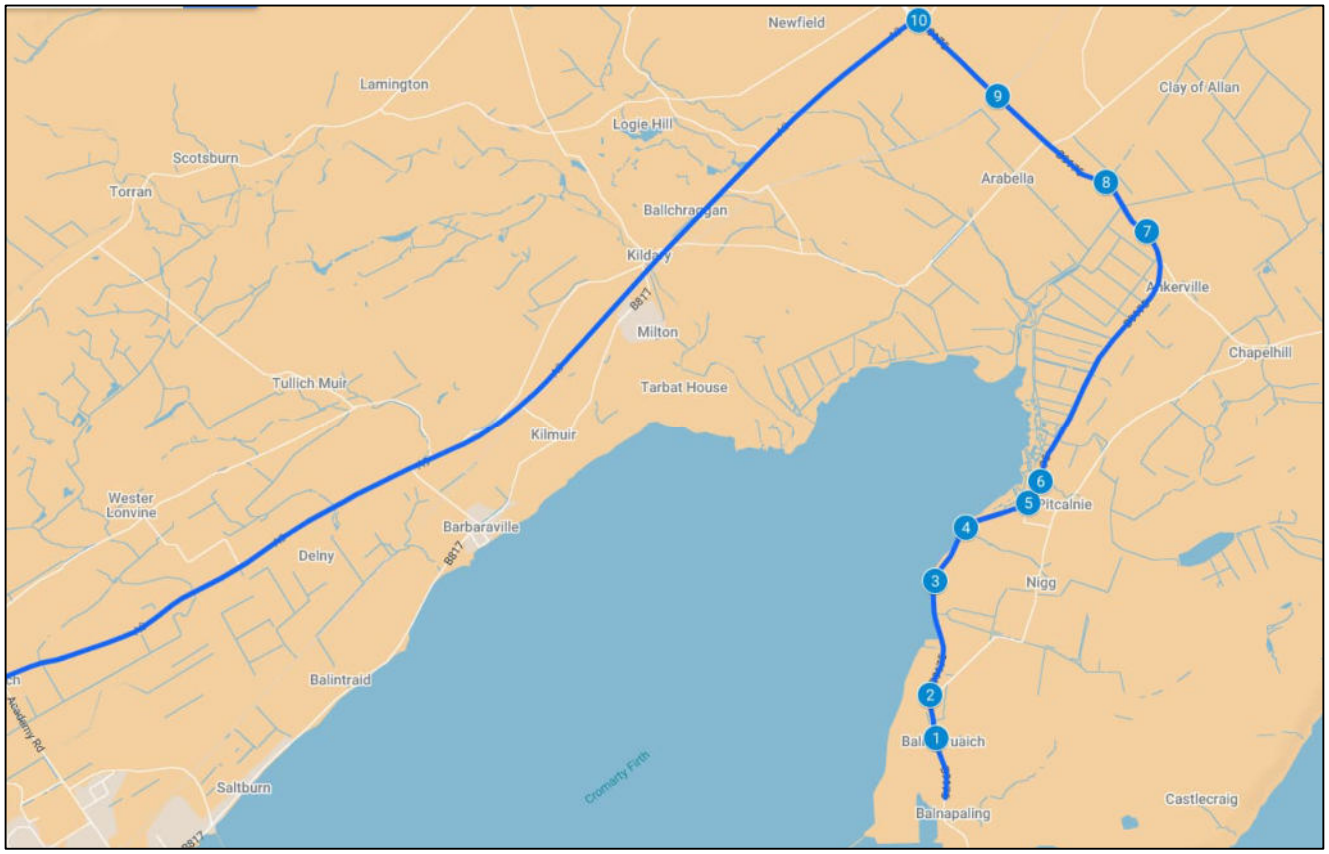
- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain any necessary land options;
- Undertake discussion with the affected utility providers and roads agencies;
- Undertake topographical survey at the identified locations and repeat the swept path assessments to confirm mitigations measures;
- A review of axle loading on structures along the entire access route with the various road agencies is undertaken immediately prior to the loads being transported in case of last minute changes to structures;
- A review of clear heights with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations);
- That a test run is completed to confirm the route and review any vertical clearance issues;
- That a condition survey is undertaken to ascertain the extents of road defects prior to loads commencing to protect the developer from spurious damage claims;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Abnormal Load Transport Management Plan to assist in transporting the proposed loads. Further details in this regard are included in **Chapter 12: Traffic and Transport of EIA Report Volume 1**.

Annex A Points of Interest

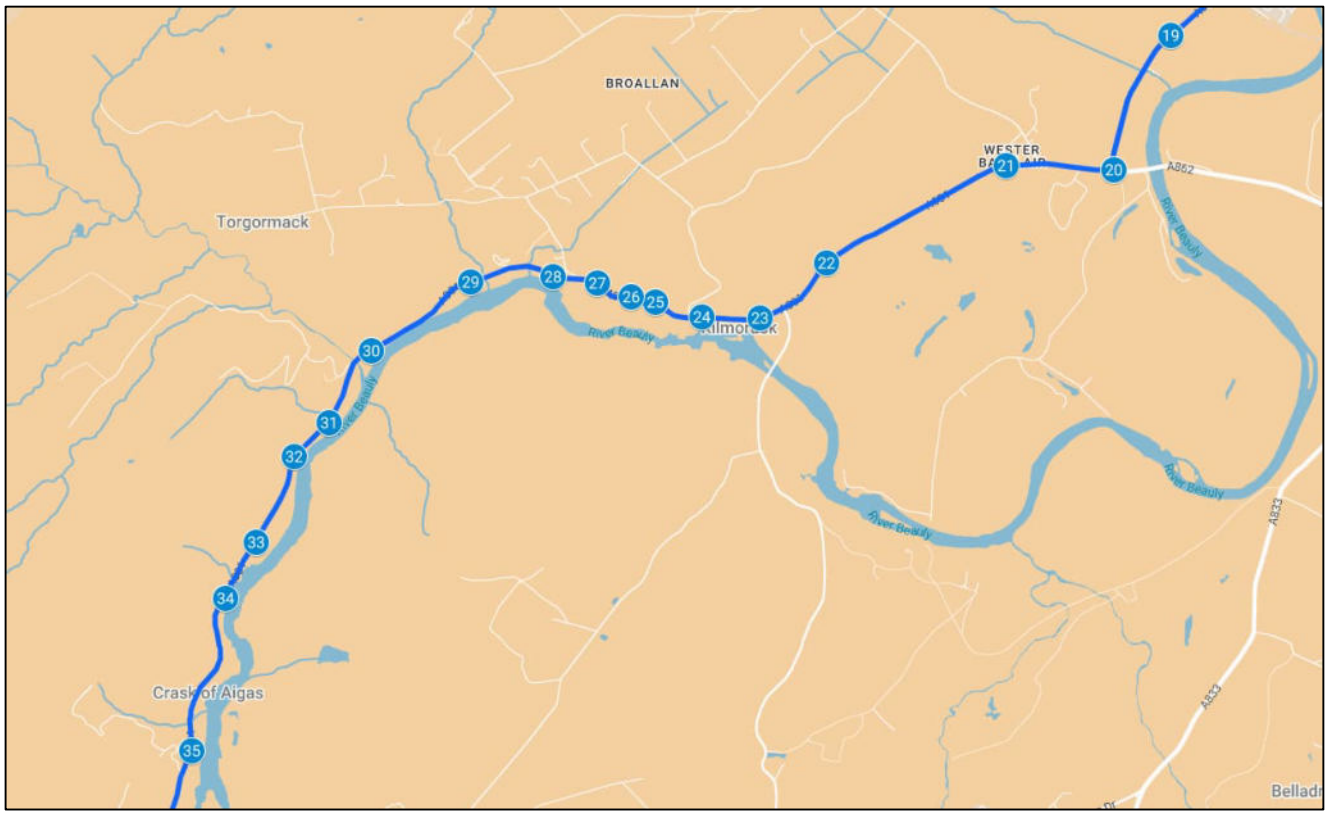
An electronic version of the POI plans for the access routes can be found at the link below.

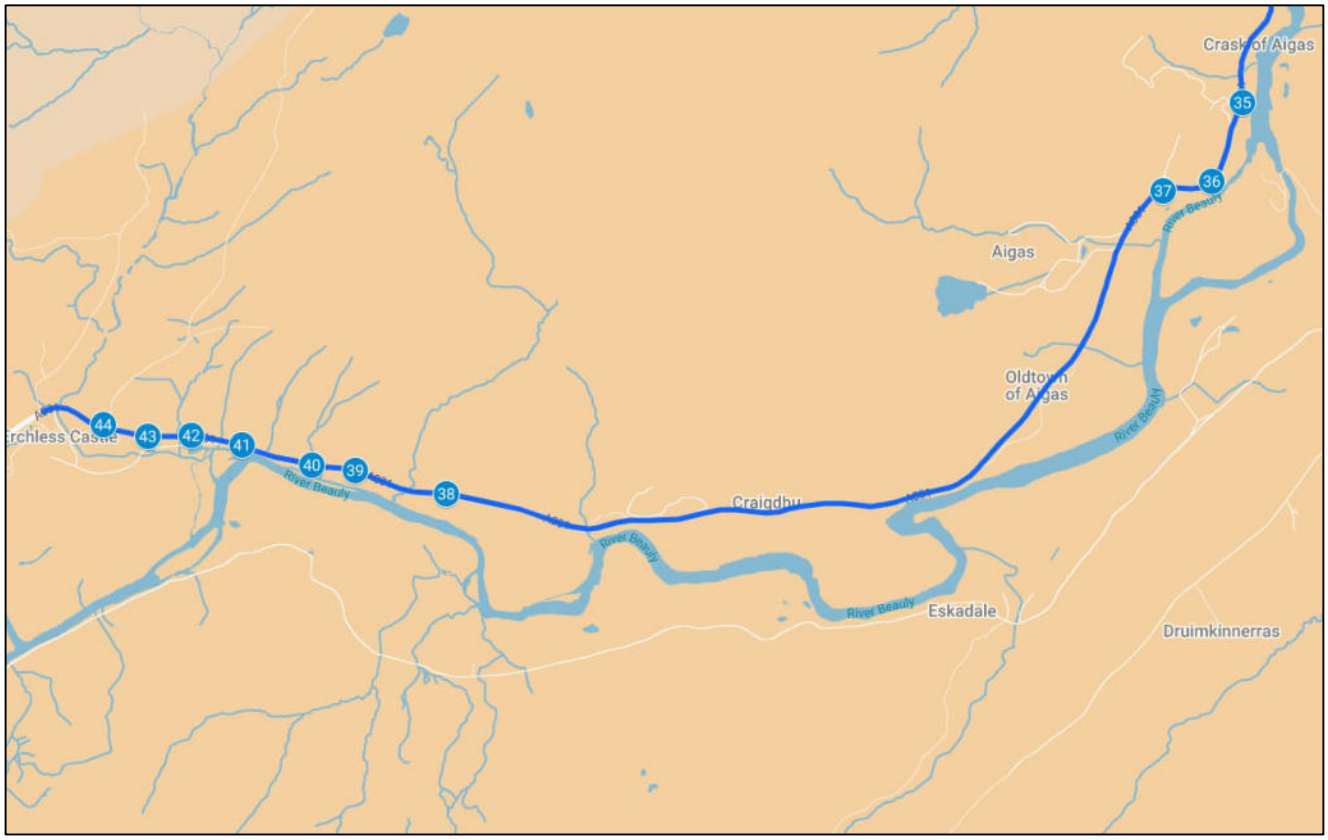
https://www.google.com/maps/d/edit?mid=1OJmHQbPyWwCPfQr__XDg3fDjnawiVlo&usp=sharing

Port of Nigg - Route Option 1




Urray
A862
Newton of Kinkell
A835
Tore
A9
Muir of Allangrange
Balvaird
A832
Glackmore
Arpafeelie
A862
West Rd
Muir of Ord
Muir of Tarradale
Newton
ORD
Black Isle Rd
B9169
Gaddeston
Milton Redcastle
Artafallie
Great N Rd
Ardnagrask
River Beauly
Aultvaich
Rheindown
Beauly Firth
Ruilick
RUISAURIE
A862
Bunchrew
Rhinduie
Lentran
Kirkhill
B9164
12
13
14
15
16
17
18
19


BROALLAN
Torgormack
A862
River Beauly
A833
Crask of Aigas
Belladr
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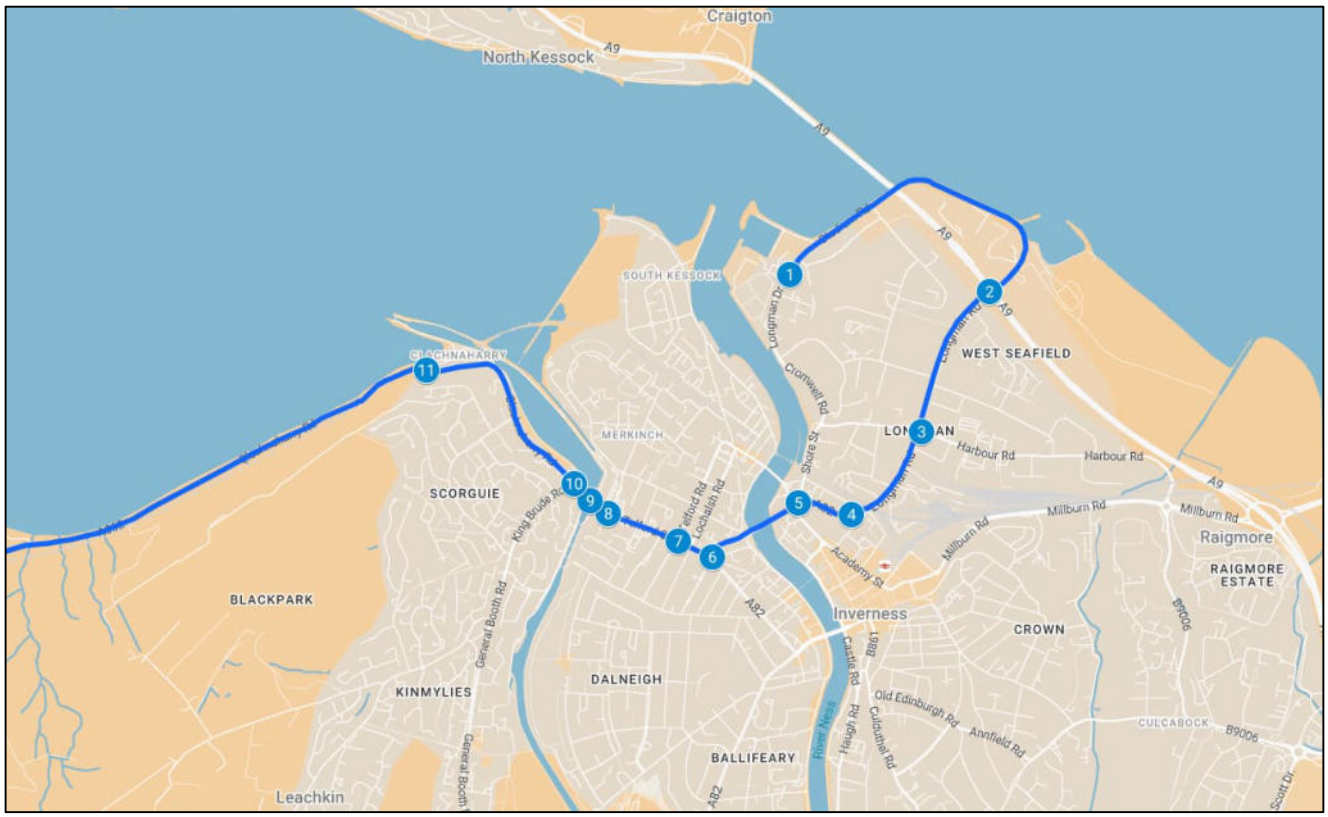
Port of Nigg - Route Option 2

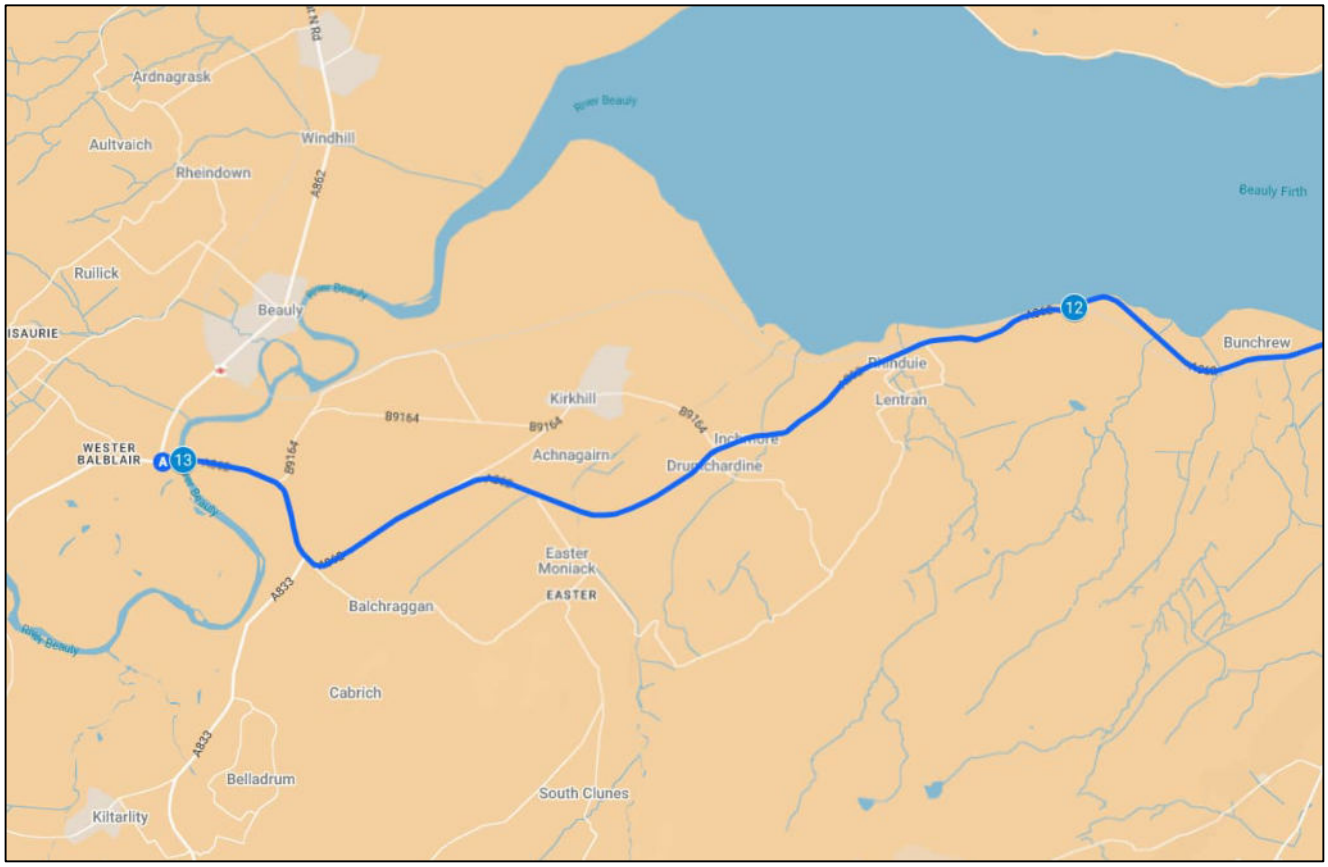


Port of Nigg - Route Option 3



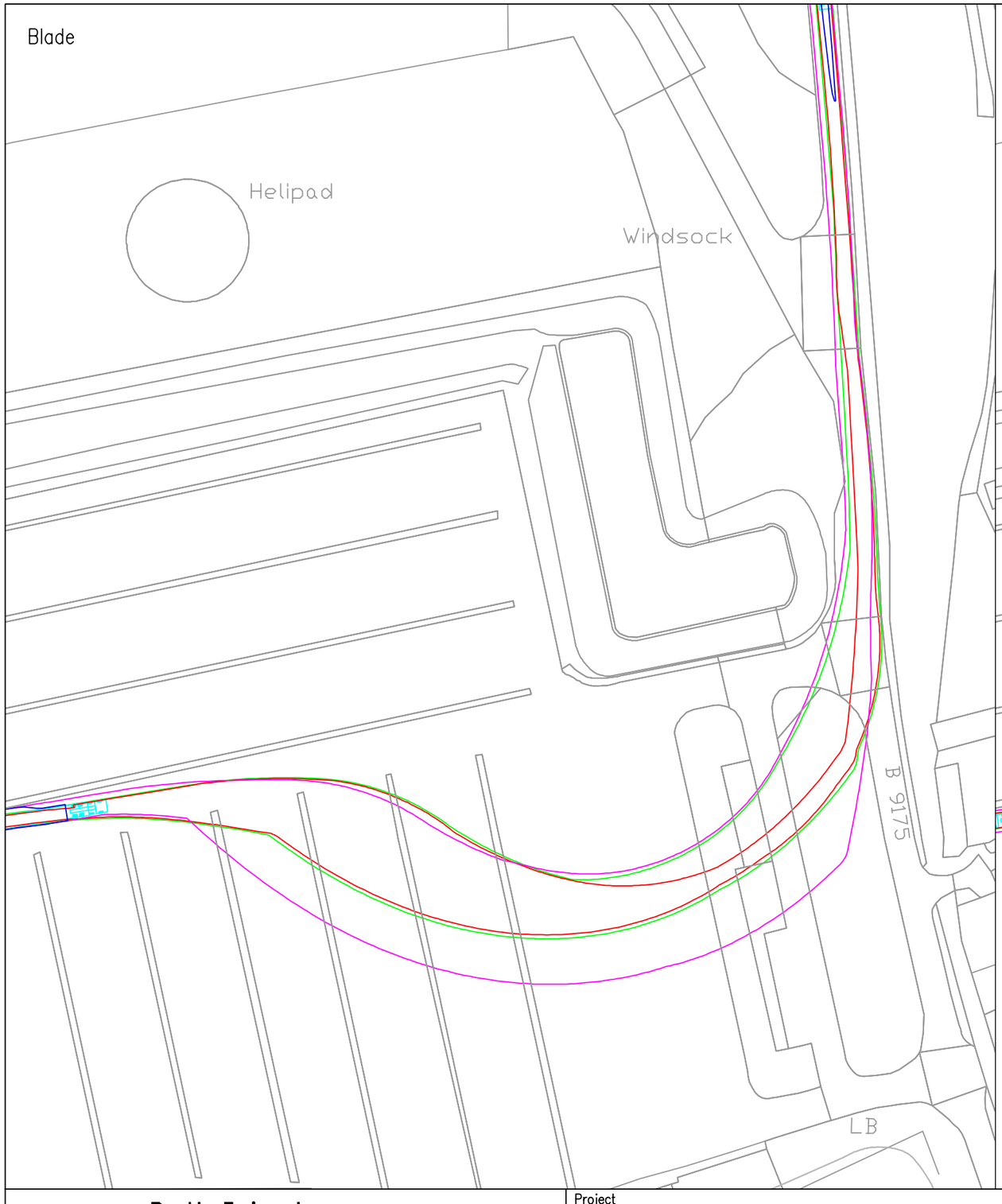
Inverness Port Route Option



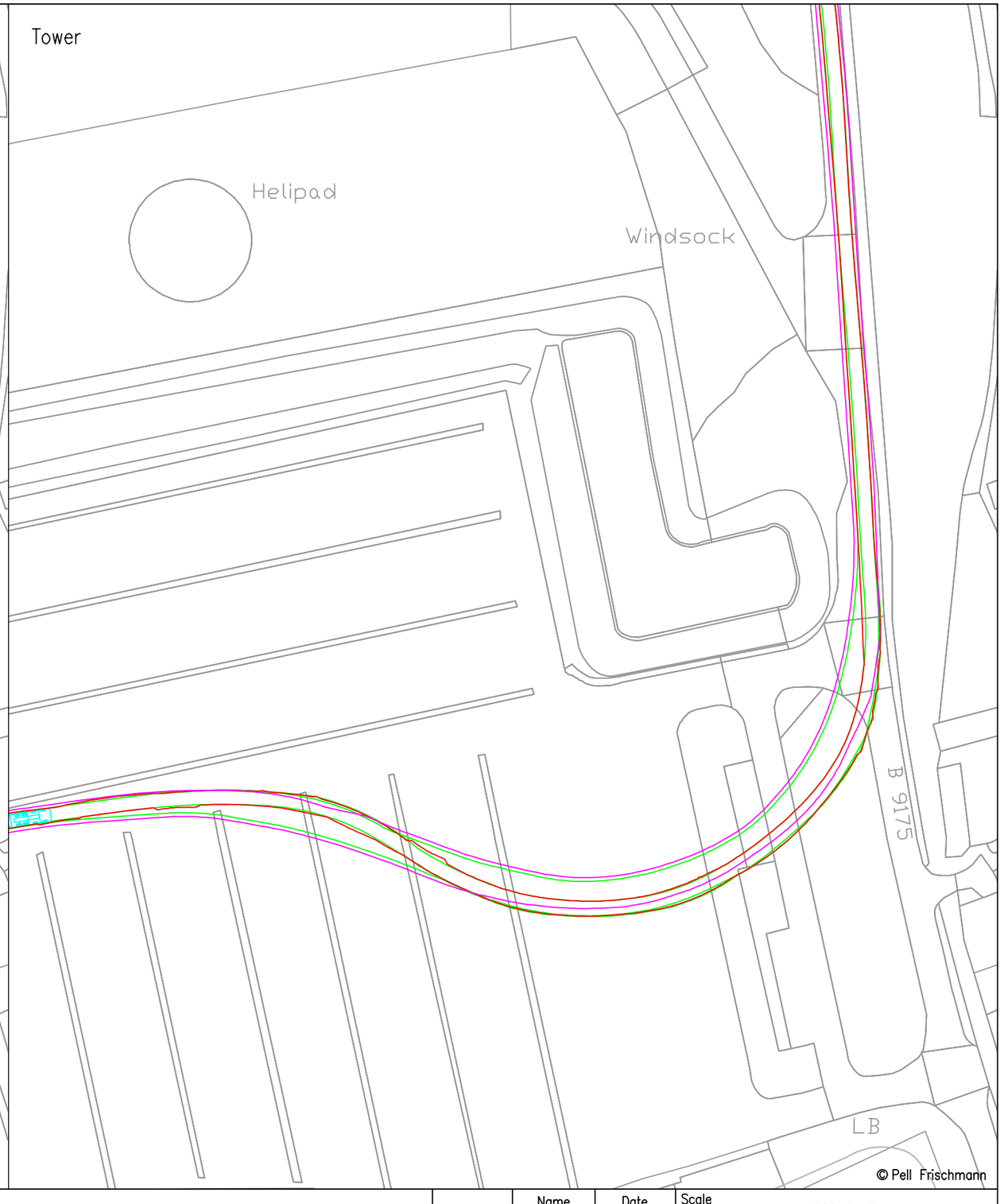

Ardnagrask
Aultvaich
Windhill
Rheindown
A862
Beauly Firth
Ruillick
Beauly
ISAURIE
12
Bunchrew
Kirkhill
B9164
Lentran
WESTER
BALBLAIR
A 13
Achnagairn
Easter
Moniack
EASTER
A833
Balchraggan
Cabrich
Belladrum
South Clunes
Kiltarlity

Annex B Swept Path Assessments Drawings

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Exit from Port of Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		1

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK01

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Exit from Port of Nigg

	Name	Date
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Designed	TO	26/06/2025
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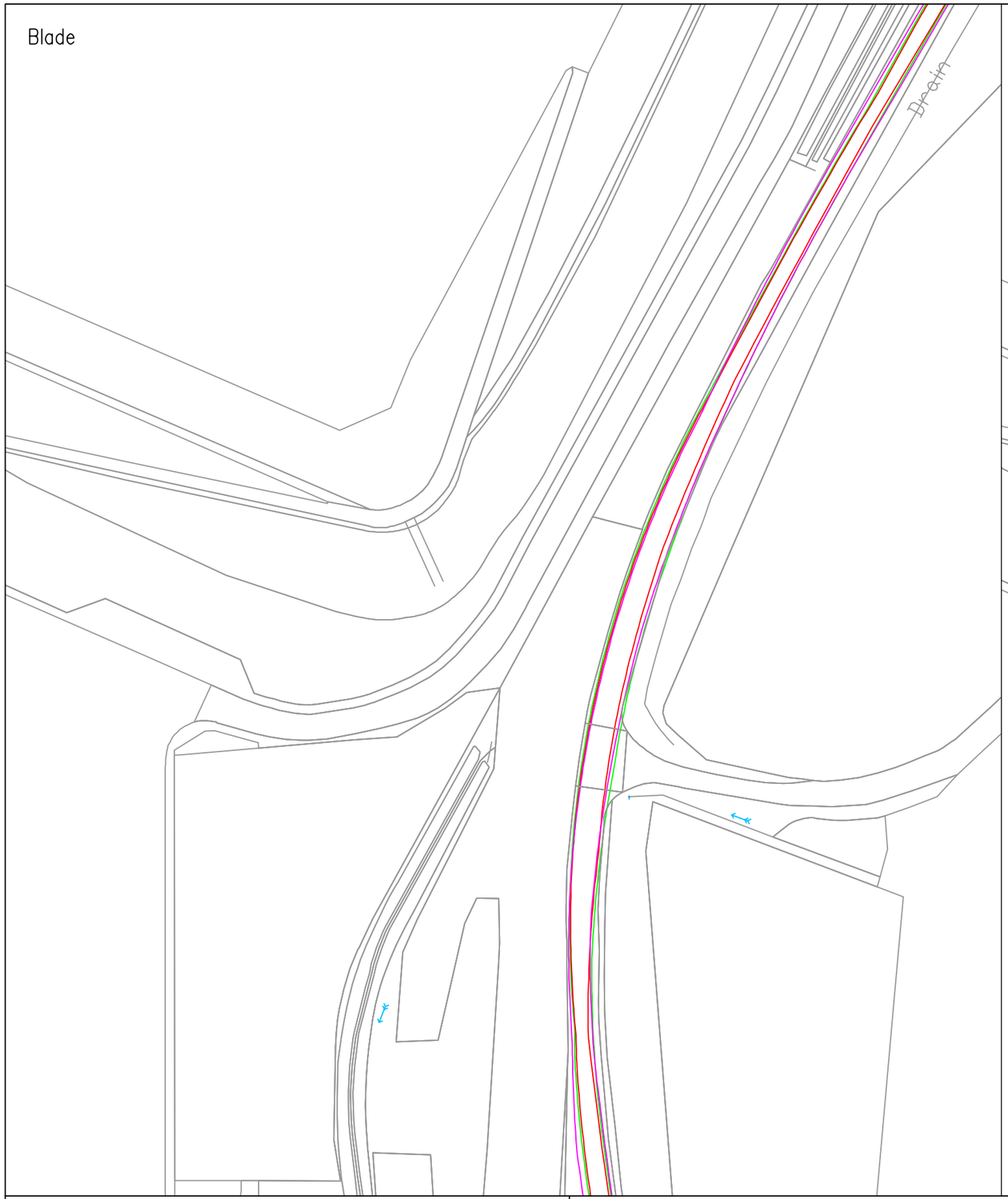
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Drawing No. SK01A

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Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 North of Port of Nigg

	Name	Date
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Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		2

Scale: 1:1000 @ A3

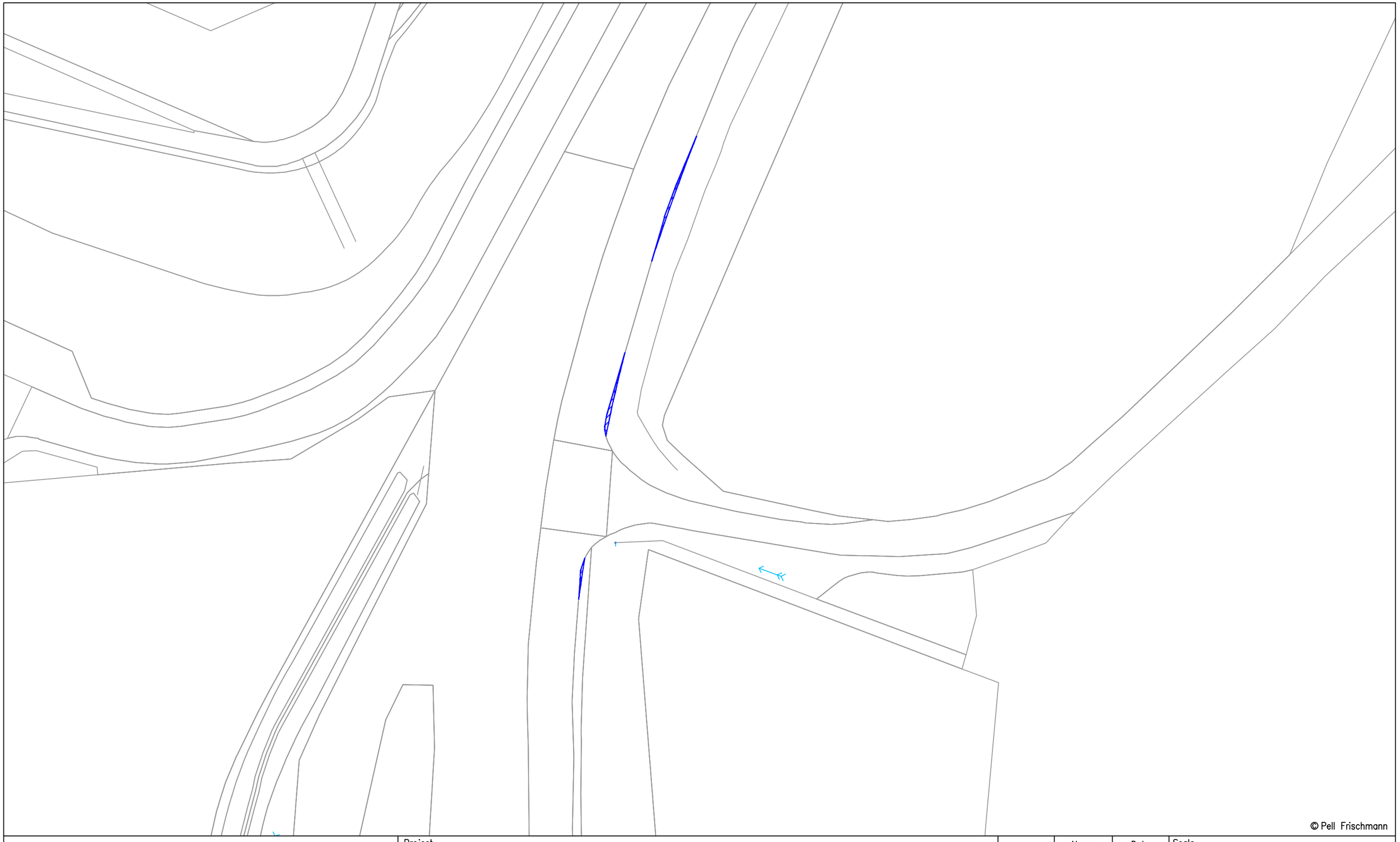
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Drawing No.: SK02

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 North of Port of Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		2

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK02A

Notes:
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Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		3

Scale: 1:1000 @ A3

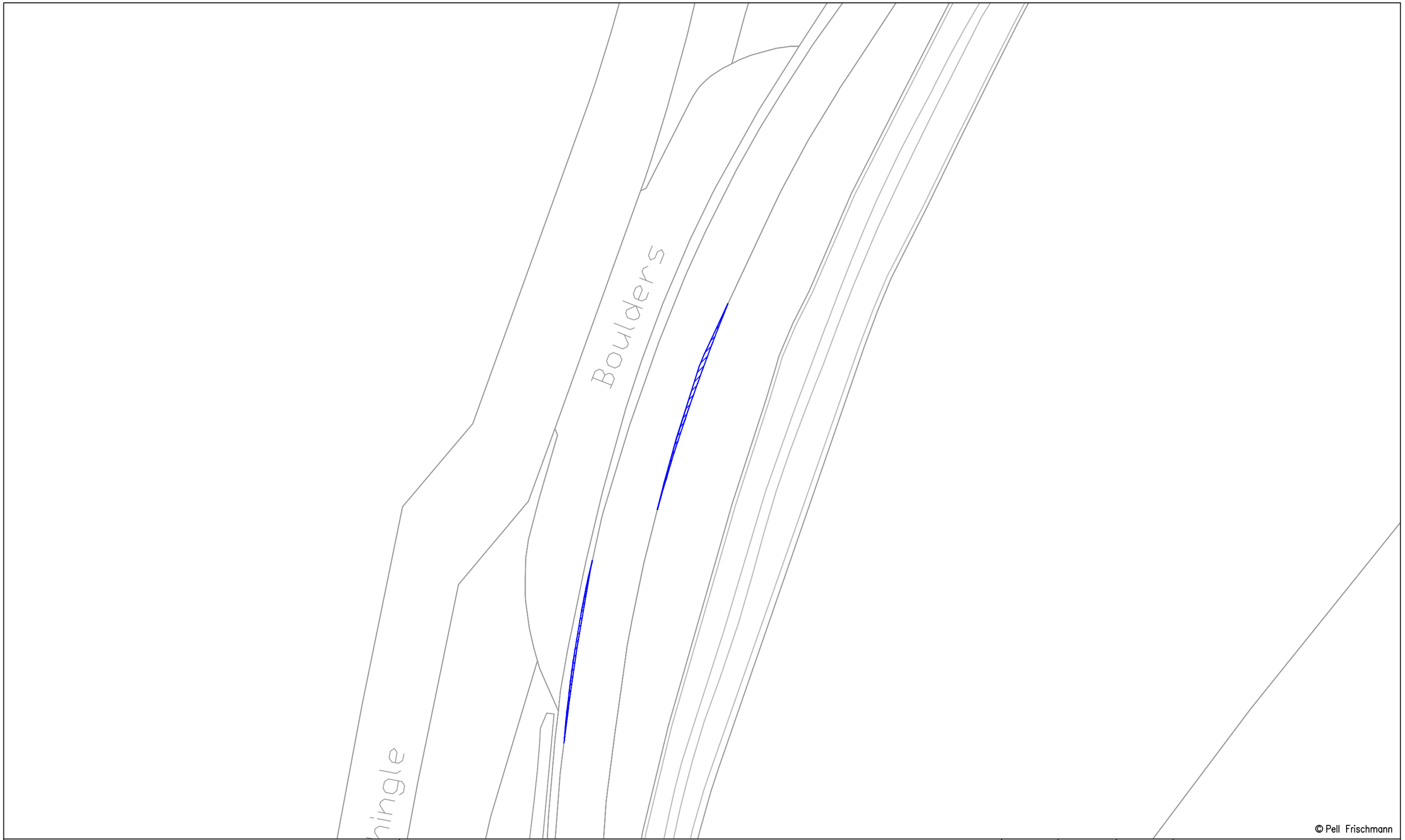
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Drawing Status: Draft

Drawing No.: SK03

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		3

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK03A

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Blade



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		4

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK04

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Nigg

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		4

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK04A

Notes:
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Blade



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Pitcalnie

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		5

Scale: 1:1000 @ A3

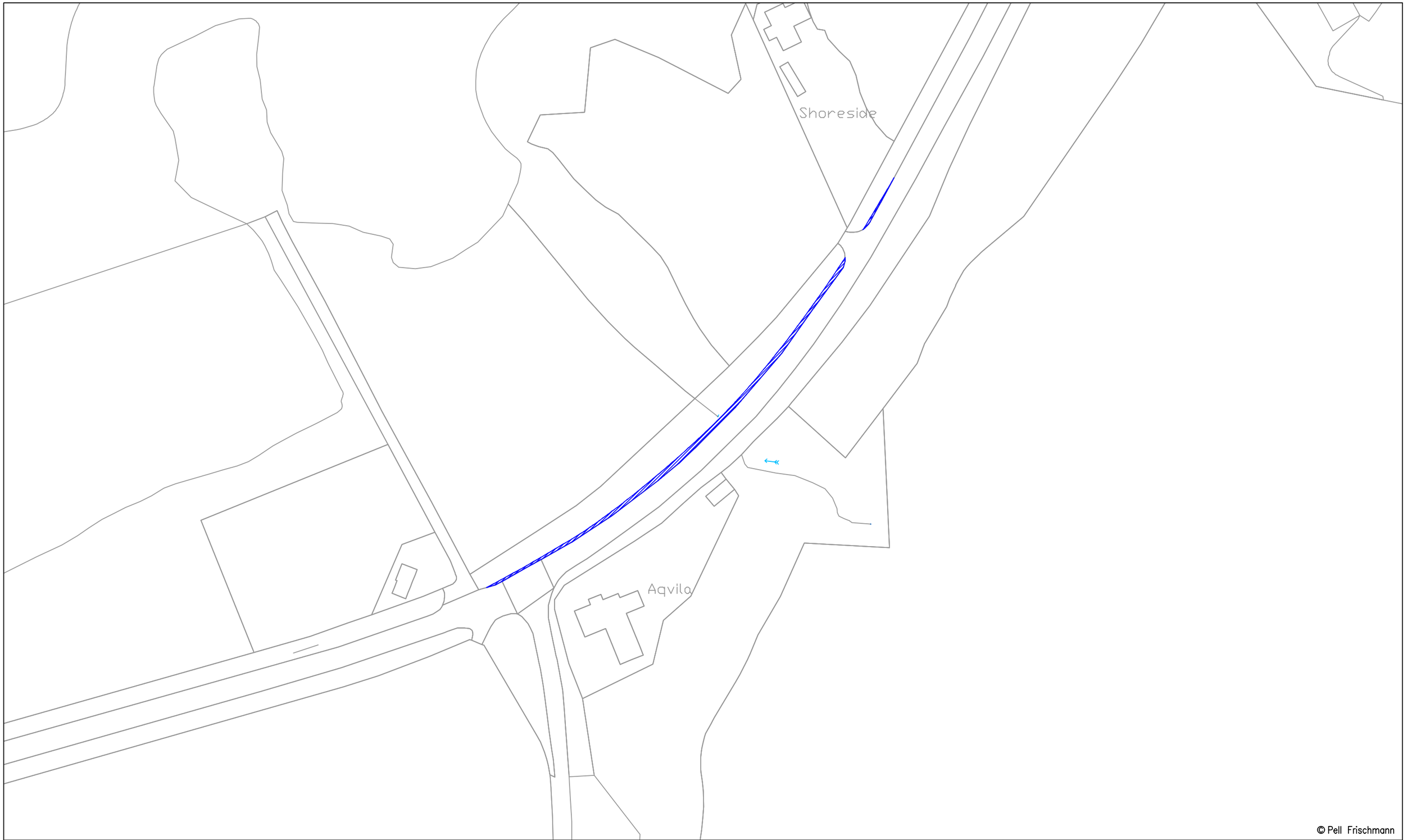
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK05

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Pitcalnie

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		5

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK05A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Pitcalnie

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		6

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK06

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Pitcalnie

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		6

Scale: 1:500 @ A3

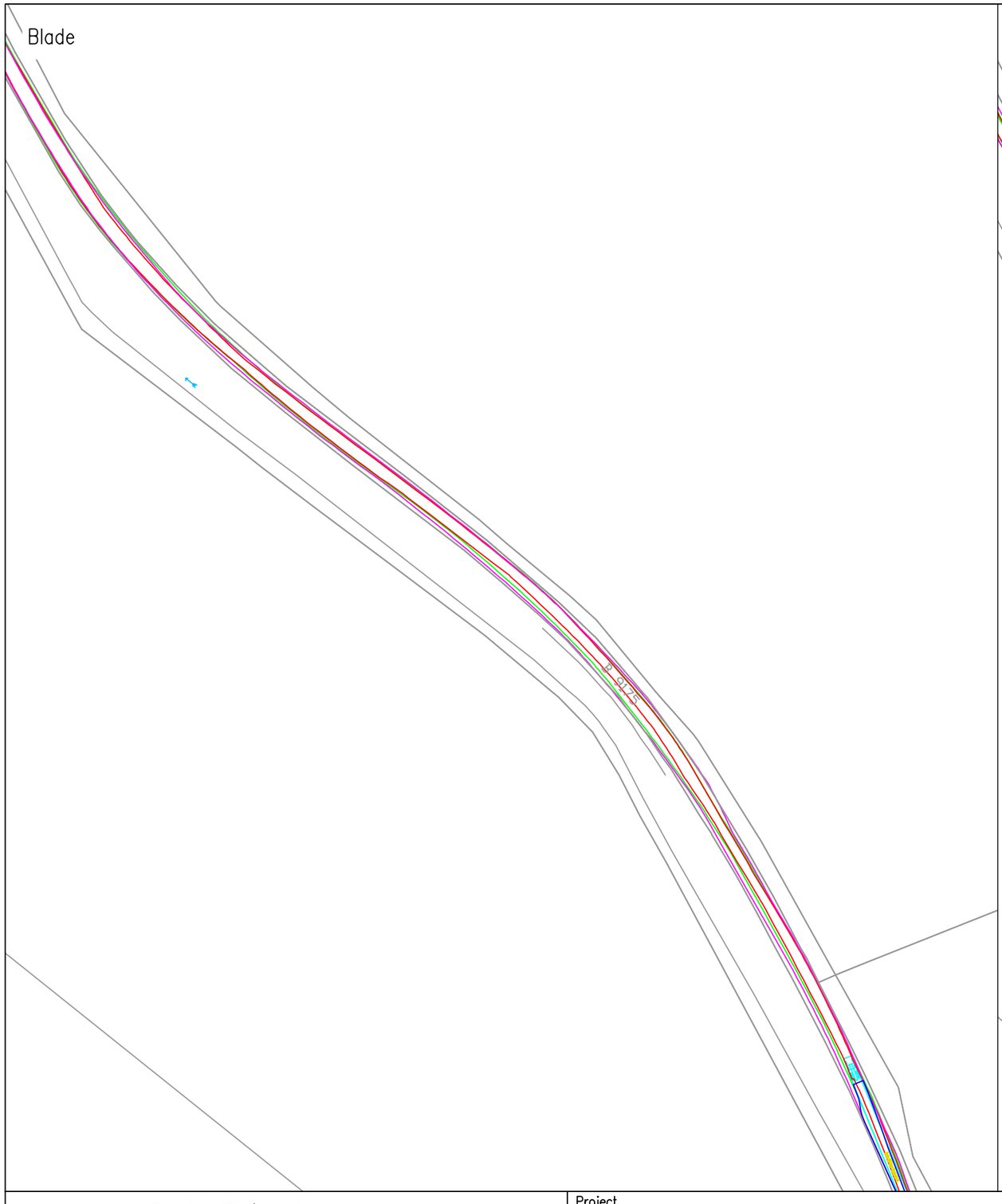
File No.: 250317 Ballach N163 SPA.dwg

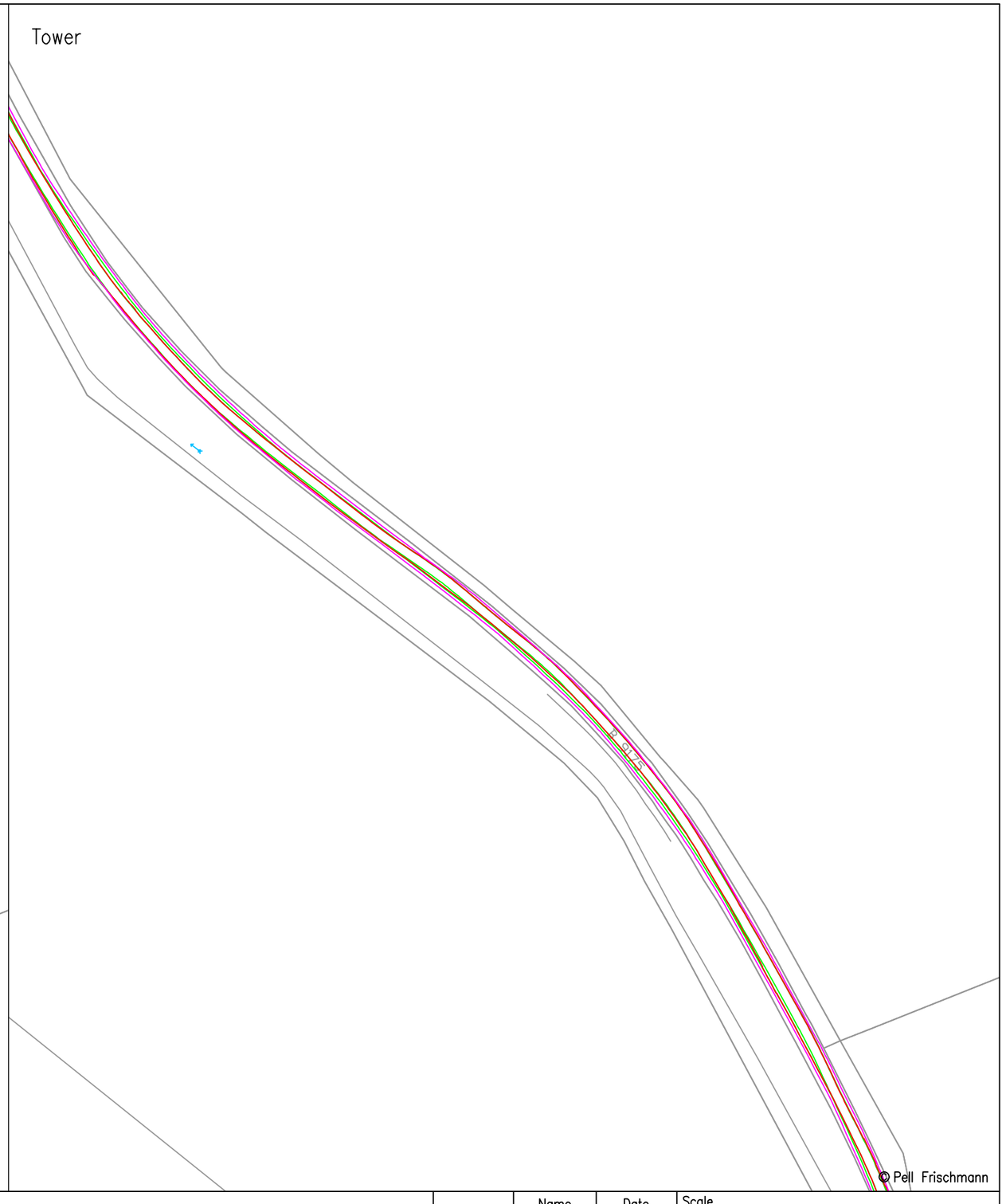
Drawing Status: Draft

Drawing No.: SK06A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Ankerville

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		7

Scale: 1:1500 @ A3

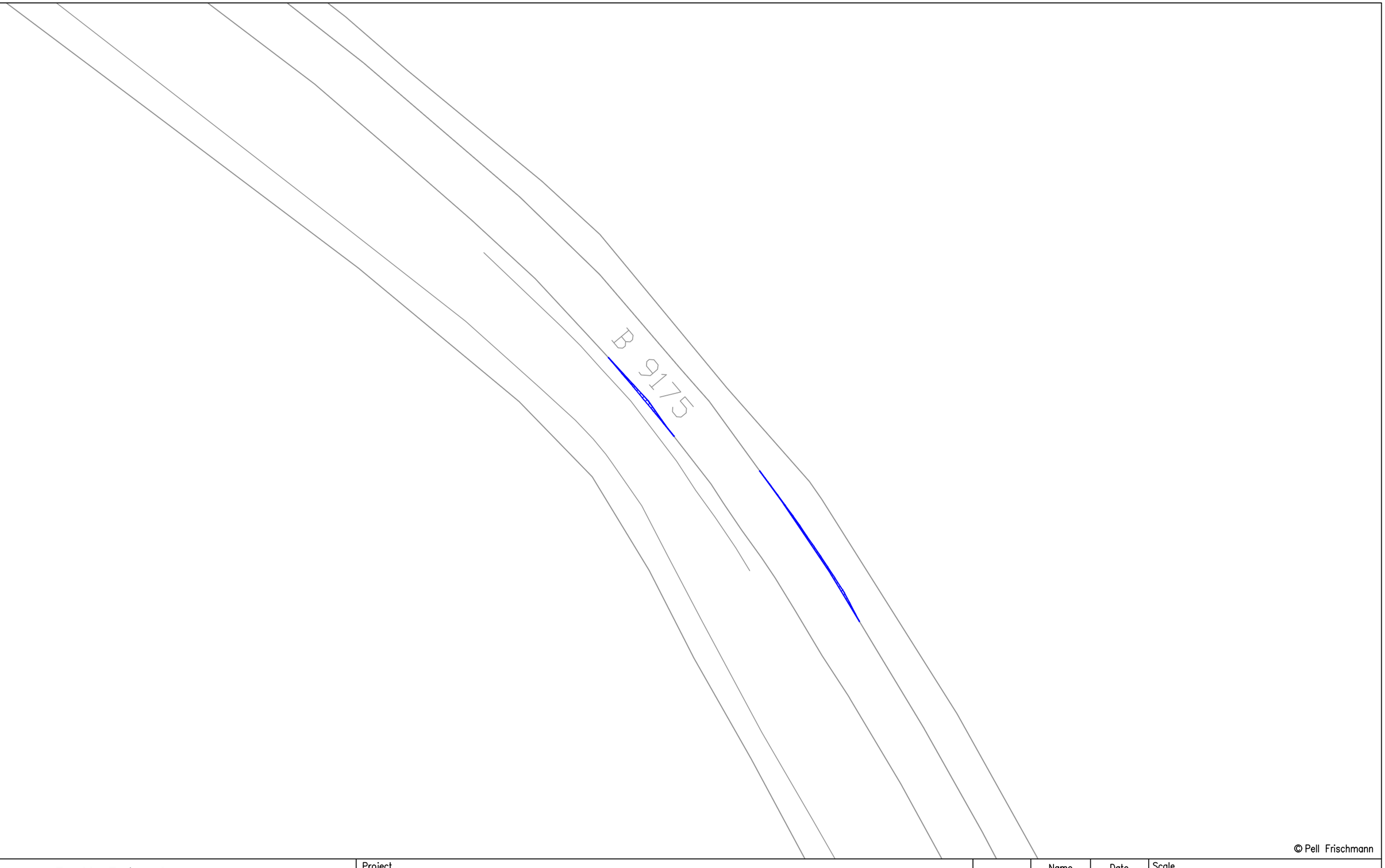
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK07

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175, Ankerville

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		7

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK07A

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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Arabella

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		8

Scale: 1:2000 @ A3

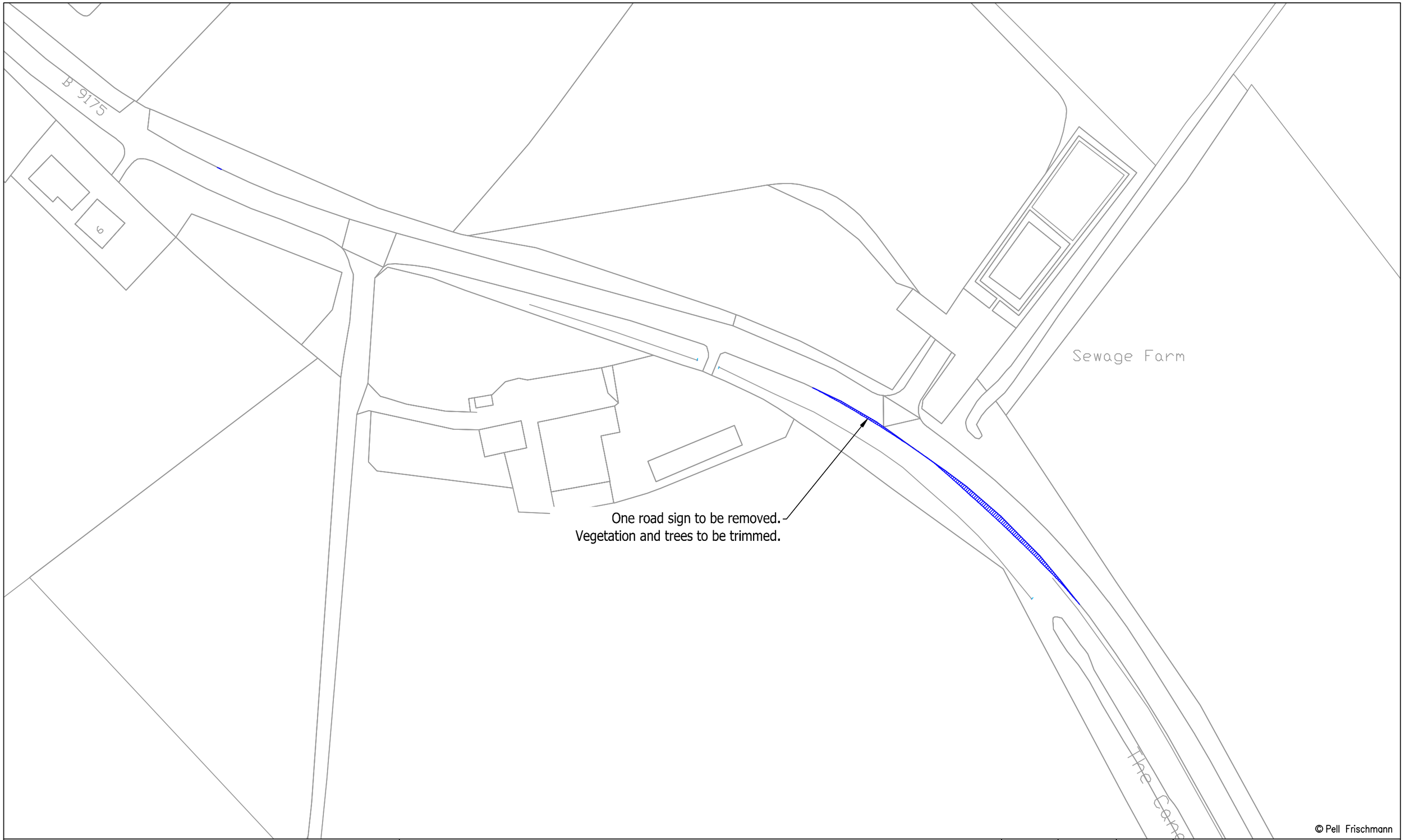
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK08

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Arabella

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		8

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

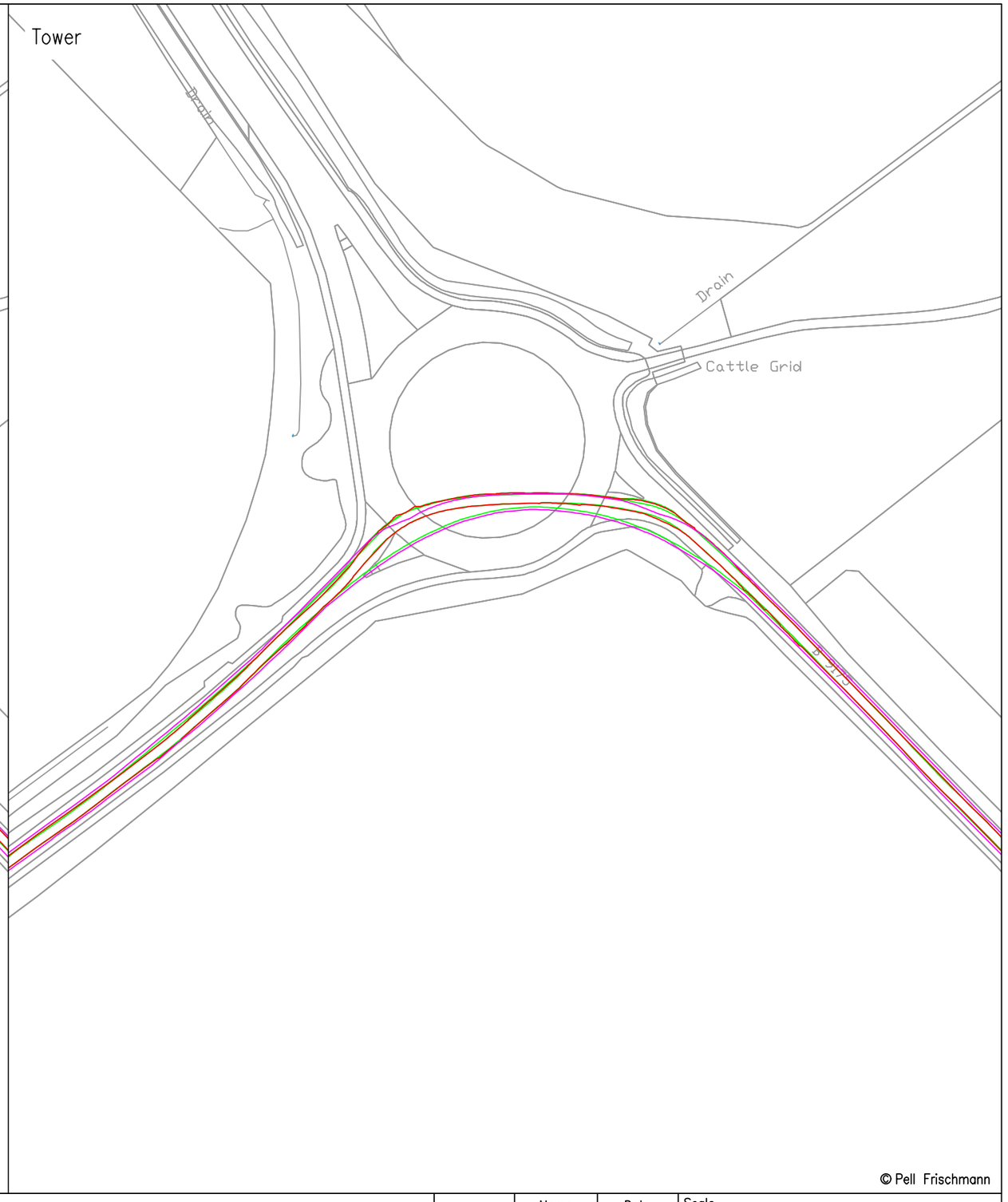
Drawing Status: Draft

Drawing No.: SK08A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Nigg Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		10

Scale: 1:1500 @ A3

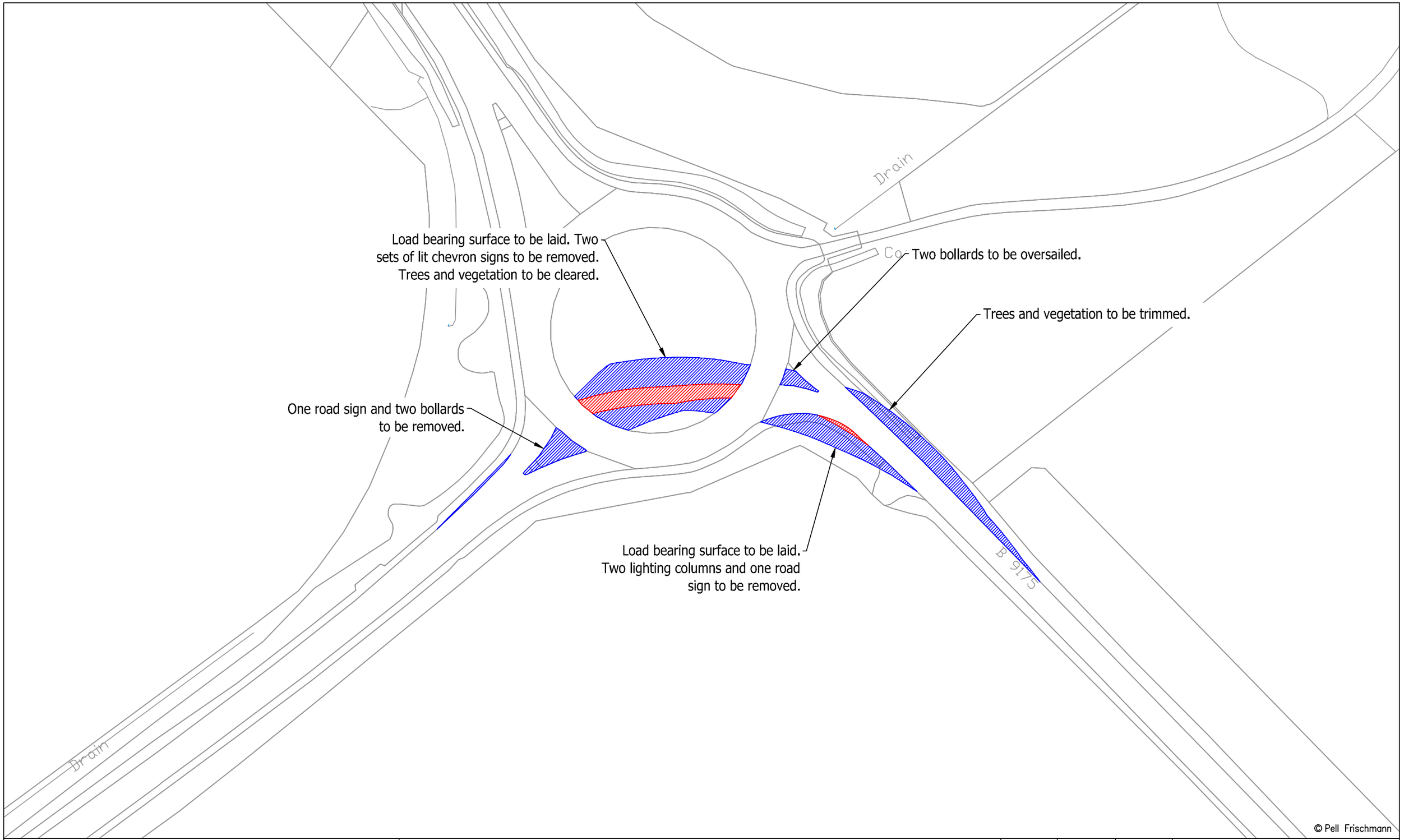
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK09

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9175 Nigg Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		10

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

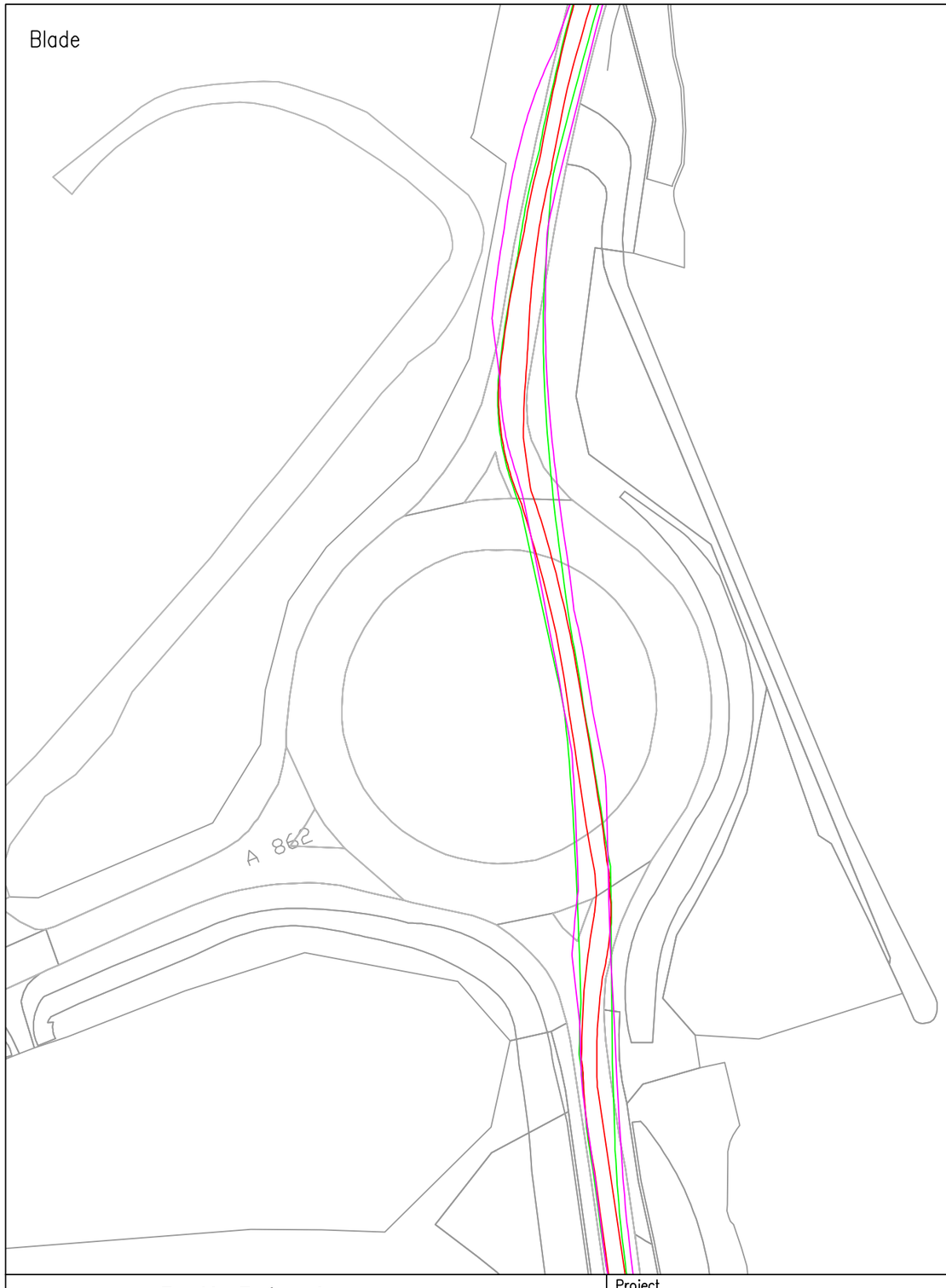
Drawing Status: Draft

Drawing No.: SK09A

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Blade



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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Ardullie Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		11

Scale: 1:1000 @ A3

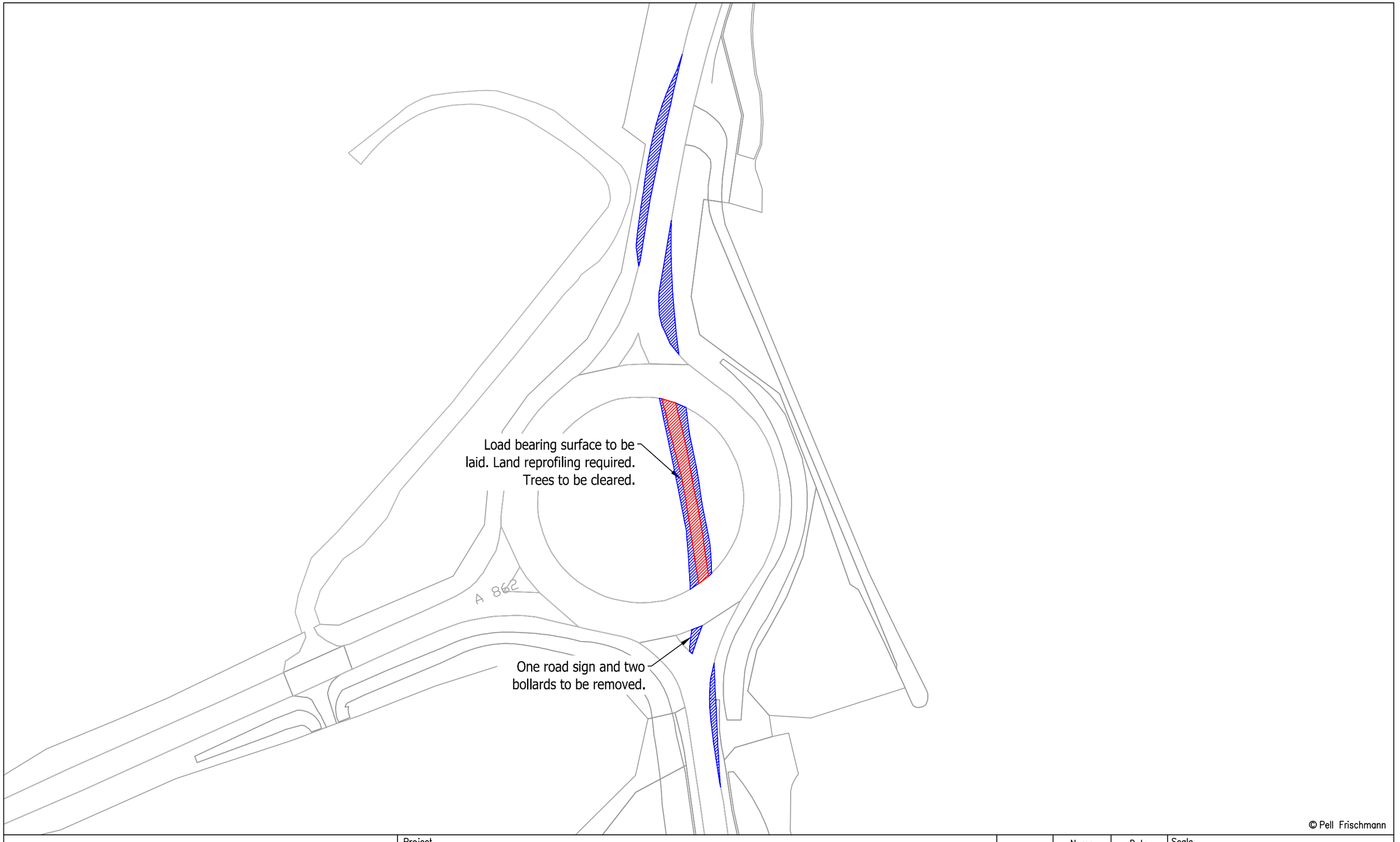
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK10

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Ardullie Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		11

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK10A

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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Tore Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		12

Scale: 1:1000 @ A3

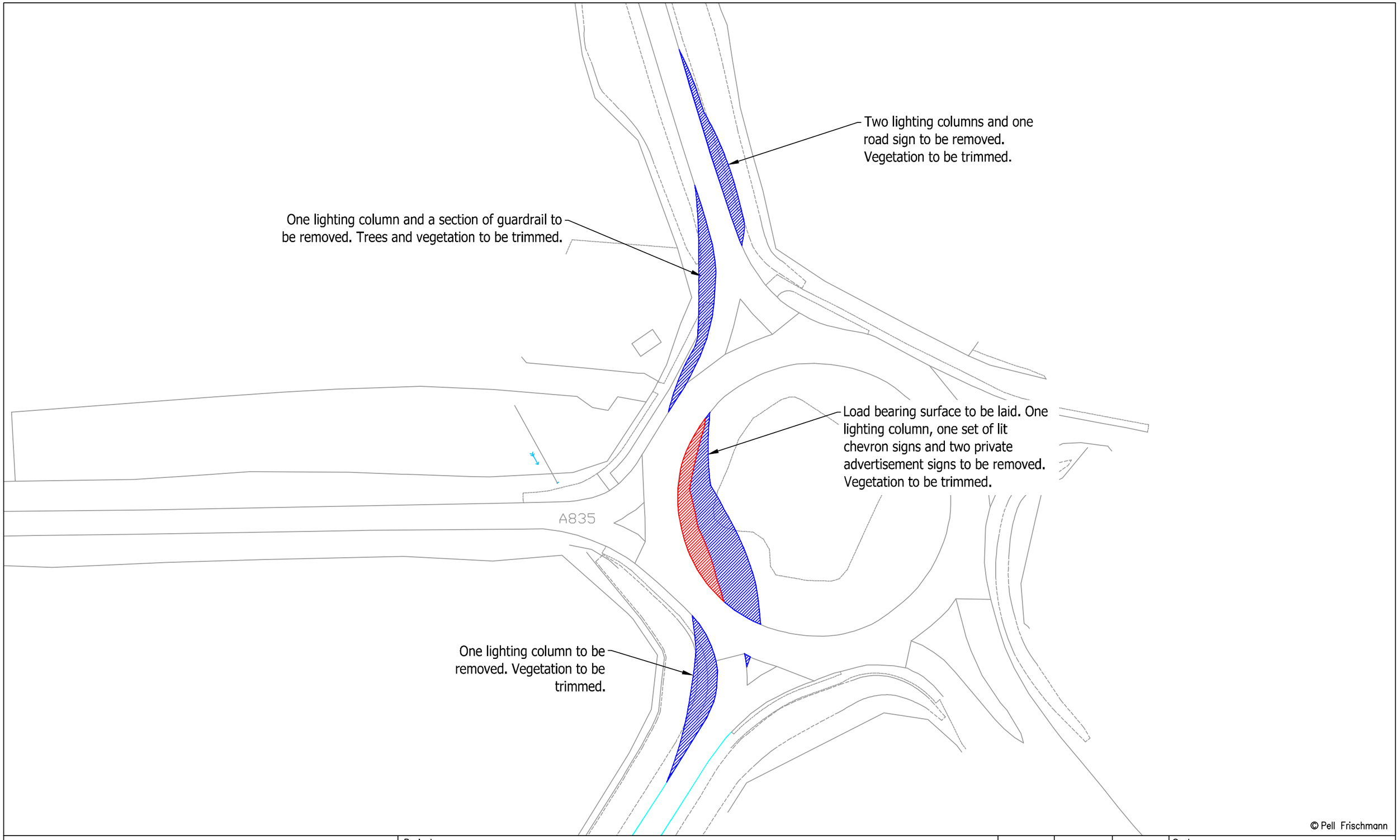
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Drawing Status: Draft

Drawing No.: SK11

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Tore Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		12

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK11A

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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Tore Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		12

Scale: 1:1000 @ A3

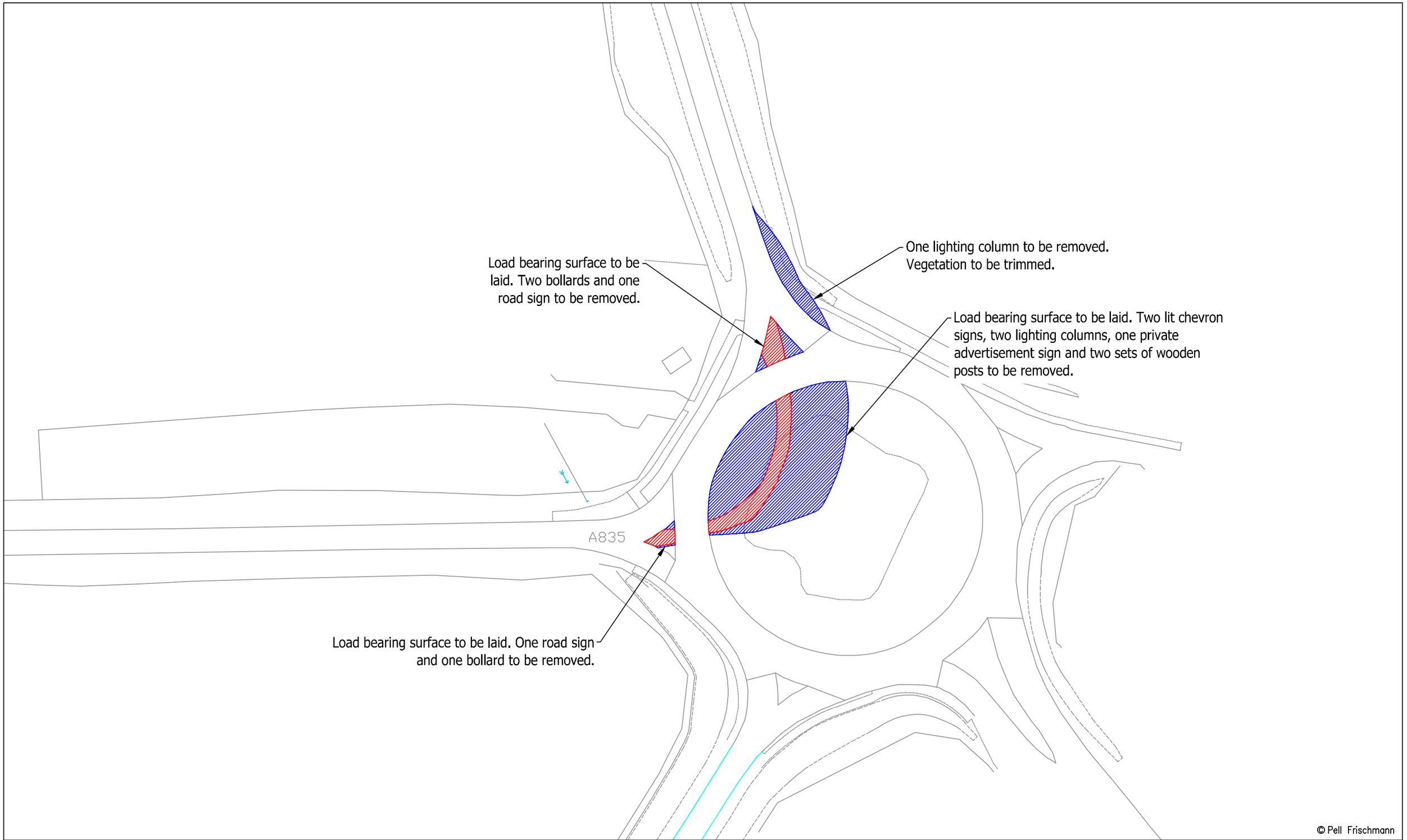
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK11B

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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 Tore Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		12

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK11C

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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 West of Garguston

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		13&14

Scale: 1:2000 @ A3

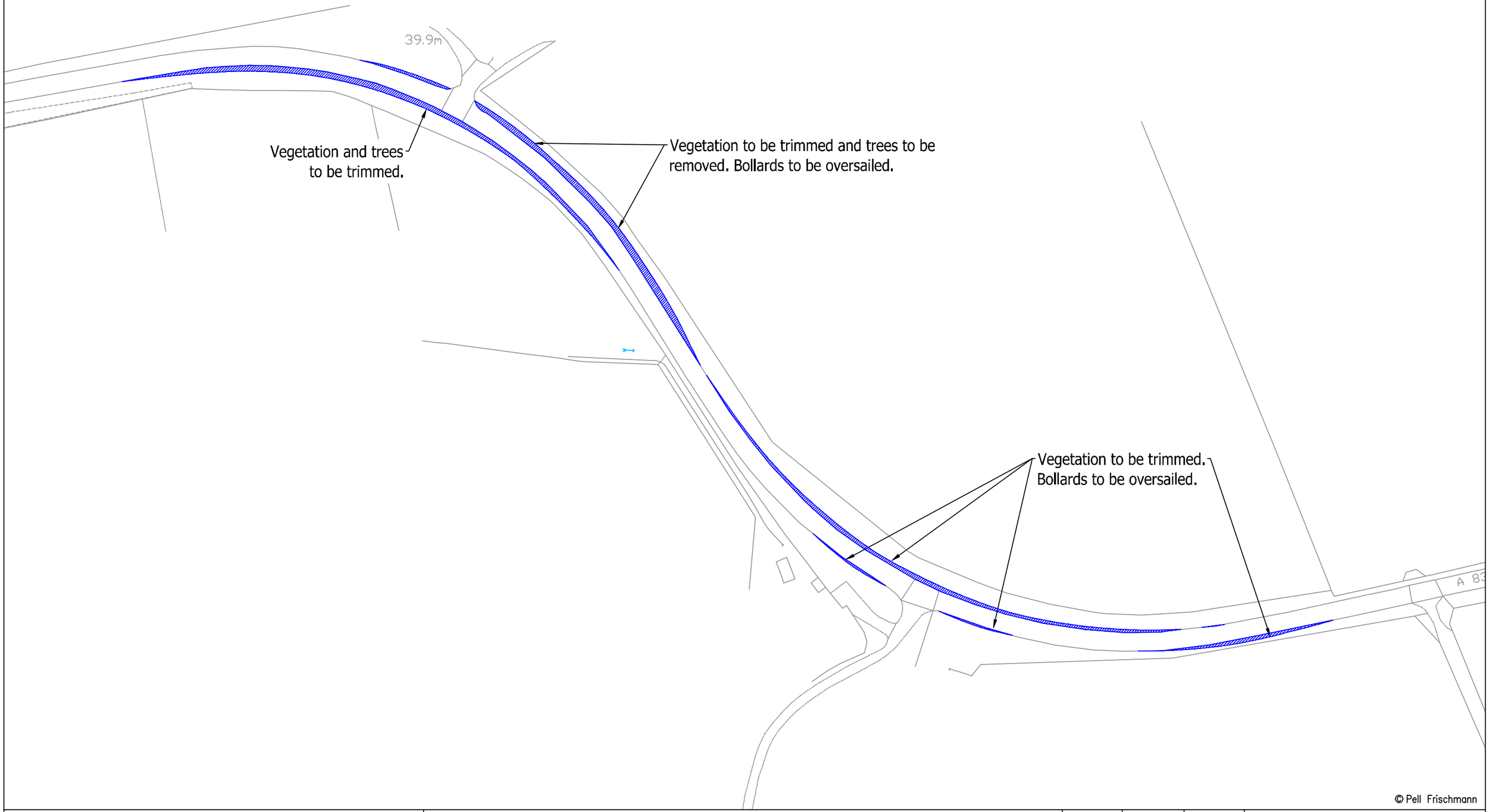
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK12

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 West of Garguston

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		13&14

Scale: 1:1250 @ A3

File No.: 250317 Ballach N163 SPA.dwg

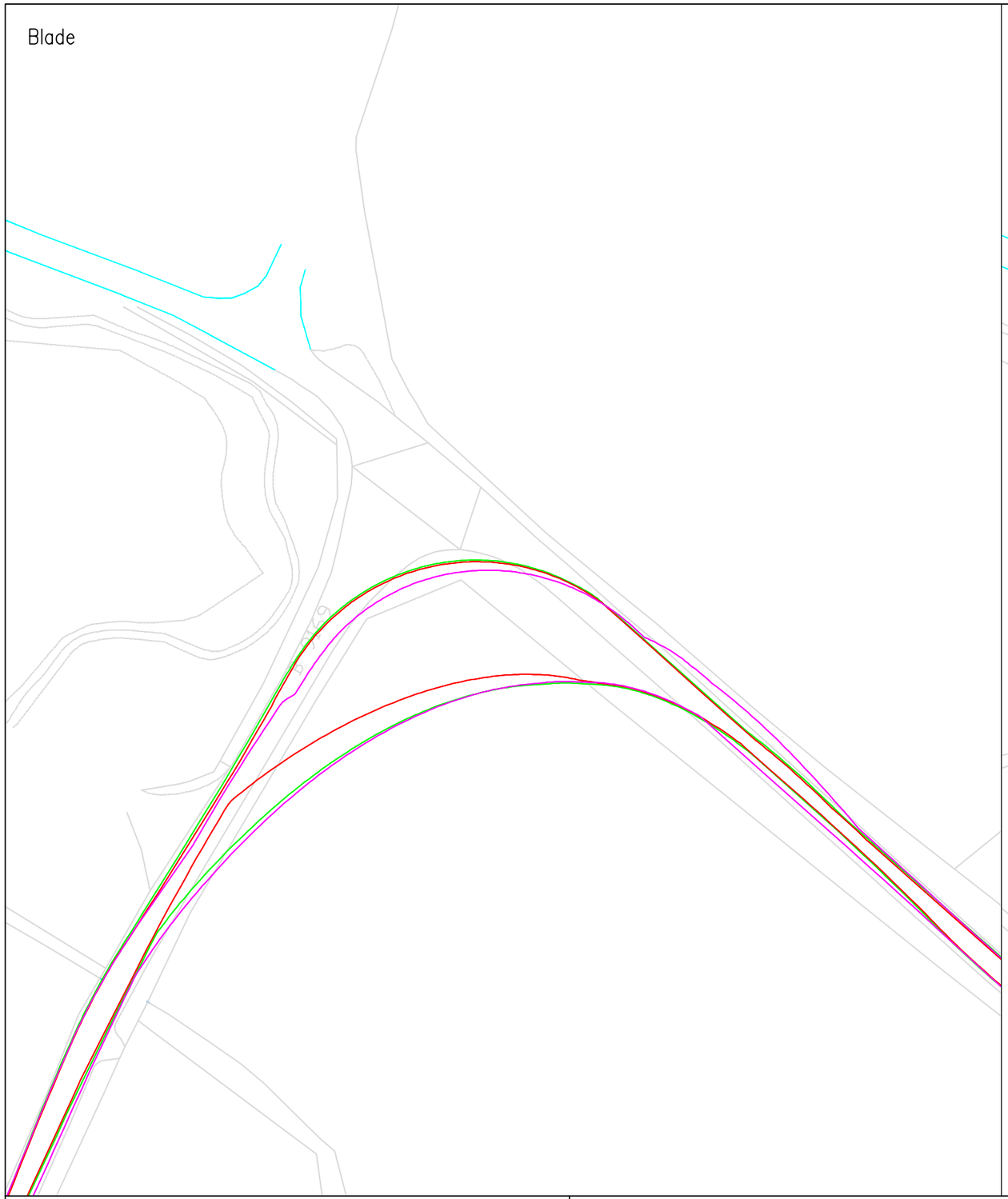
Drawing Status: Draft

Drawing No.: SK12A

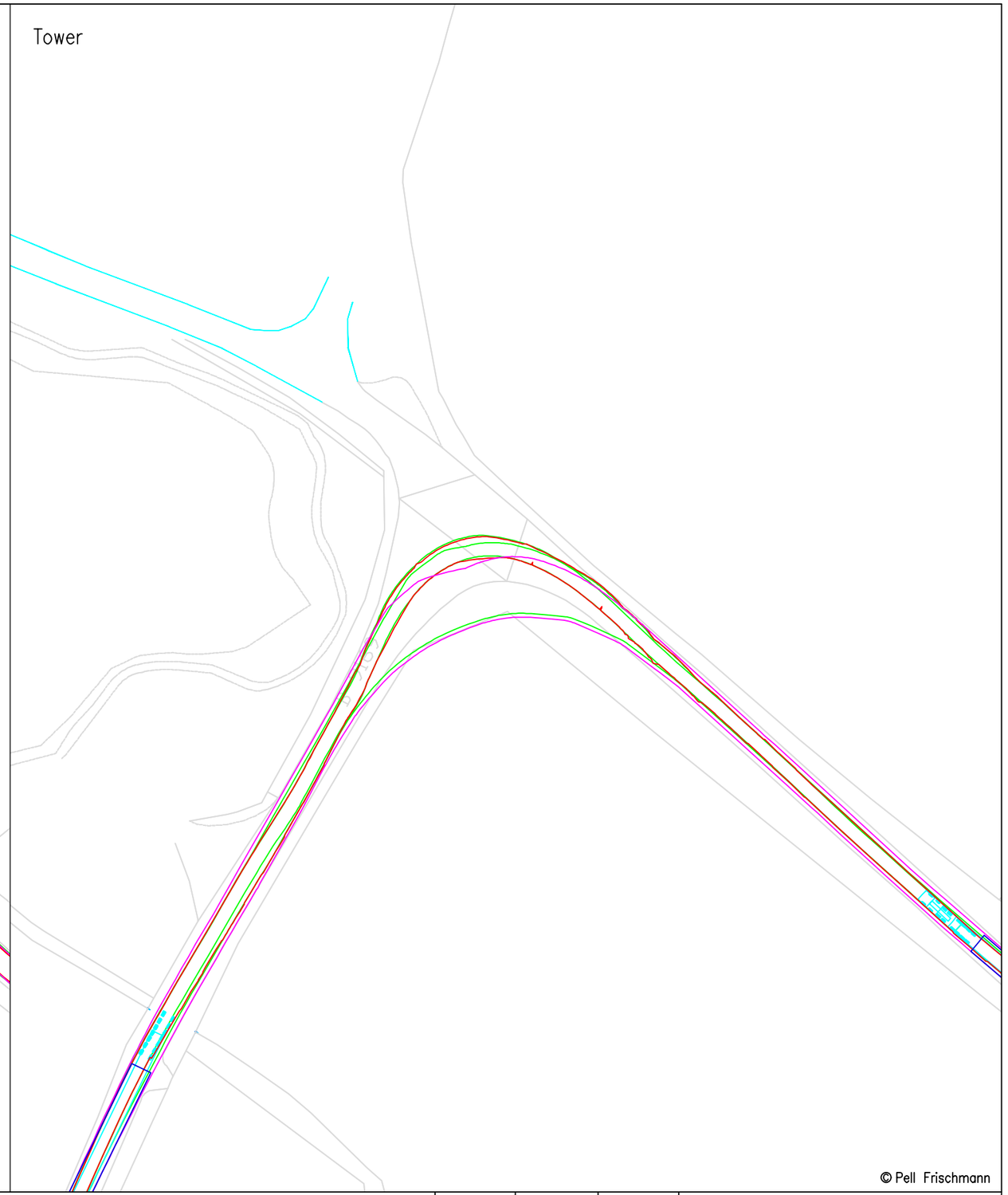
Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade



Tower



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Email: pfedinburgh@pellfrischmann.com
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 / B1969 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		15

Scale: 1:1000 @ A3

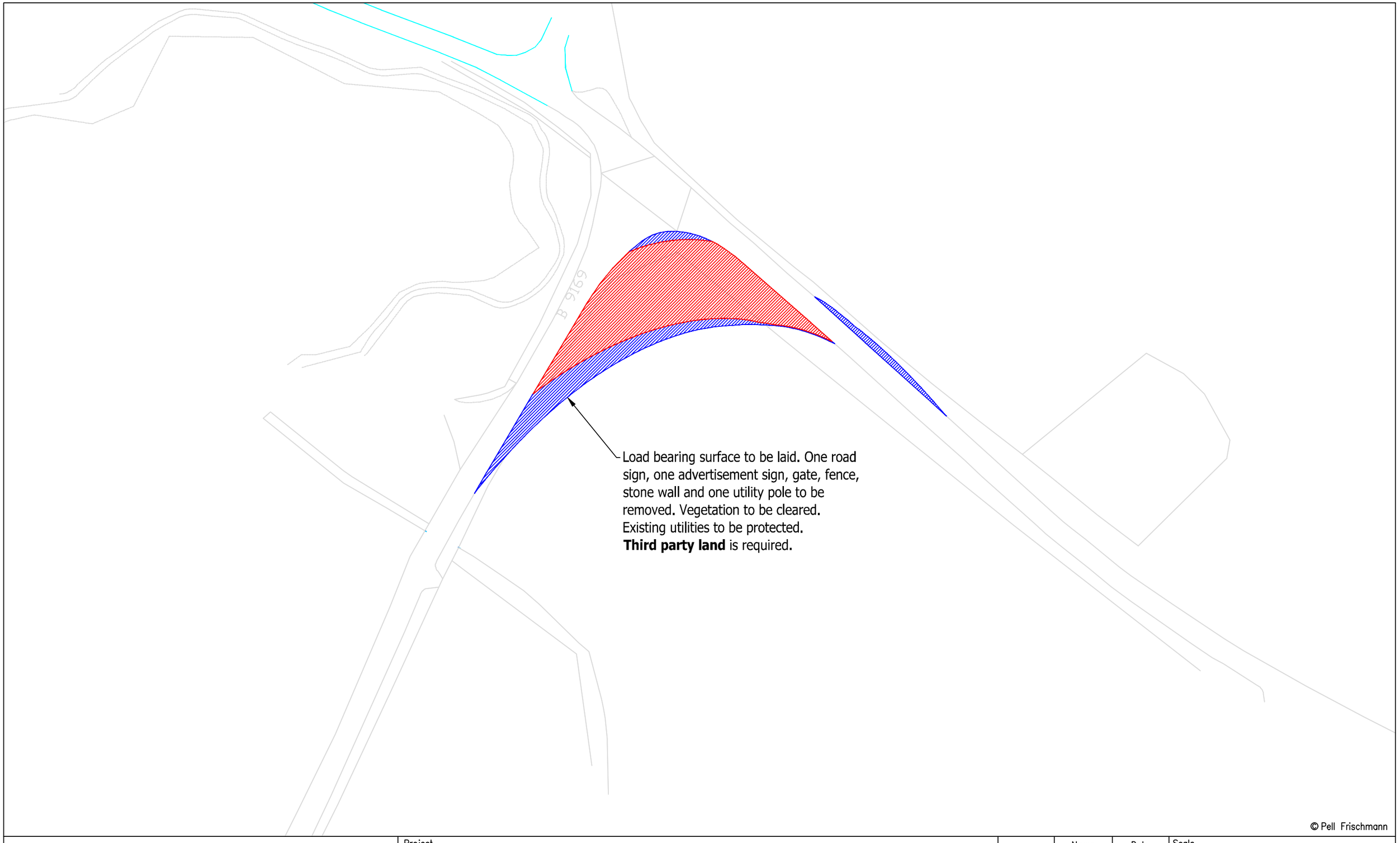
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK13

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 / B1969 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		15

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

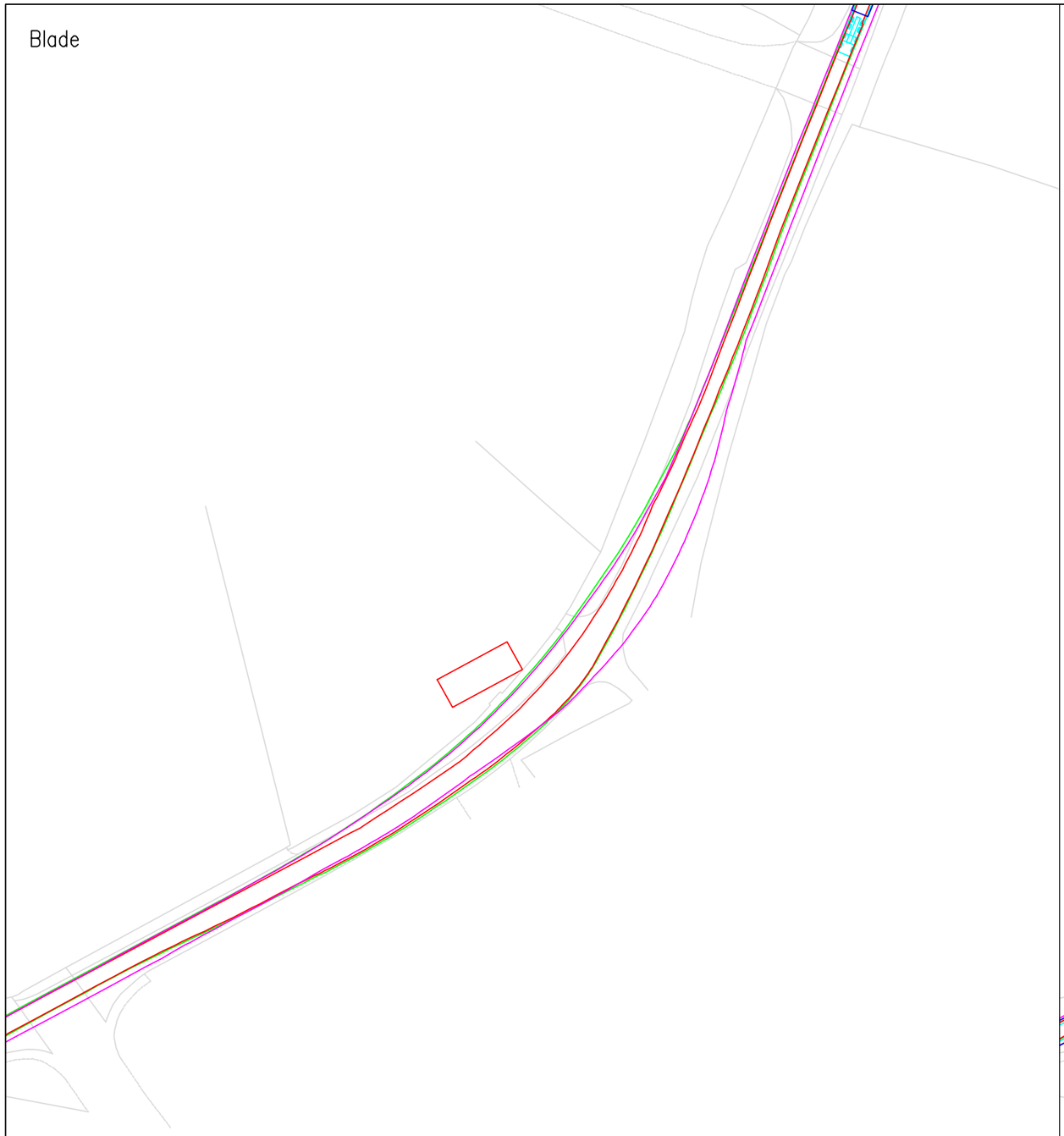
Drawing Status: Draft

Drawing No. SK13A

Notes:
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9169, Northeast of Windhill

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		16

Scale: 1:1000 @ A3

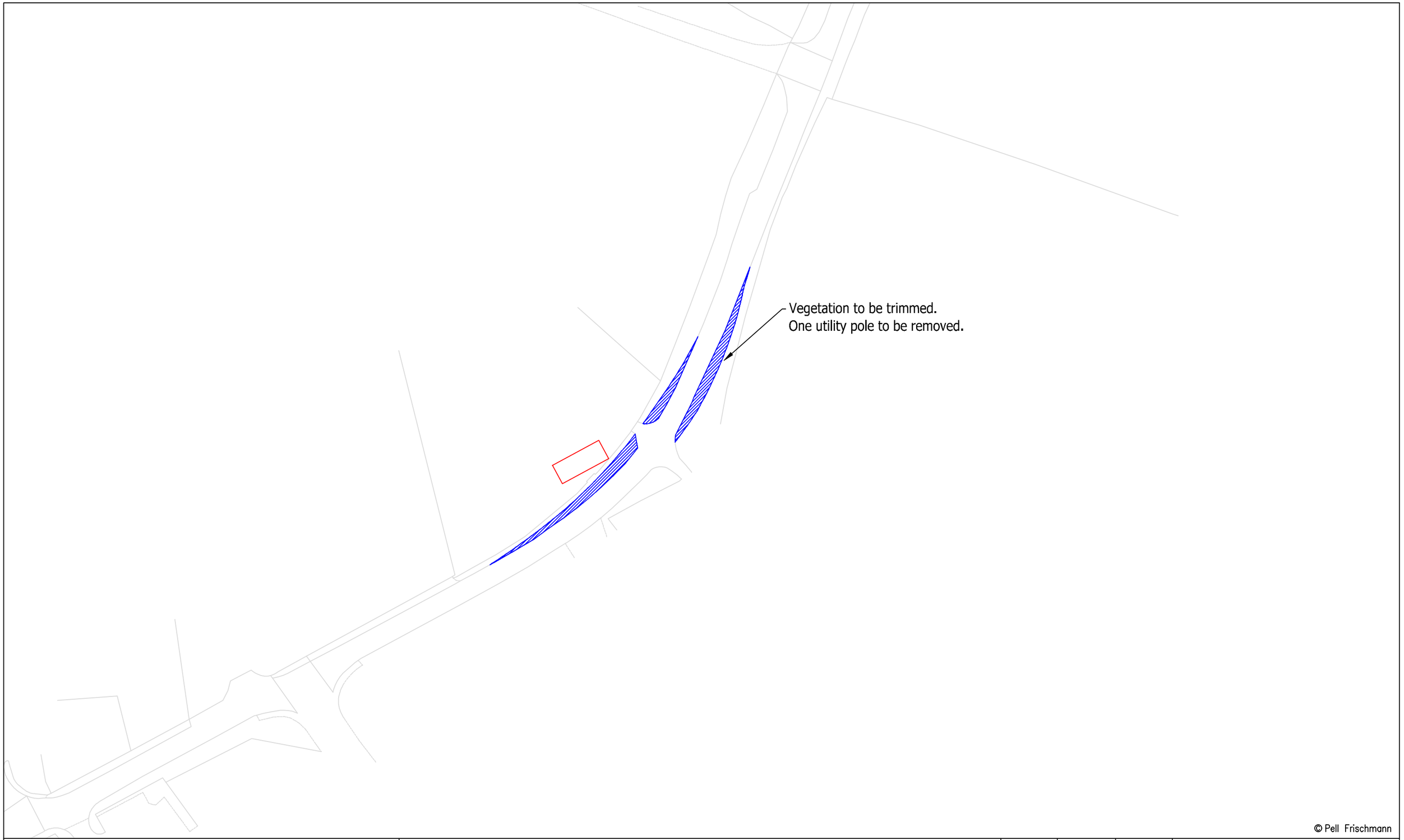
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK14

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9169, Northeast of Windhill

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		16

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK14A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B169 / A862 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		17

Scale: 1:750 @ A3

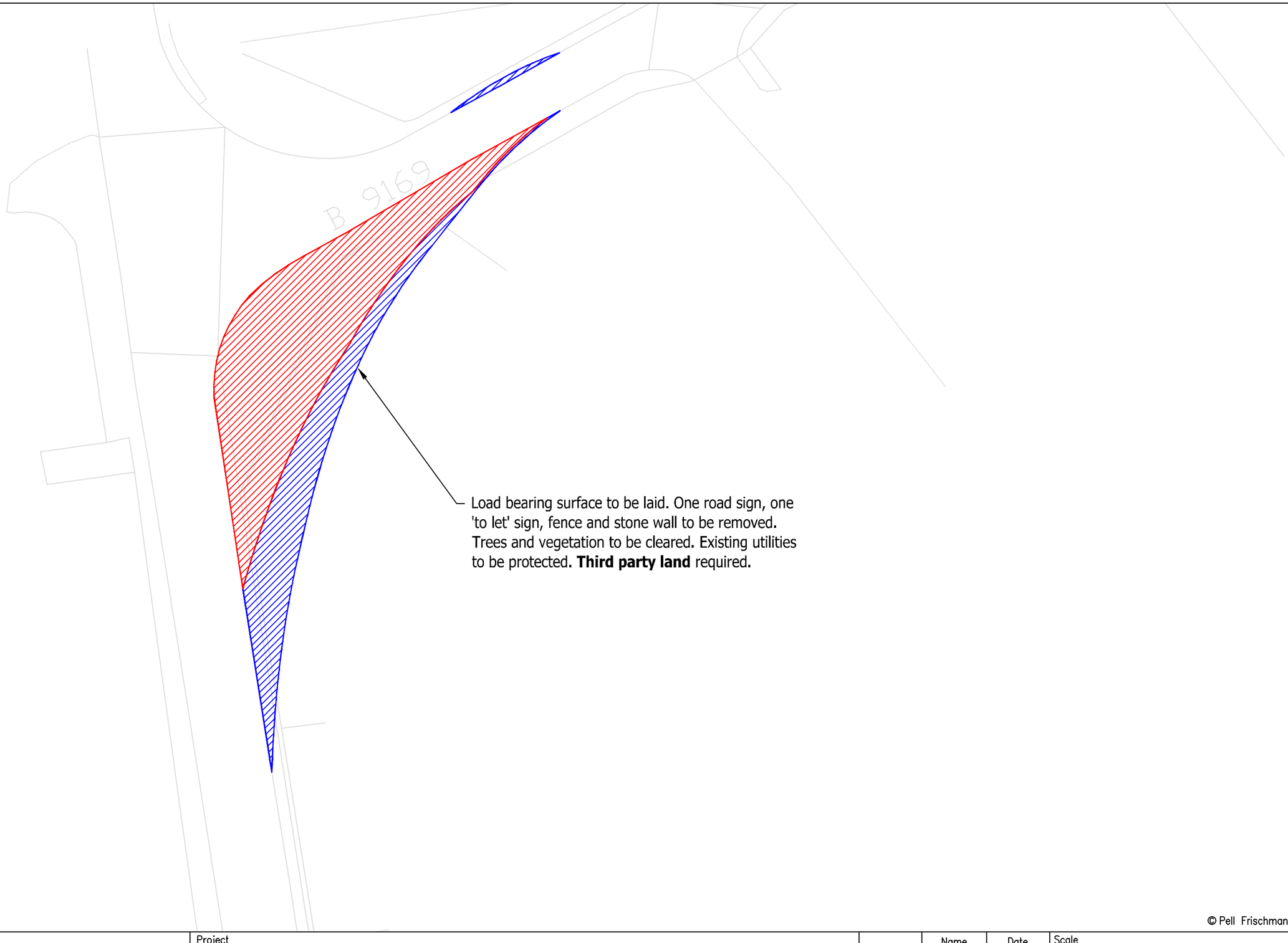
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK15

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B169 / A862 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		17

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK15A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 / A831 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		20

Scale: 1:750 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK16

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 / A831 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		20

Scale: 1:750 @ A3

File No.: 250317 Ballach N163 SPA.dwg

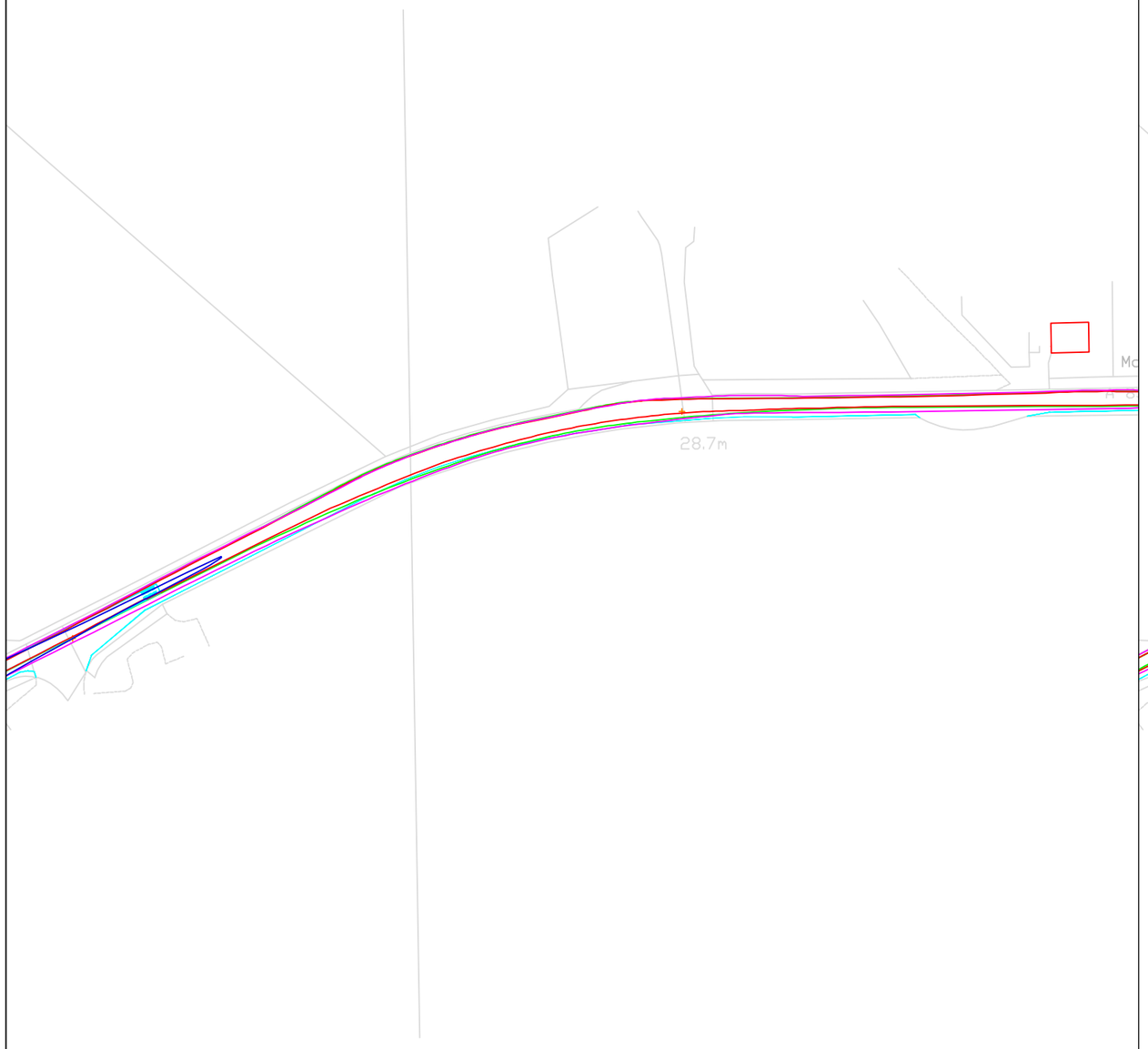
Drawing Status: Draft

Drawing No.: SK16A

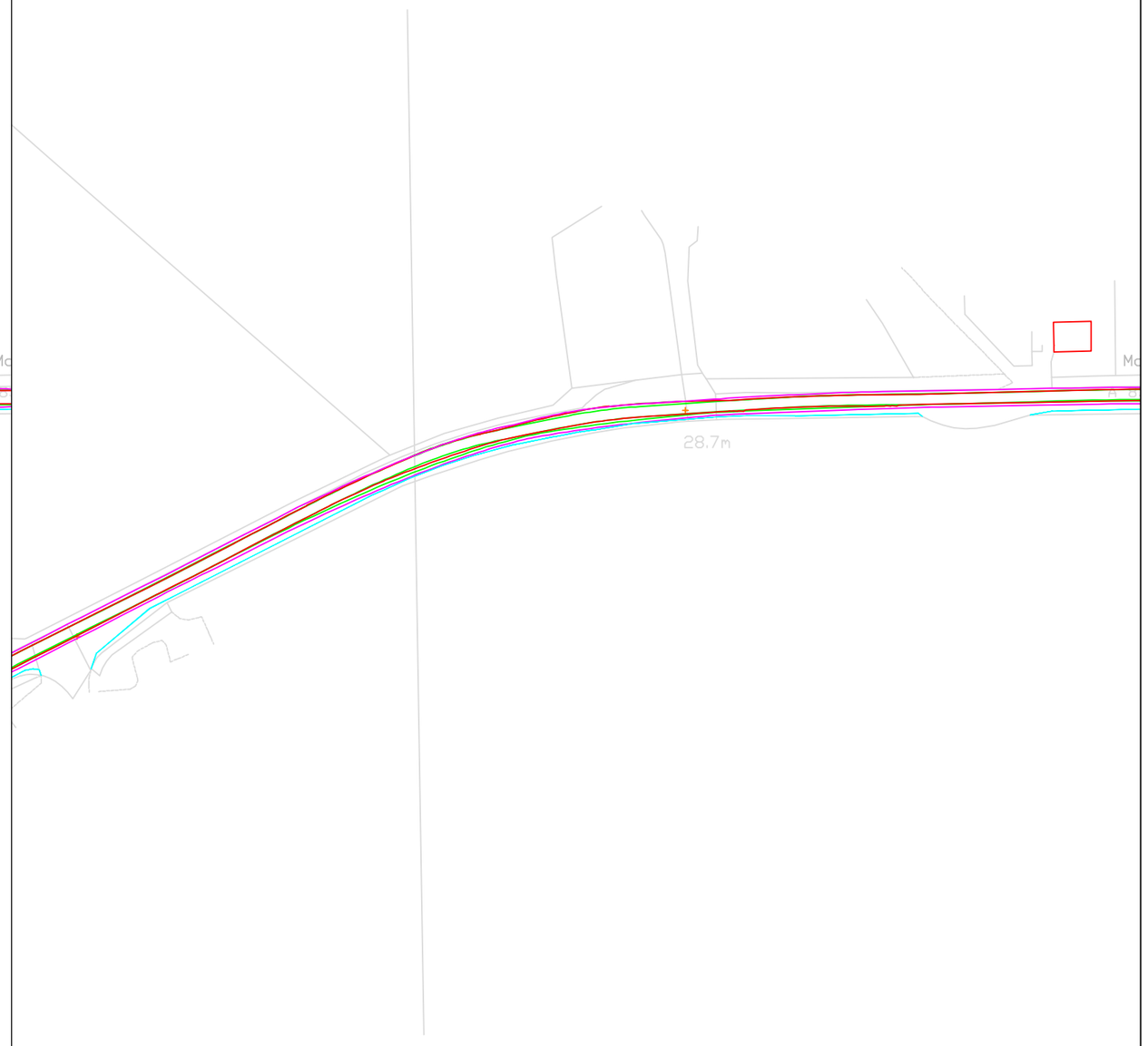
Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Southwest of Beauly

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		21

Scale: 1:1500 @ A3

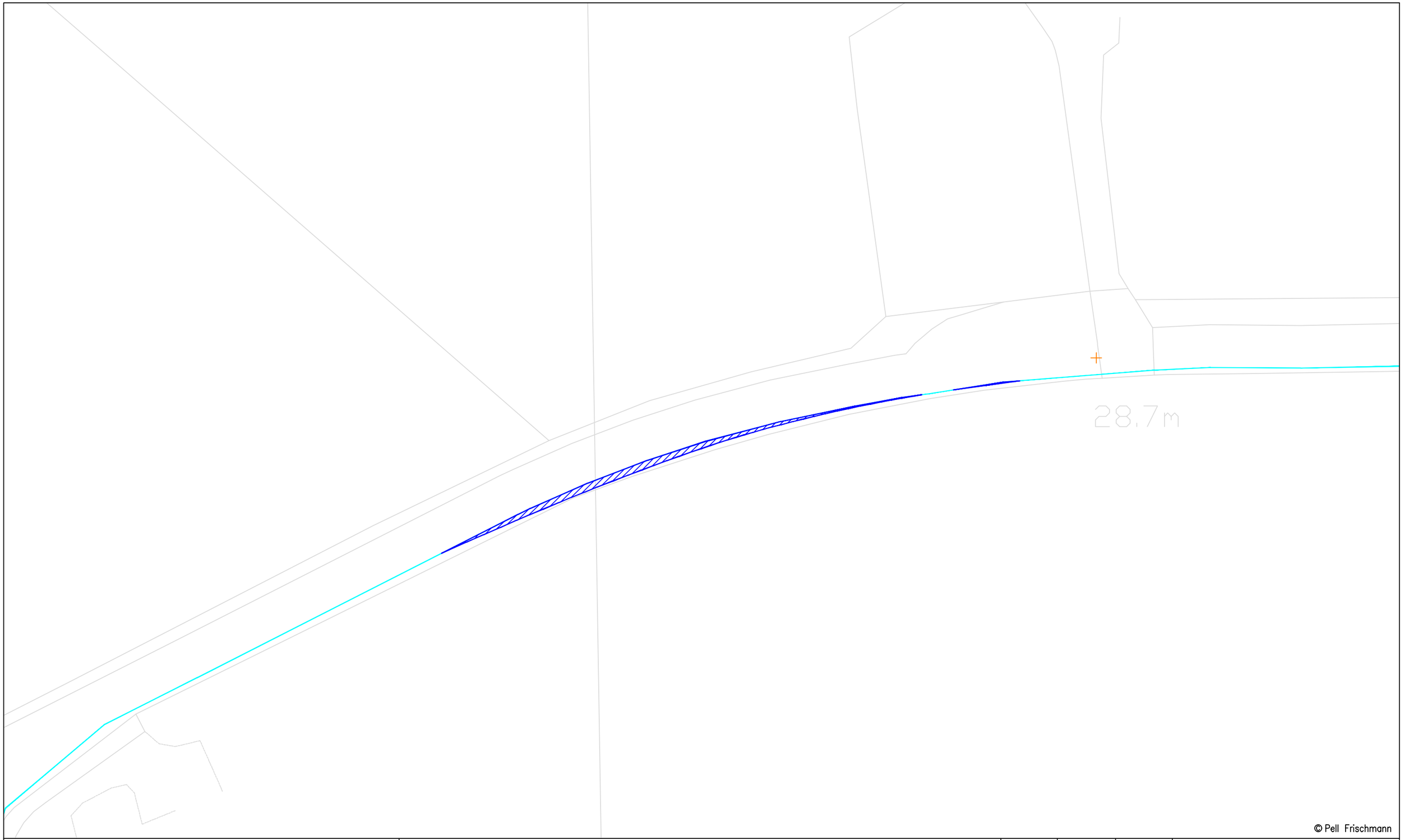
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK17

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Southwest of Beauly

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		21

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

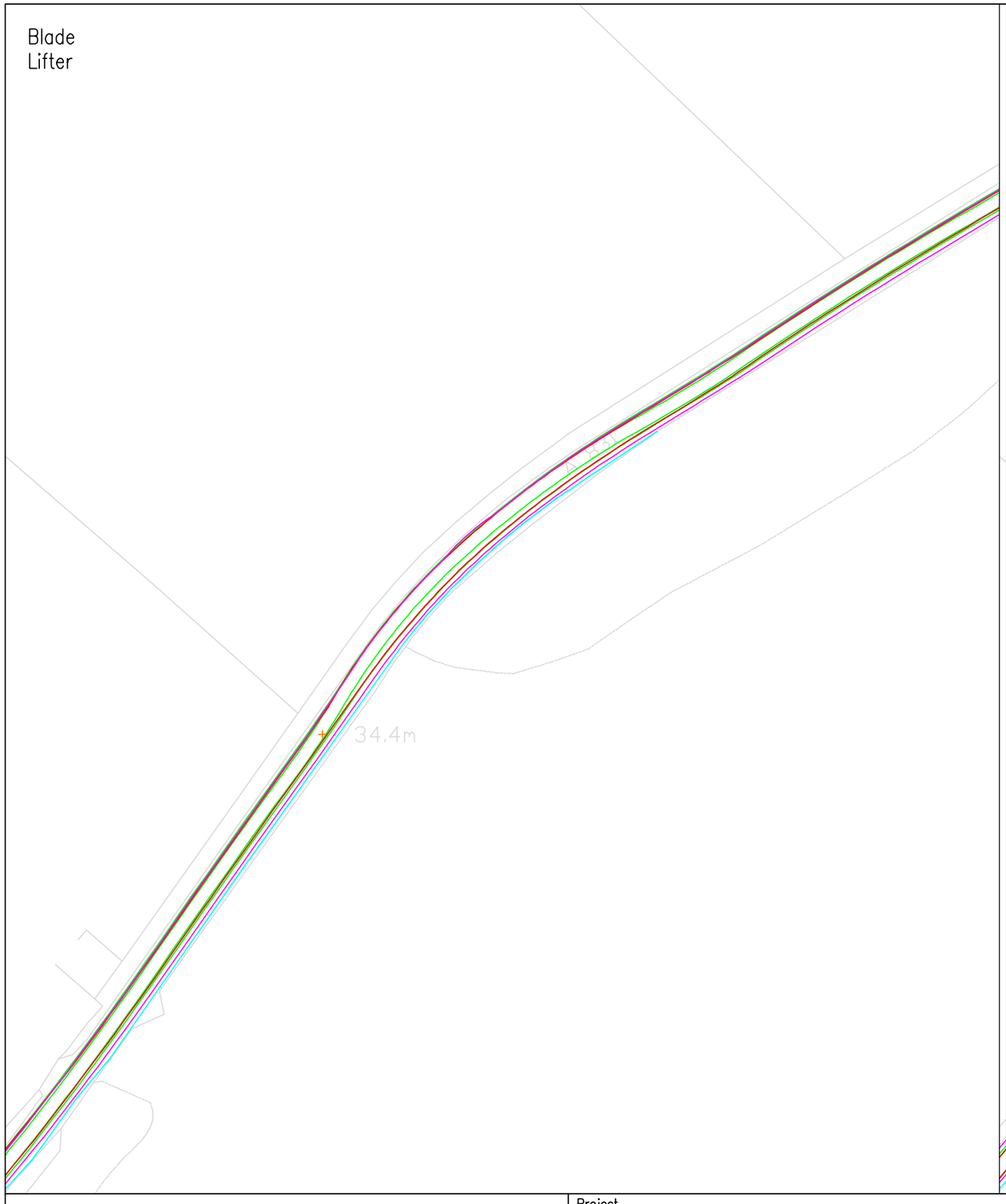
Drawing Status: Draft

Drawing No.: SK17A

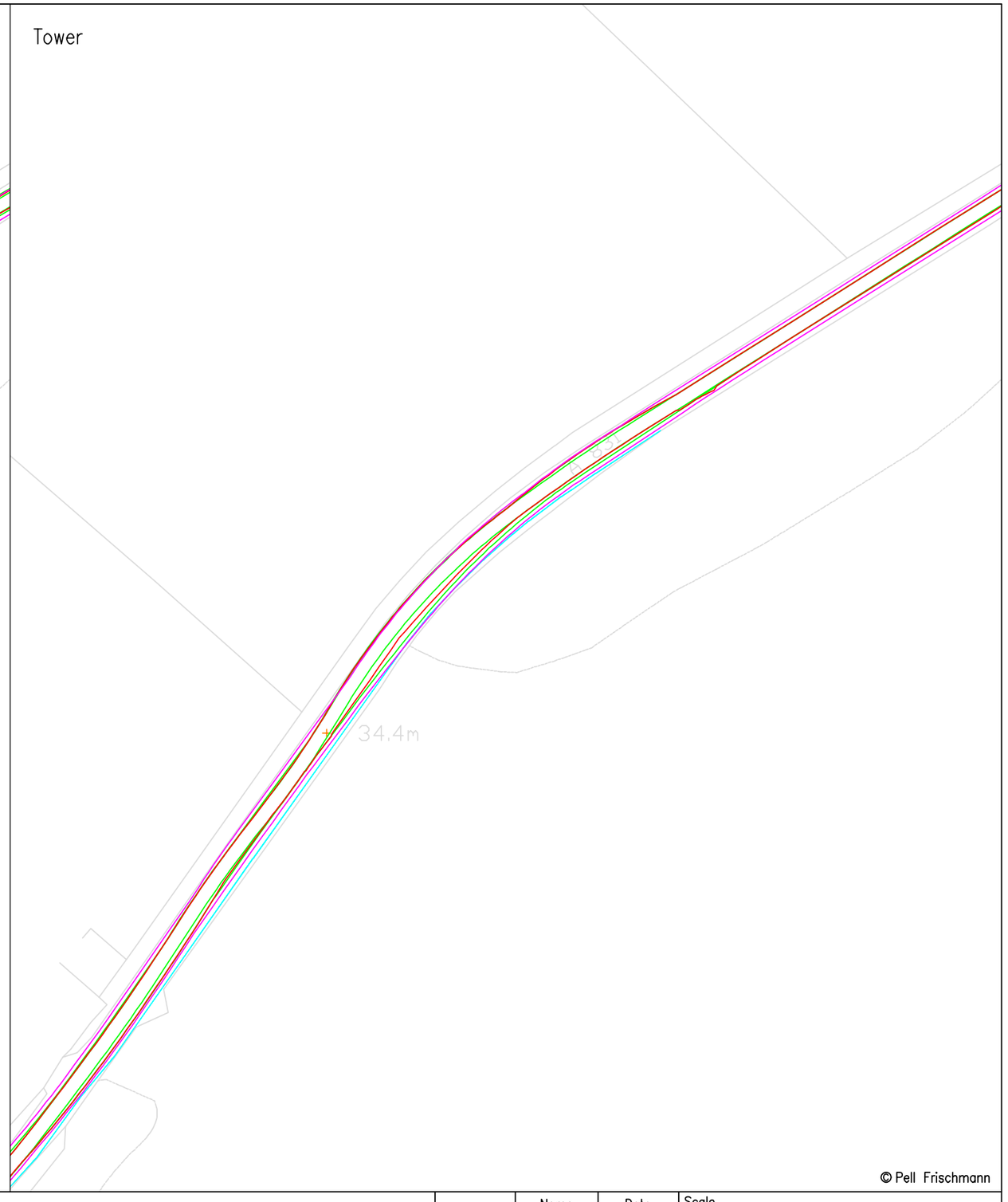
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Revision: 00

Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Northeast of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		22

Scale: 1:1000 @ A3

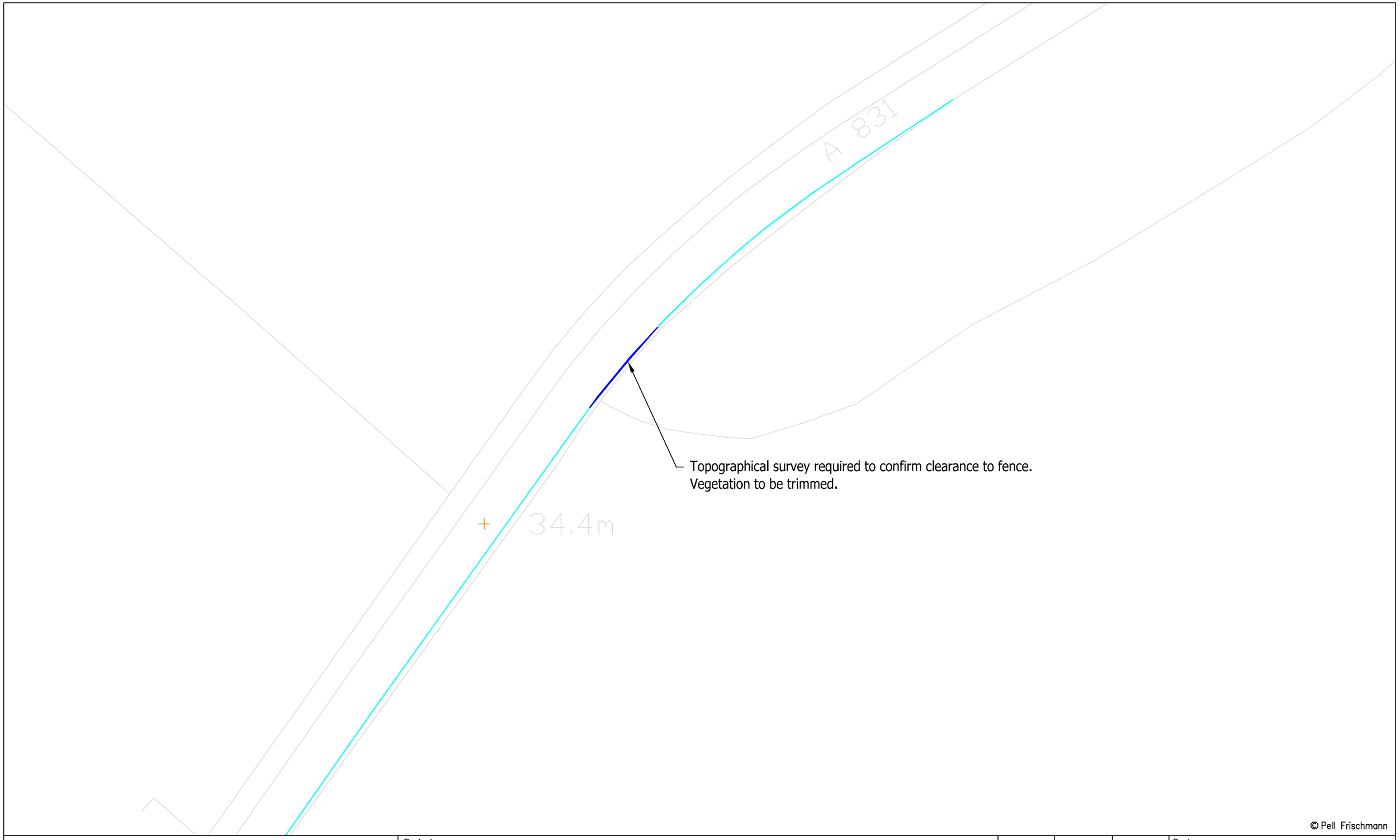
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK18

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Northeast of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		22

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

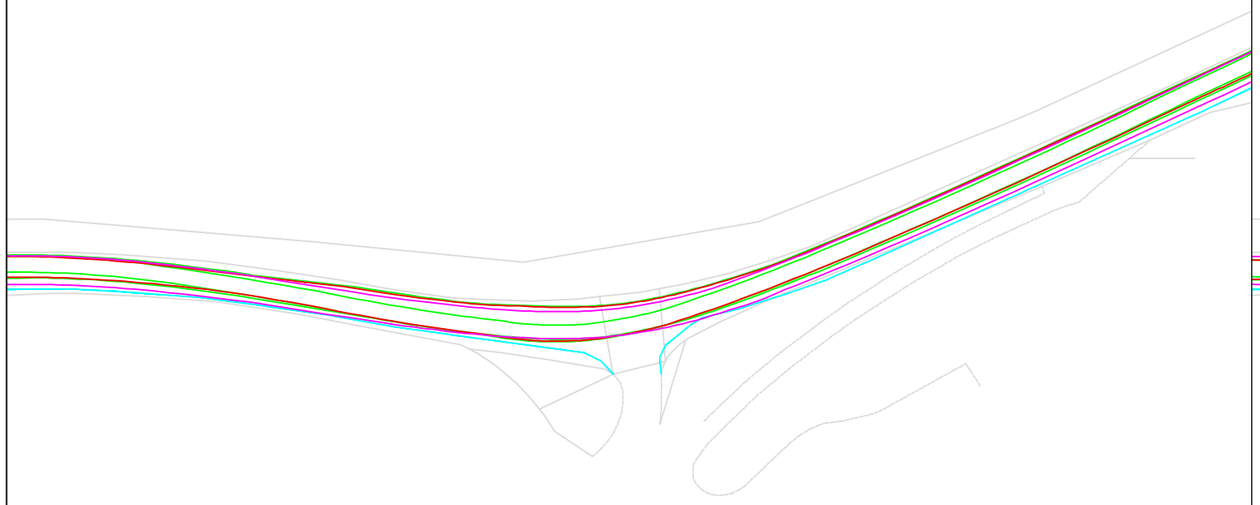
Drawing Status: Draft

Drawing No.: SK18A

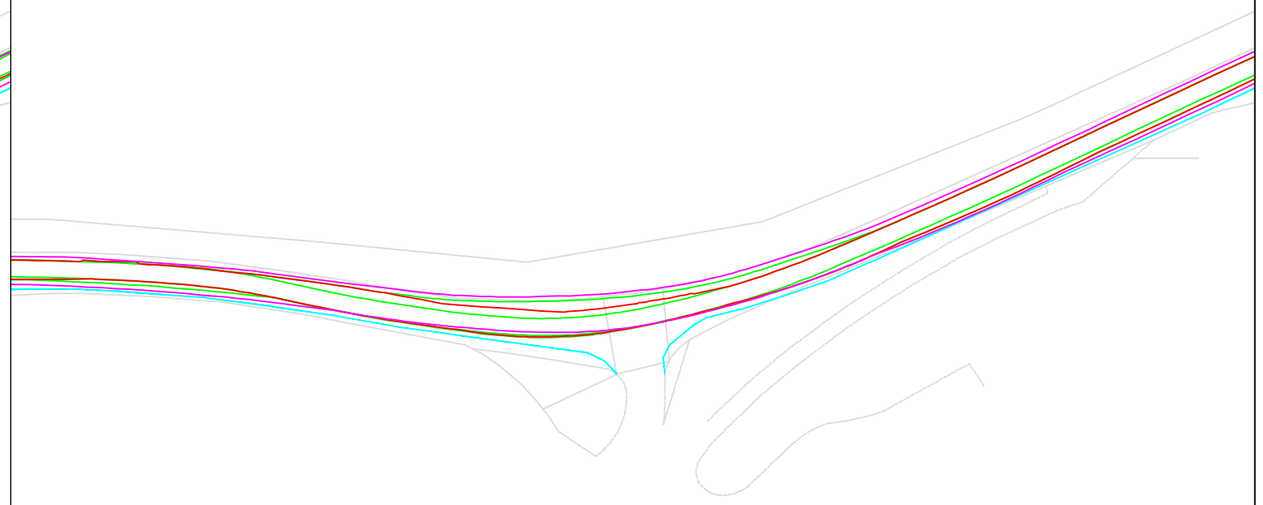
Notes:
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Revision: 00

Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		23

Scale: 1:1000 @ A3

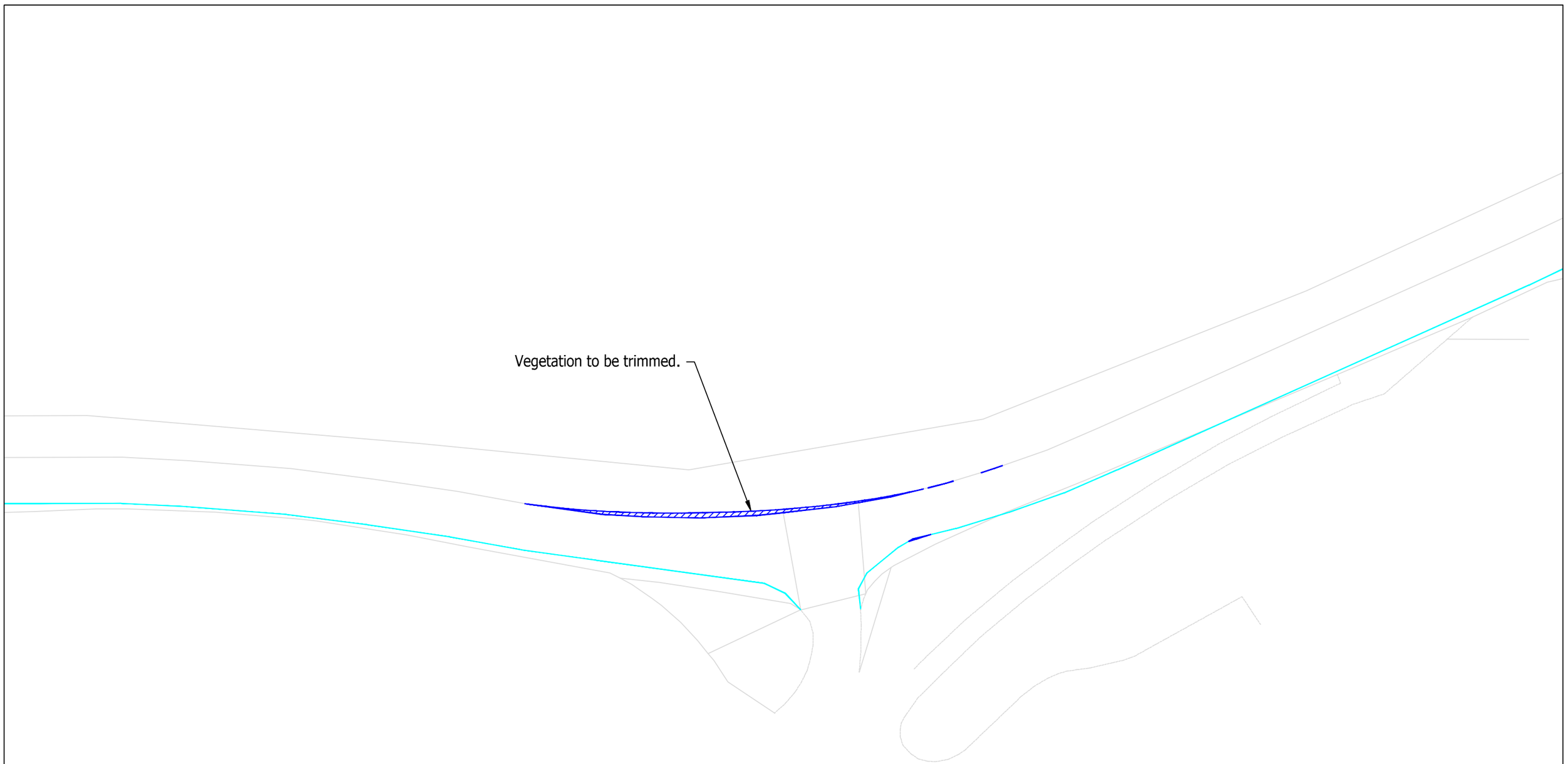
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK19

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		23

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

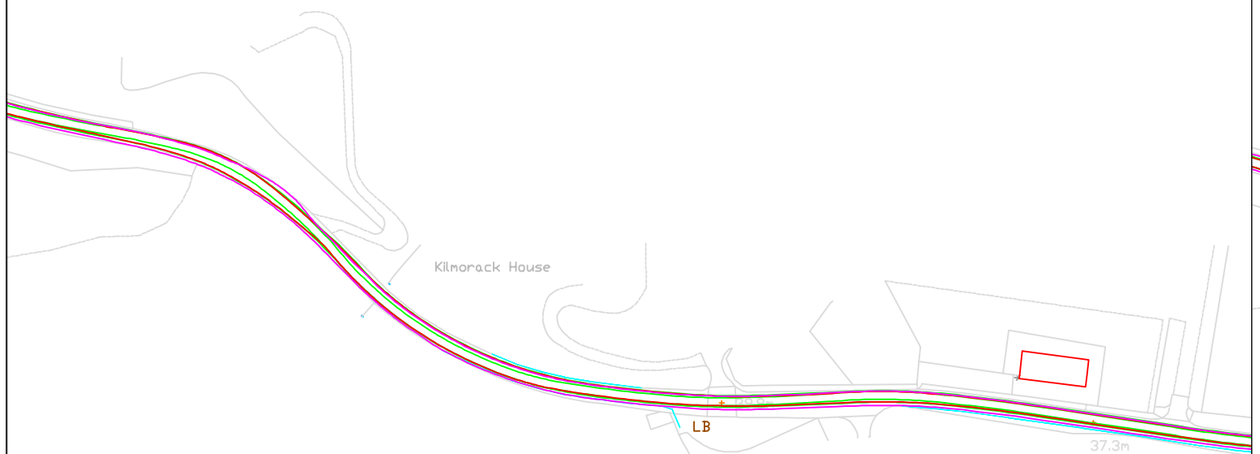
Drawing Status: Draft

Drawing No.: SK19A

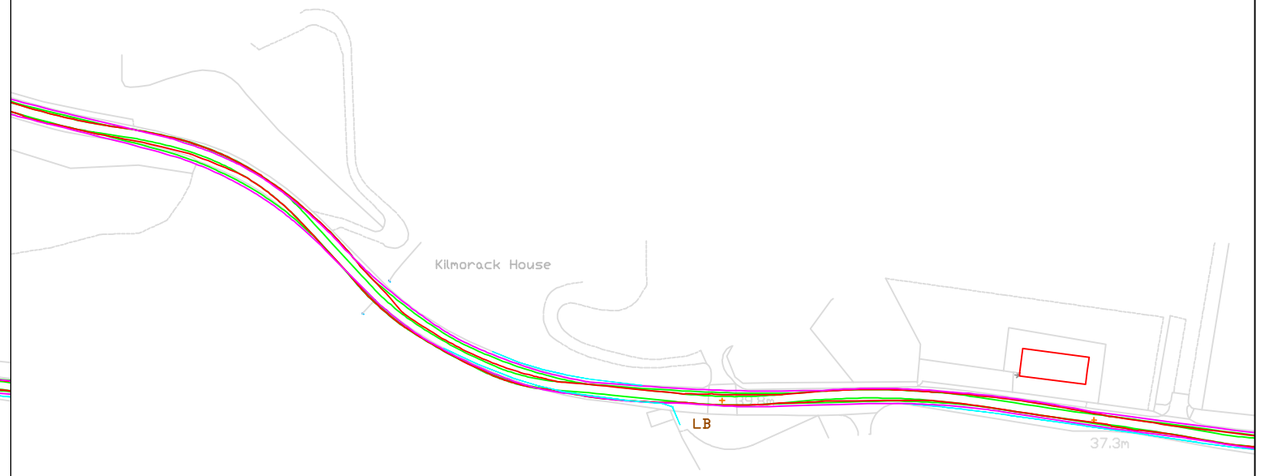
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Revision: 00

Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		24,25

Scale: 1:2000 @ A3

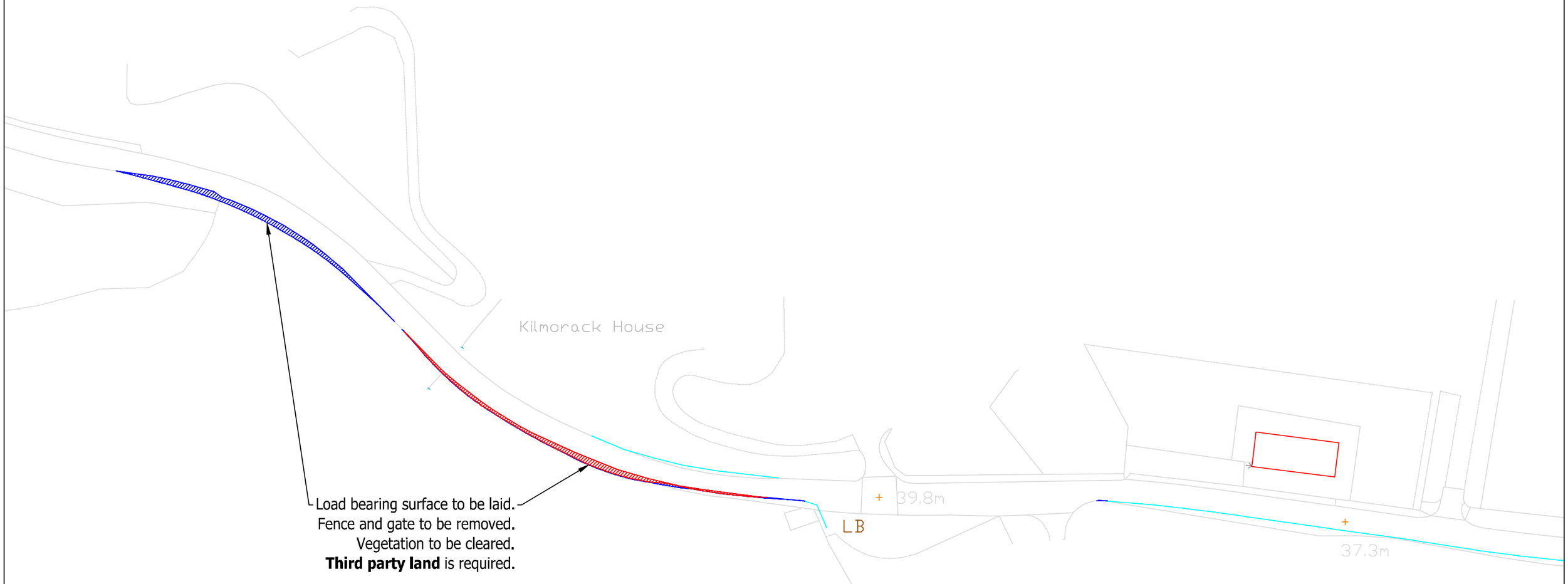
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK20

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		24,25

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

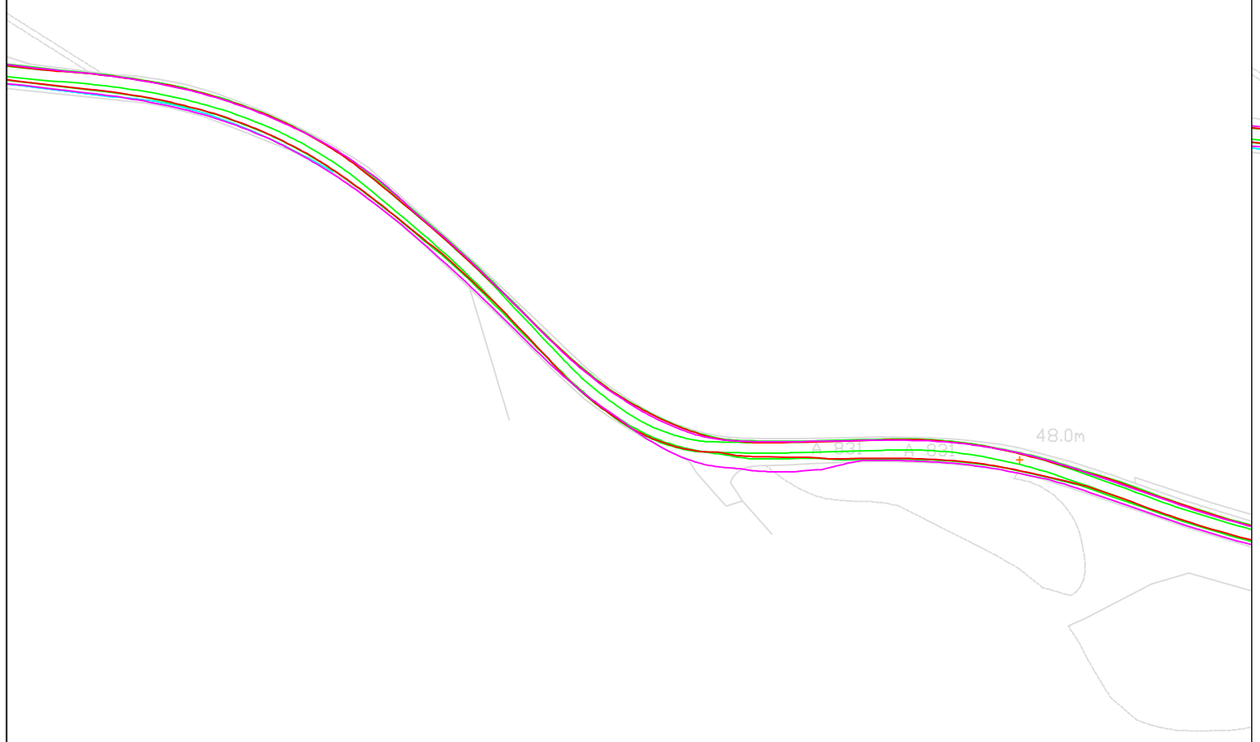
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Drawing No. SK20A

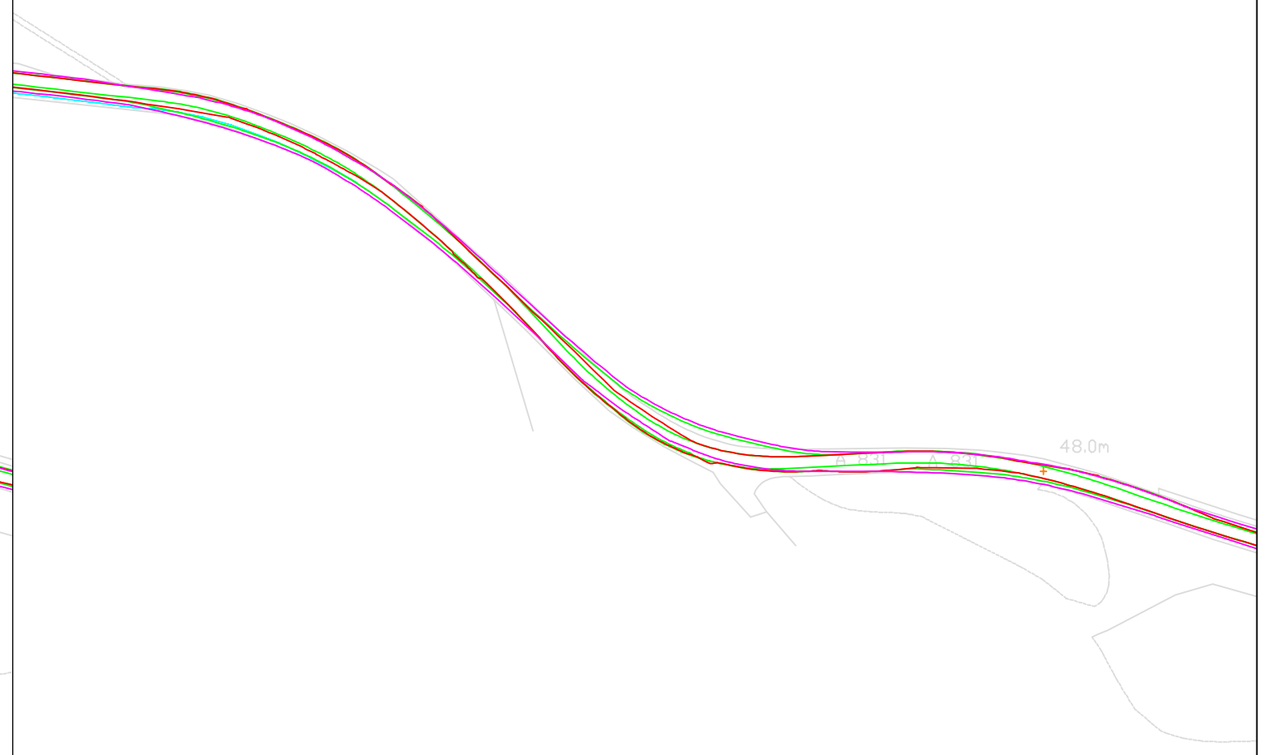
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Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, West of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		26,27

Scale: 1:1500 @ A3

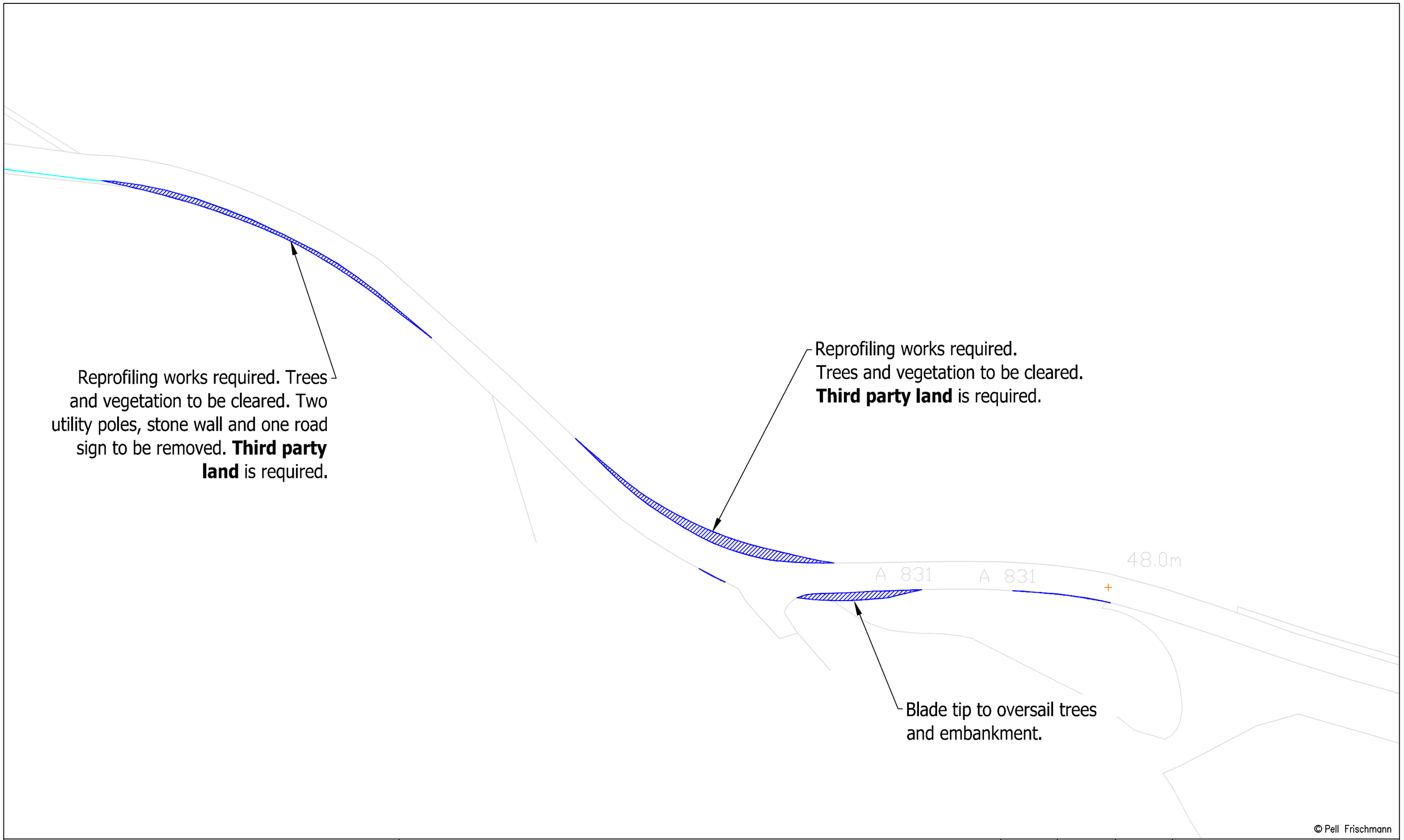
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK21

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, West of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		26,27

Scale: 1:750 @ A3

File No.: 250317 Ballach N163 SPA.dwg

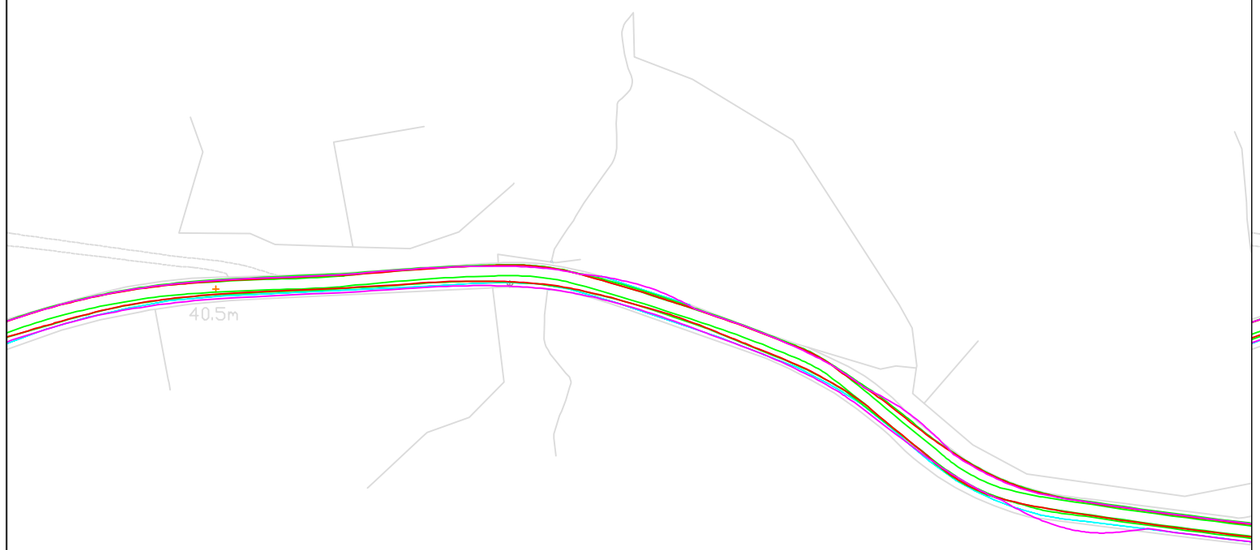
Drawing Status: Draft

Drawing No.: SK21A

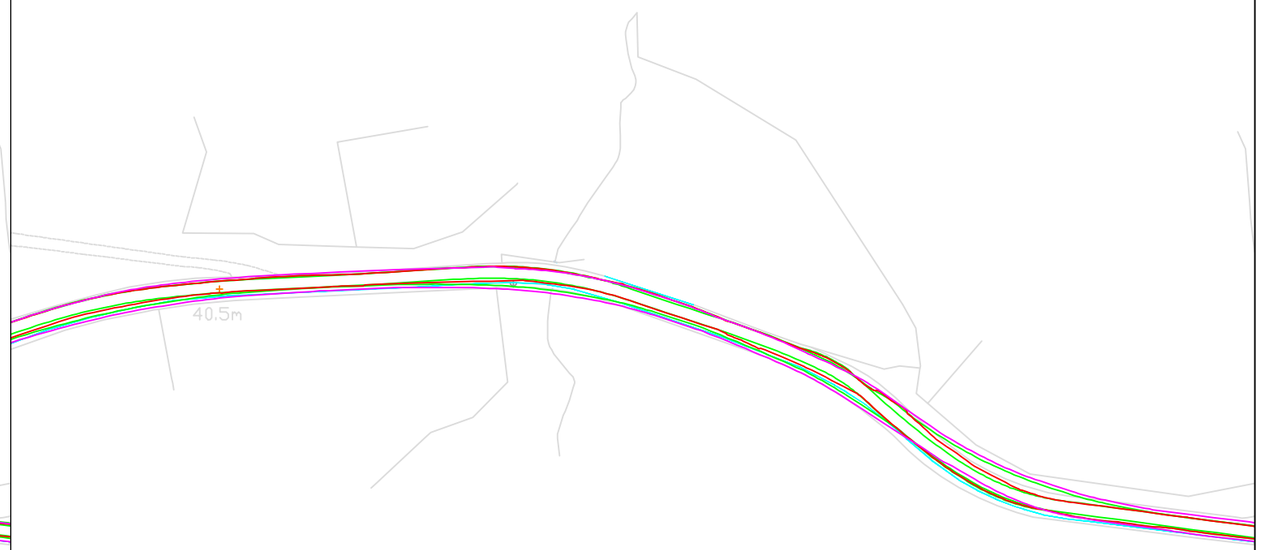
Notes:
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Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, West of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		28

Scale: 1:1500 @ A3

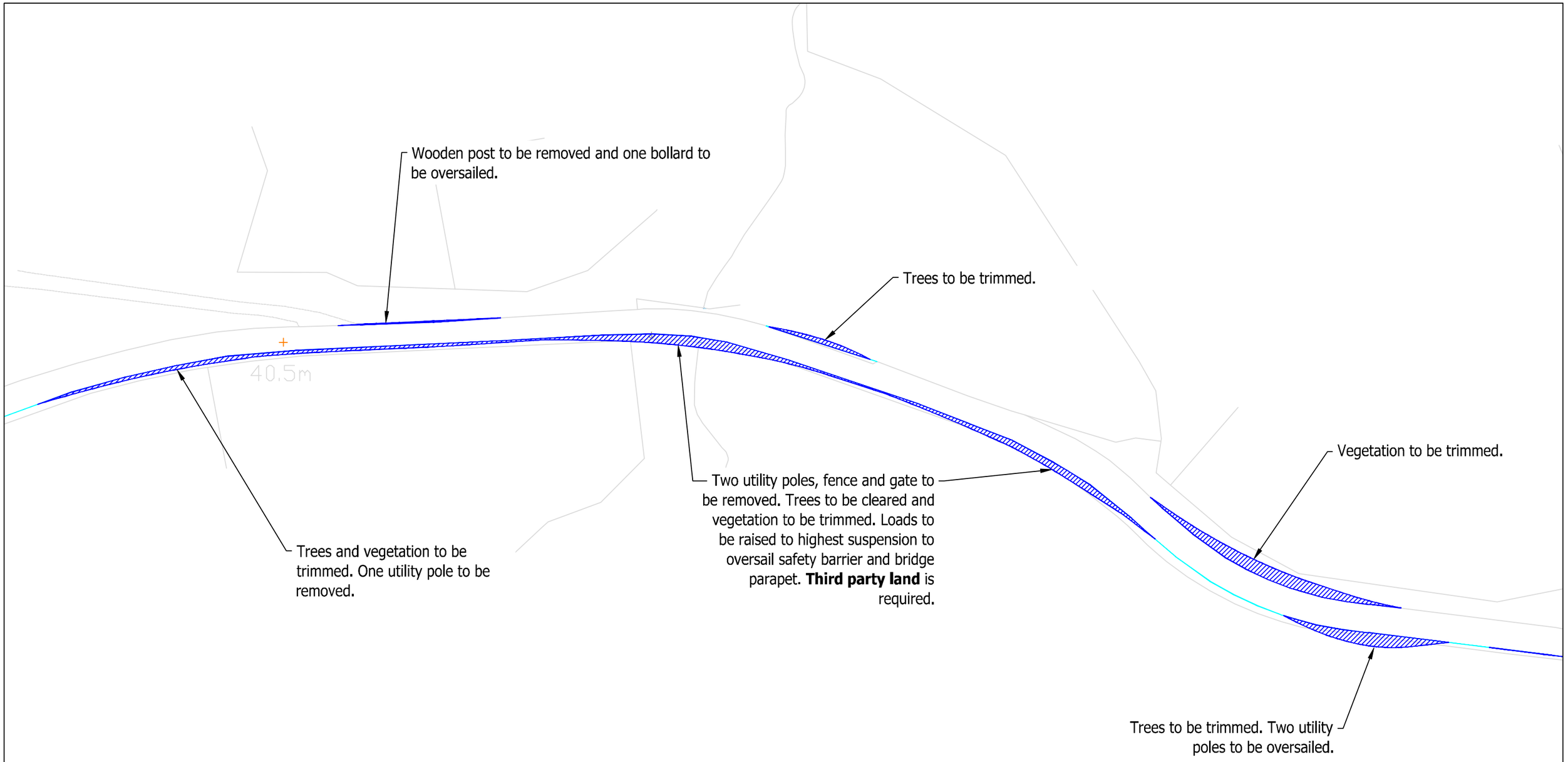
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK22

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: (LOCATION)

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		28

Scale: 1:750 @ A3

File No. 250317 Ballach N163 SPA.dwg

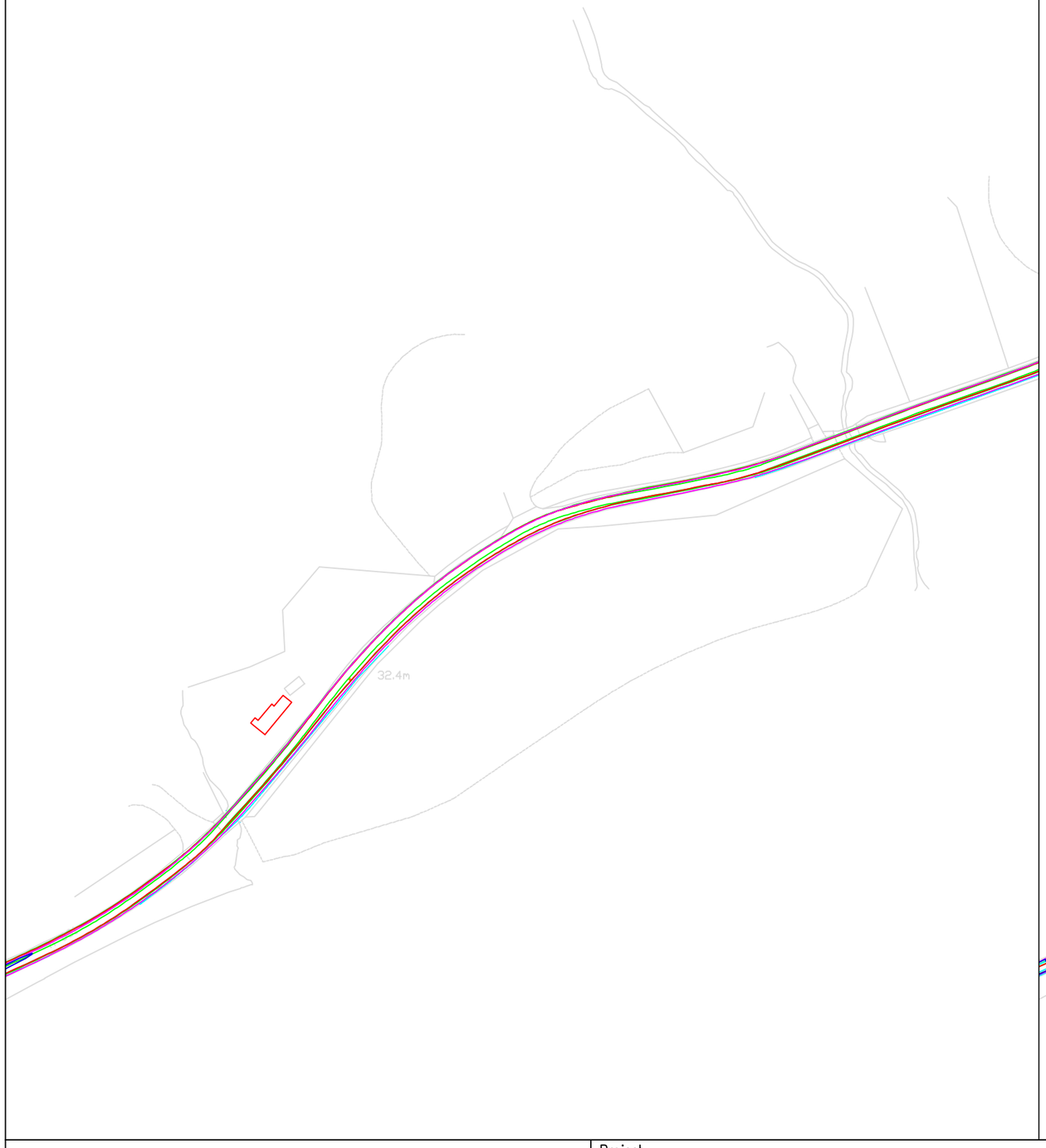
Drawing Status: Draft

Drawing No.: SK22A

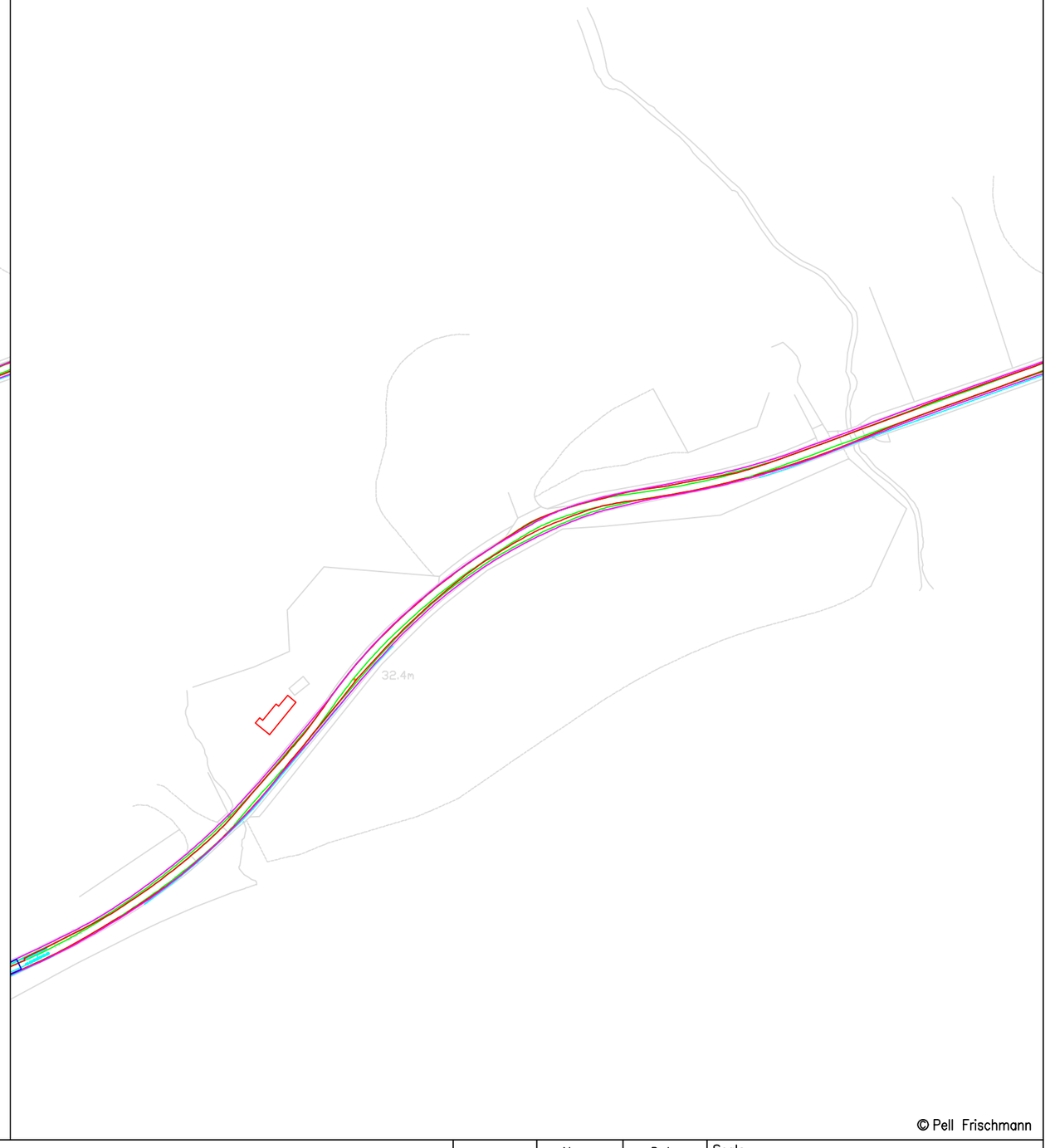
Notes:
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Revision: 00

Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, West of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		29

Scale: 1:2000 @ A3

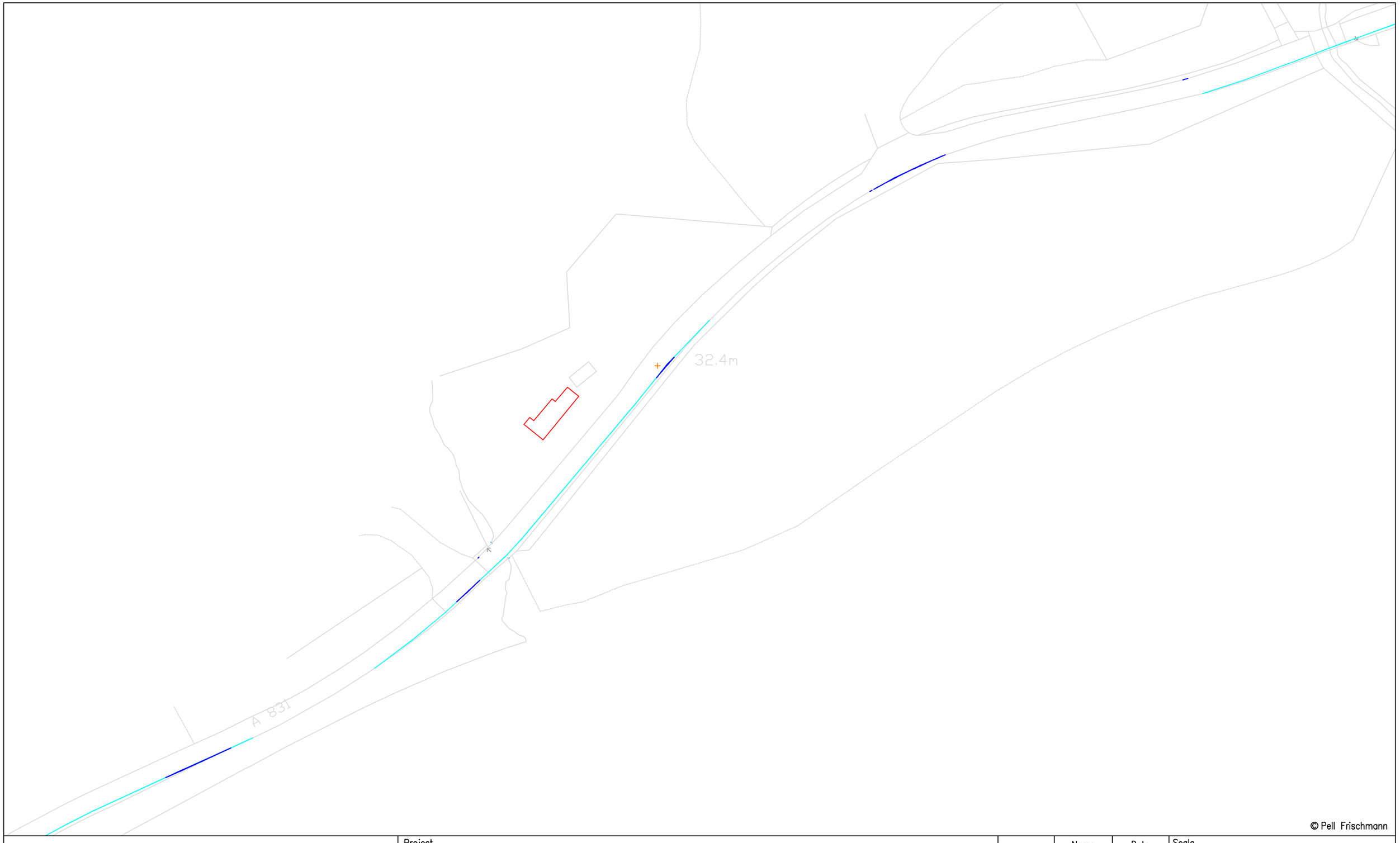
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK23

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, West of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		29

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

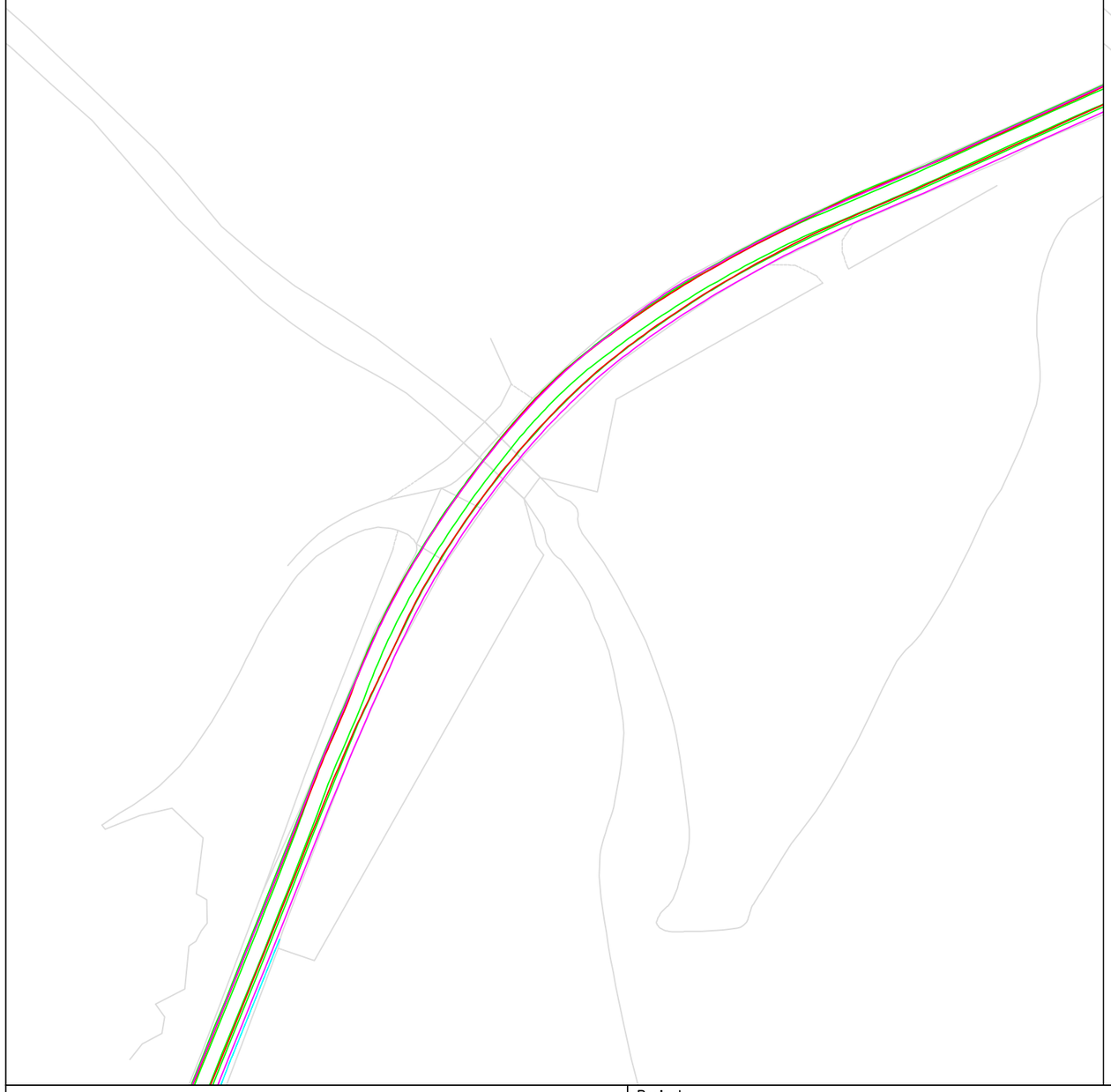
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Drawing No.: SK23A

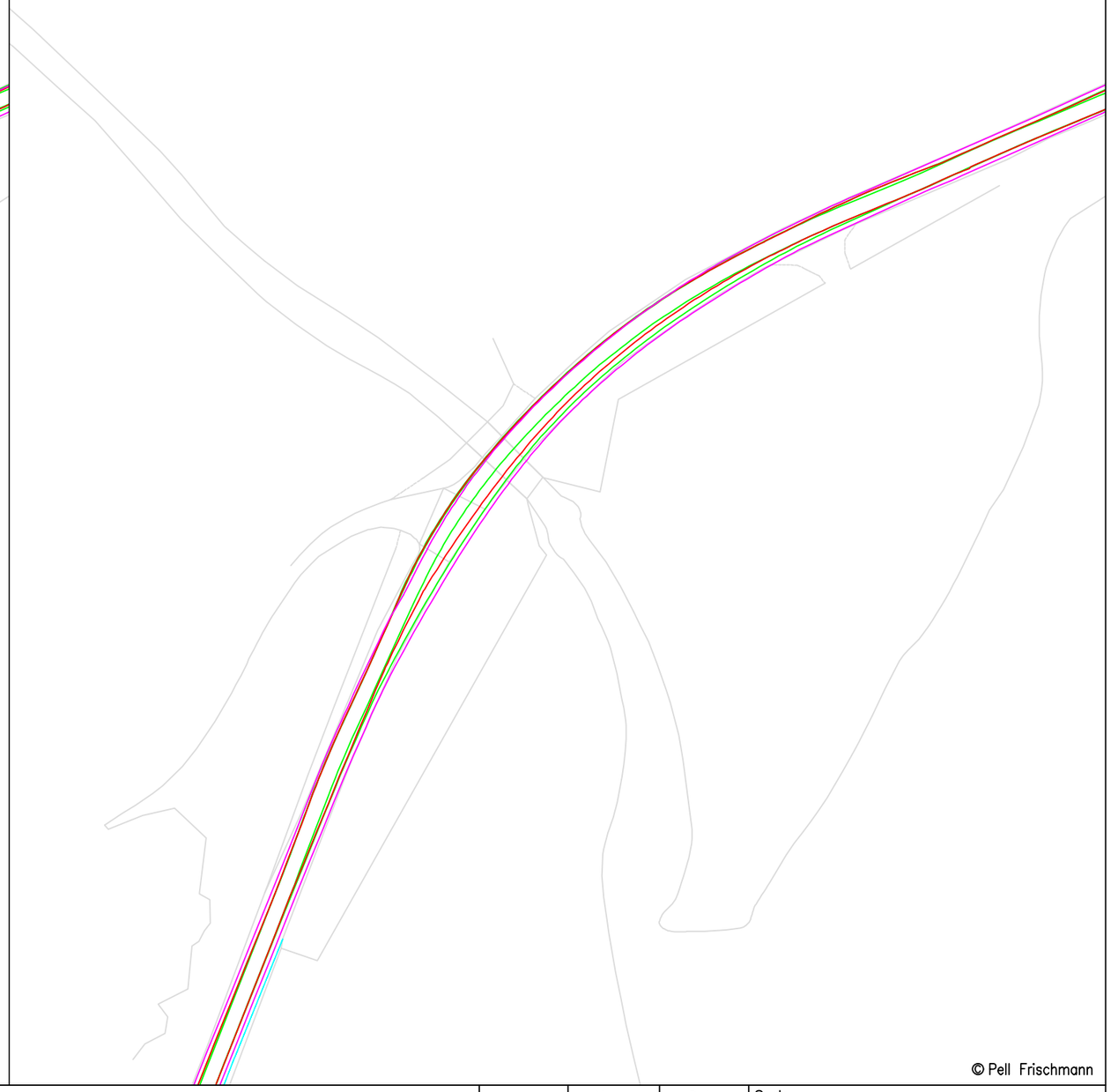
Notes:
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Blade
Lifter



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Southwest of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		30

Scale: 1:1000 @ A3

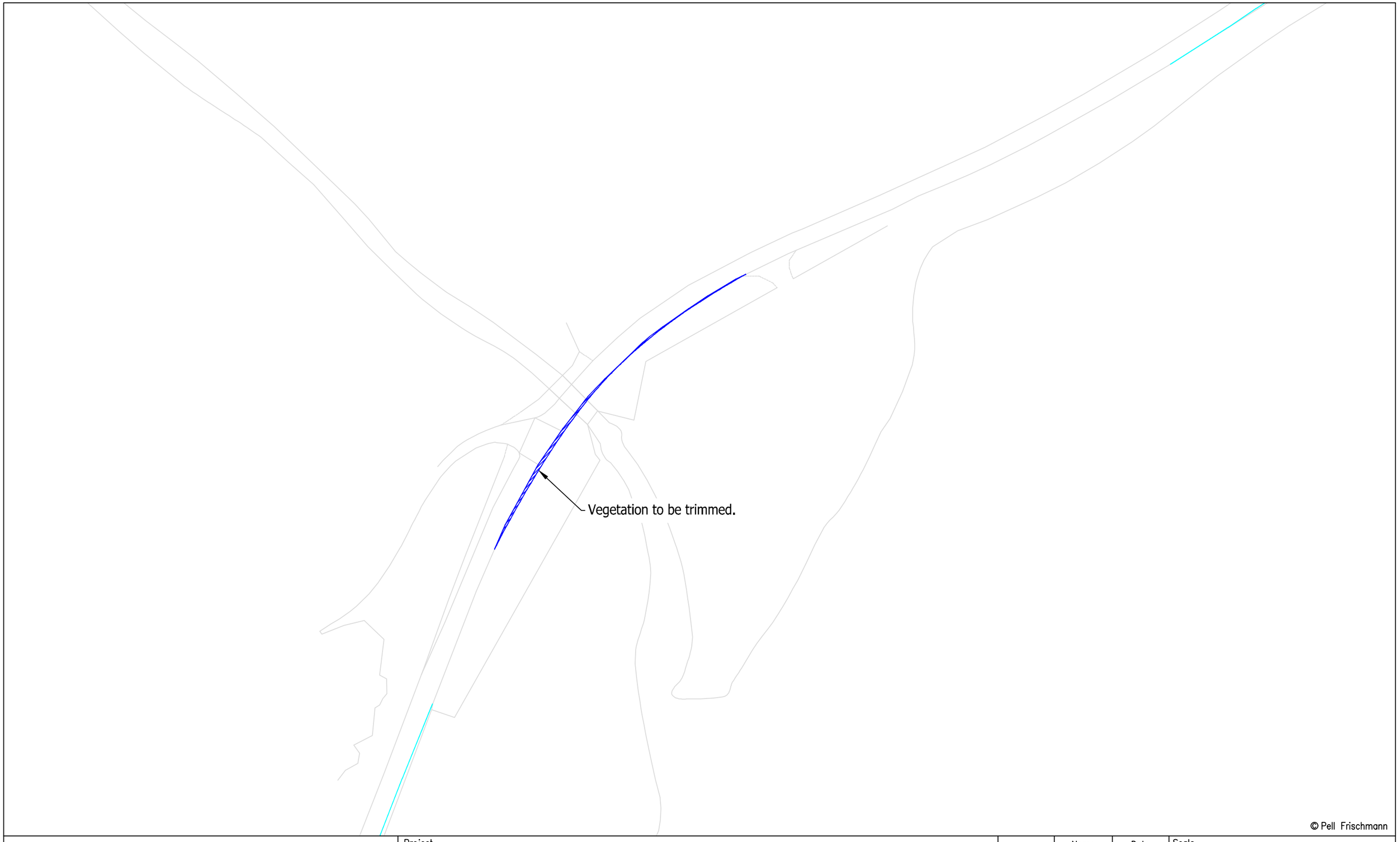
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK24

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Southwest of Kilmorack

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		30

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

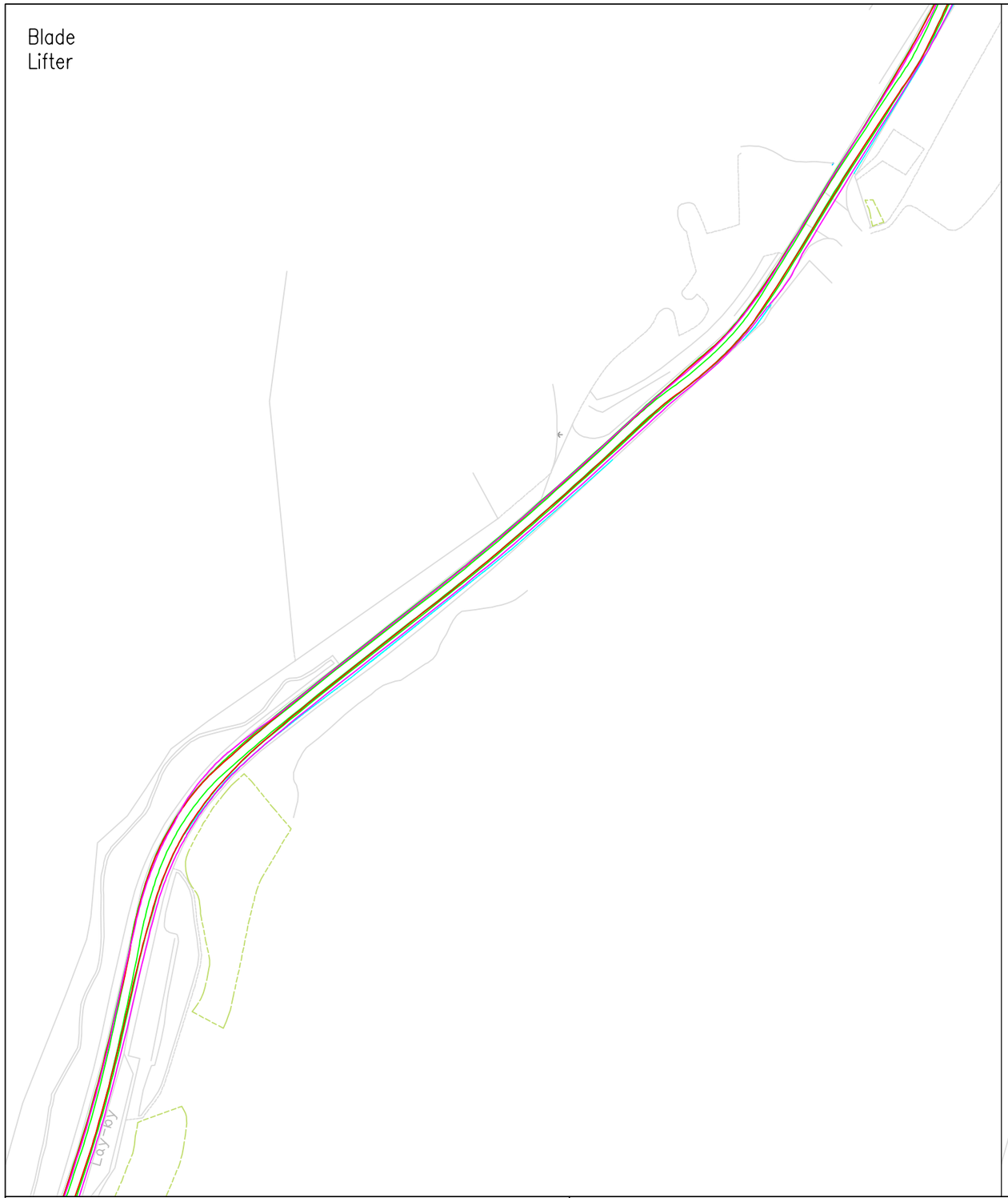
Drawing Status: Draft

Drawing No. SK24A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		31,32

Scale: 1:1500 @ A3

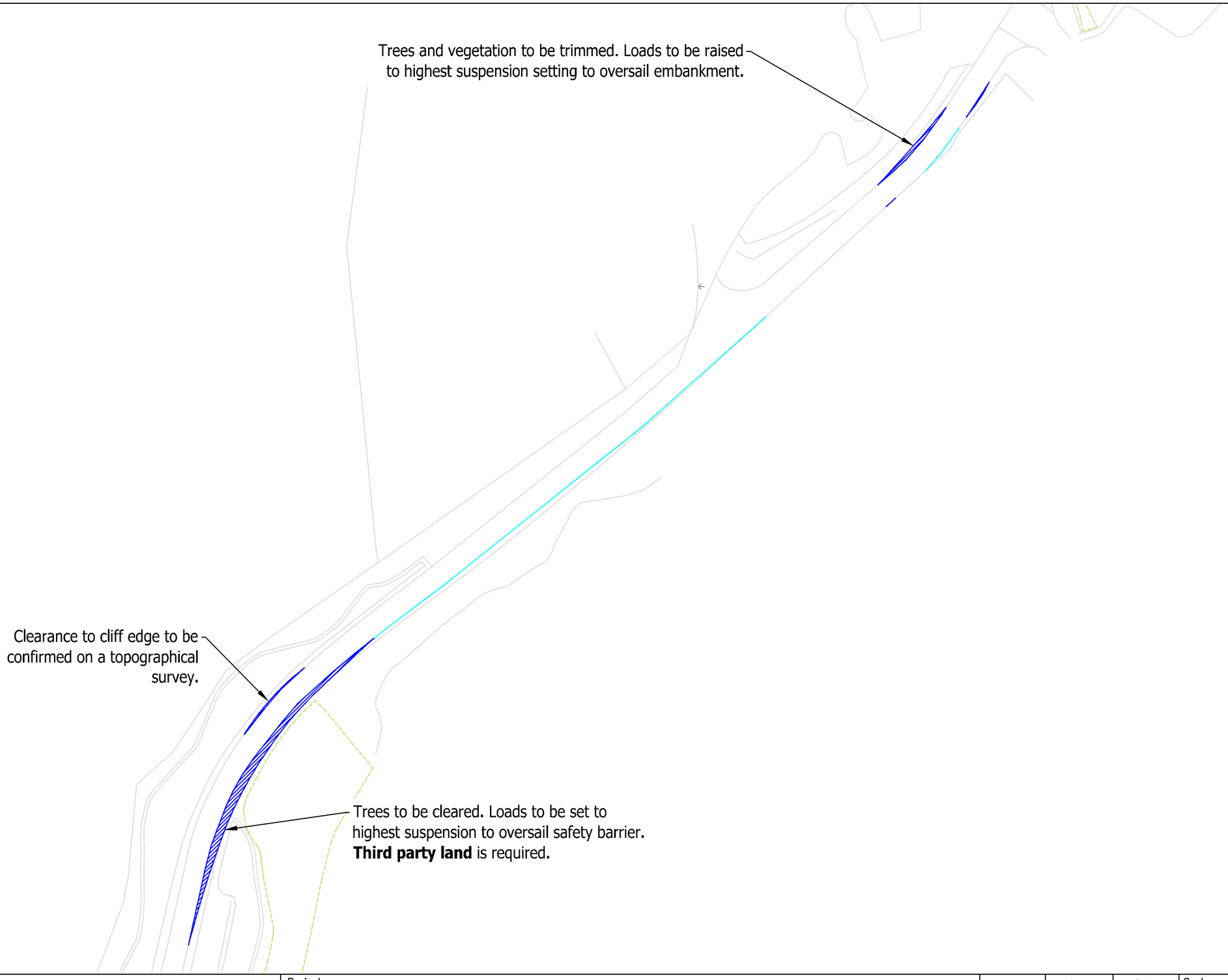
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK25

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		31,32

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

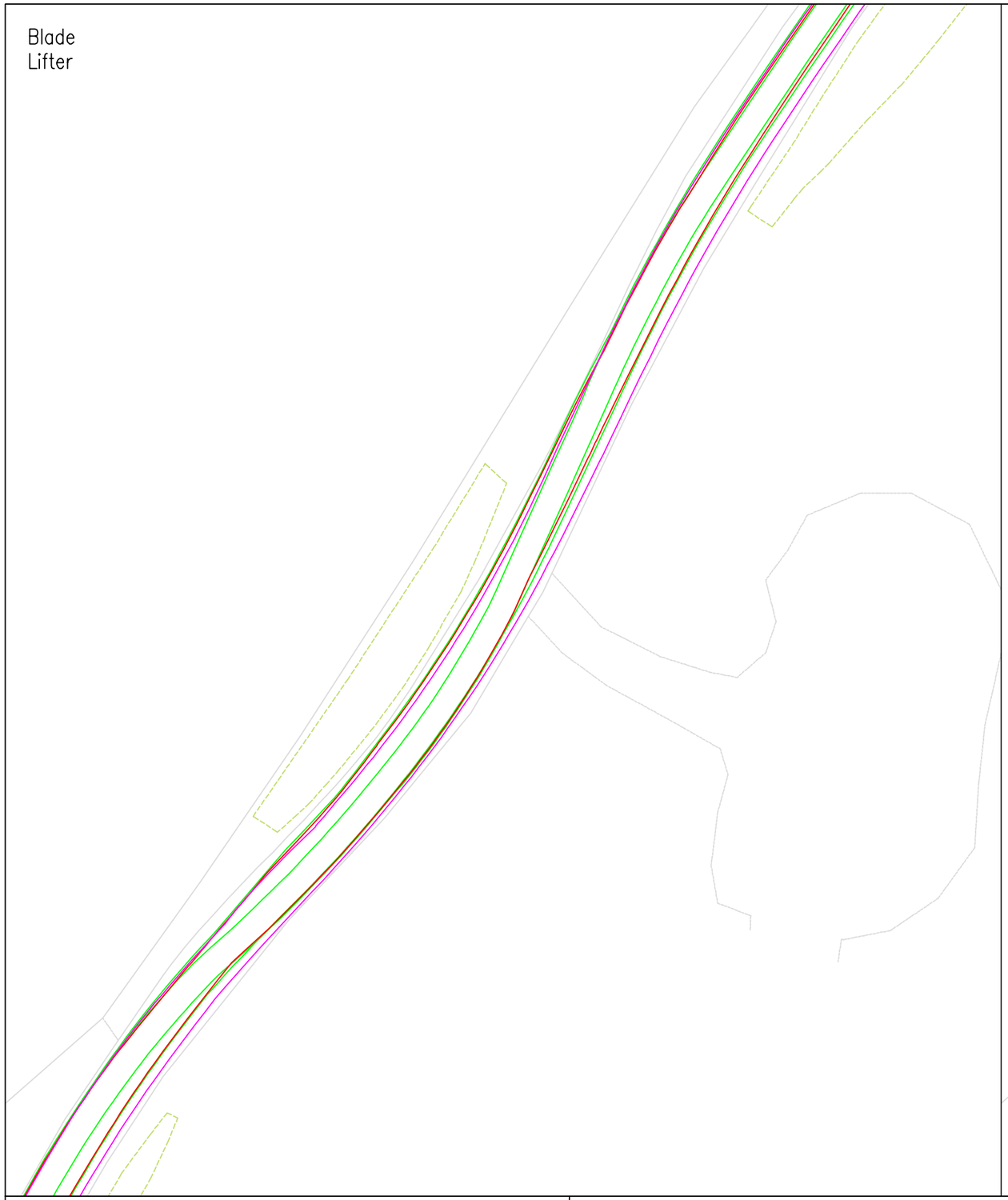
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Drawing No. SK25A

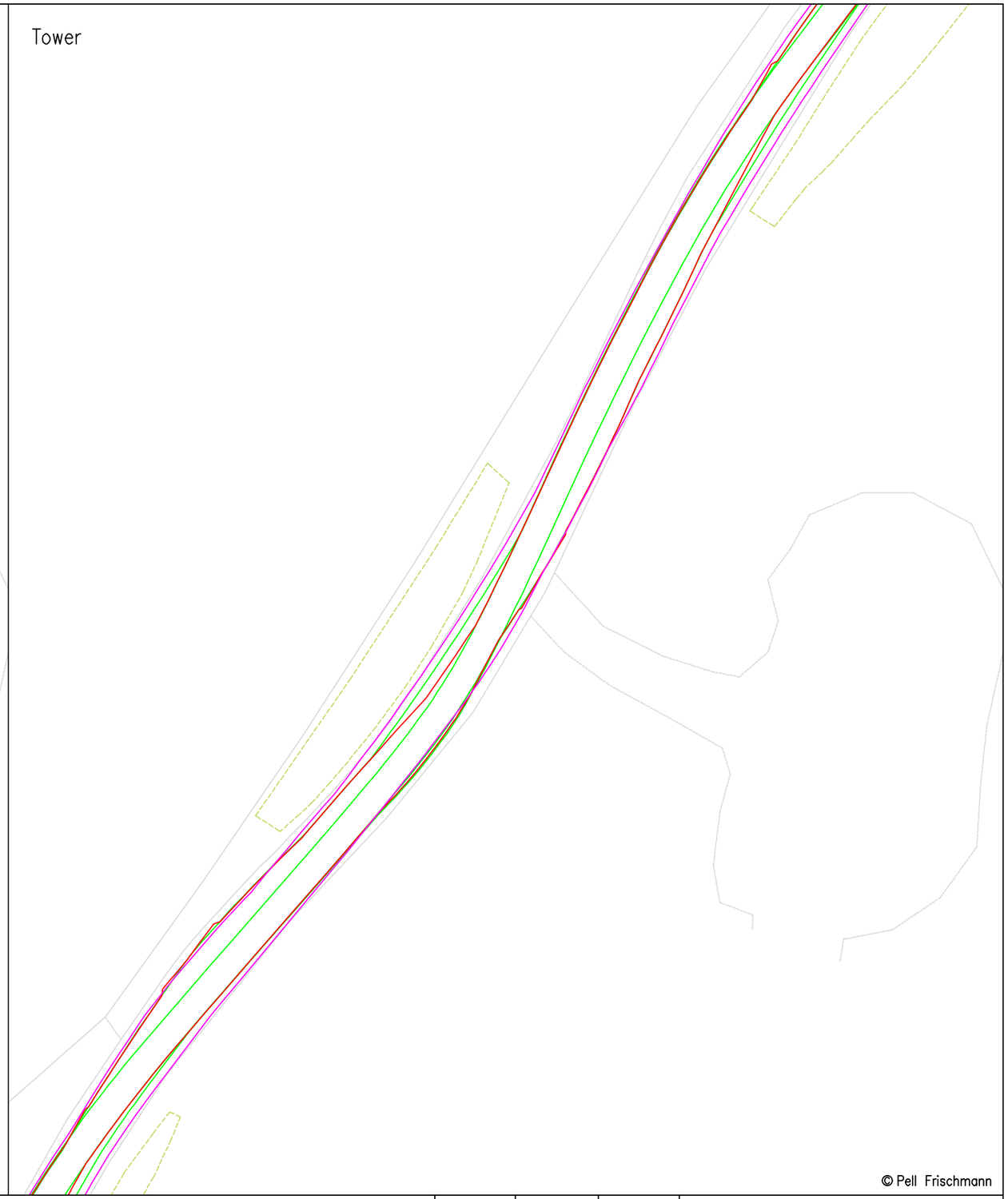
Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		33

Scale: 1:500 @ A3

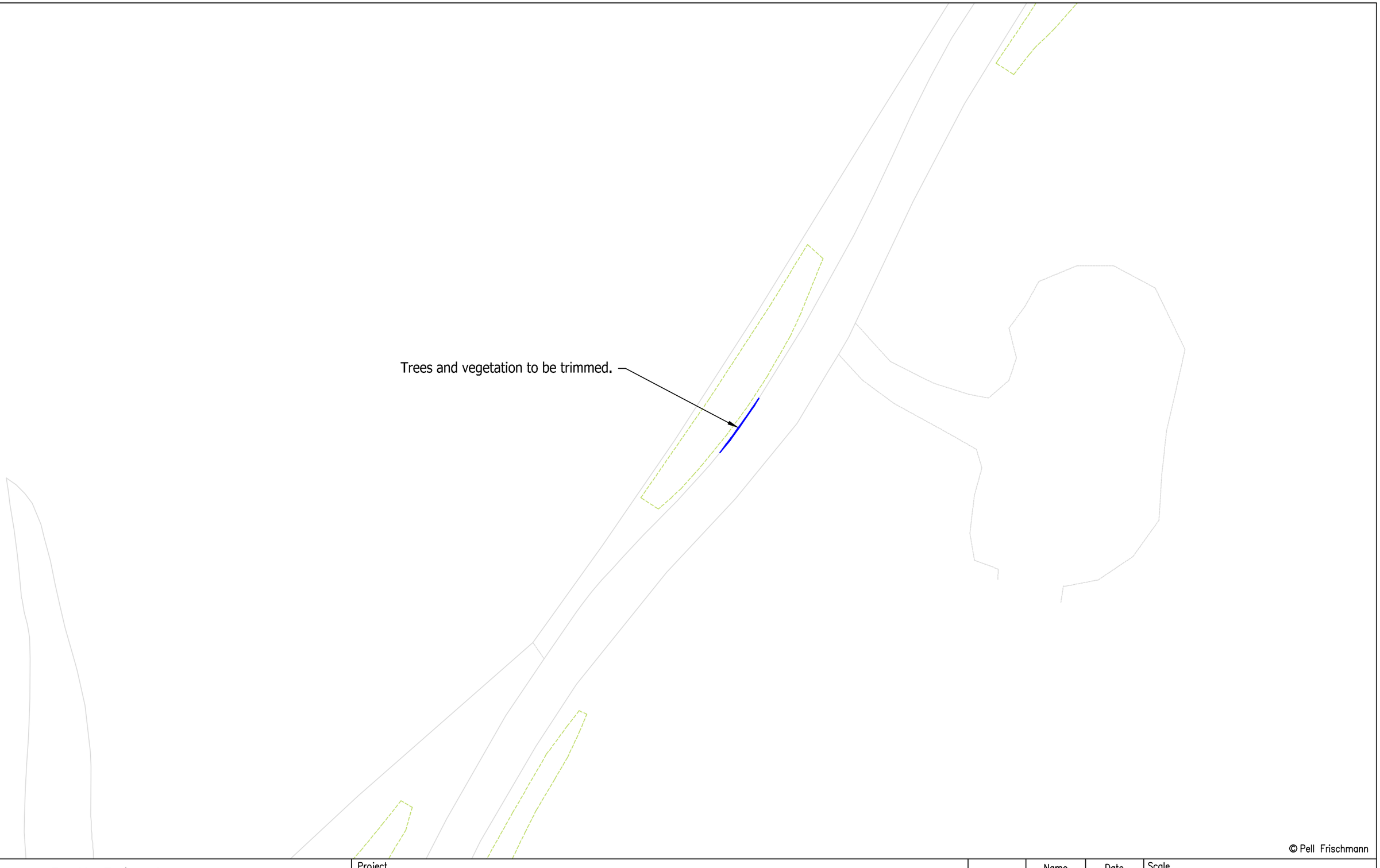
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK26

Notes:
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Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		33

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK26A

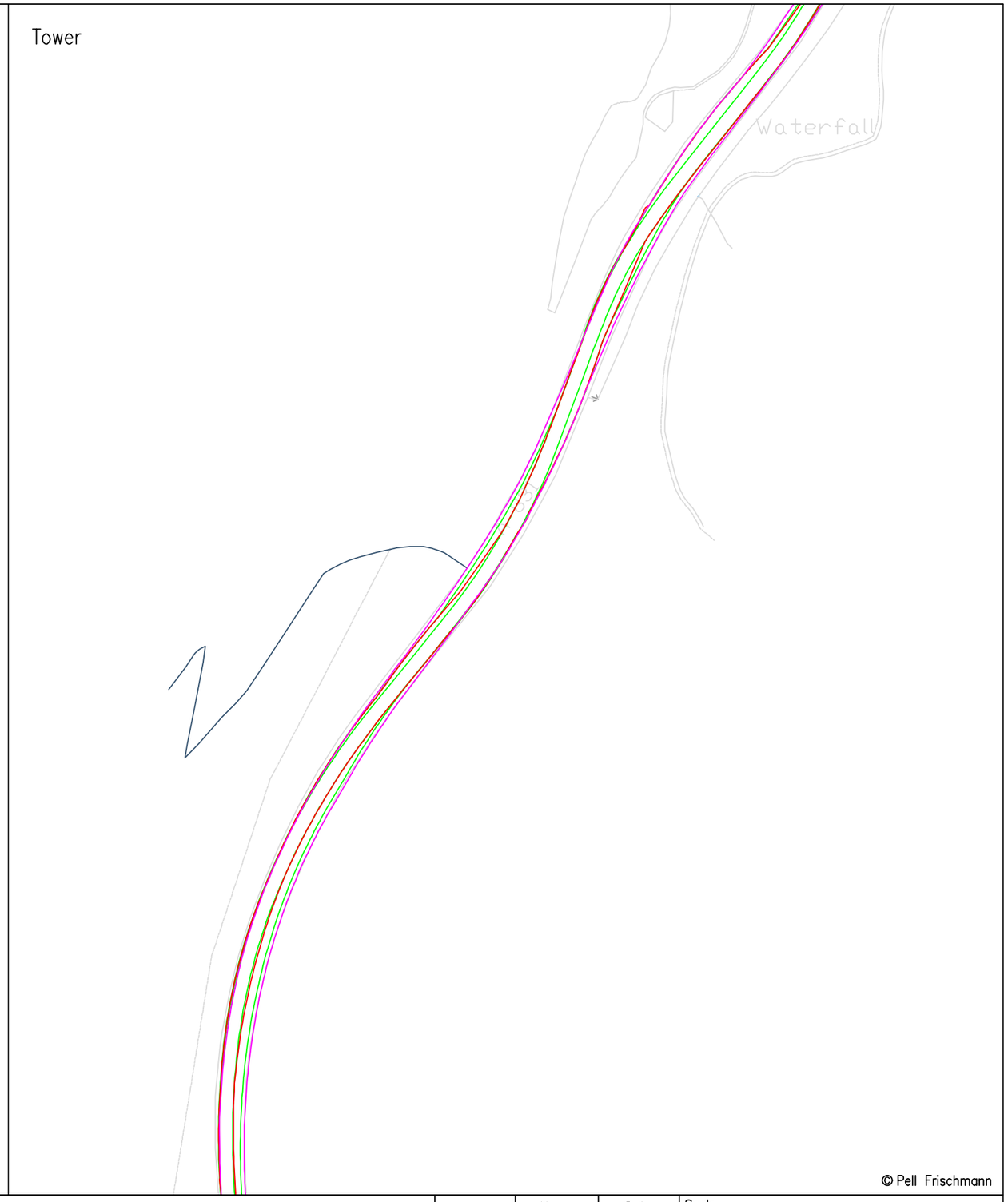
Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		34

Scale: 1:1000 @ A3

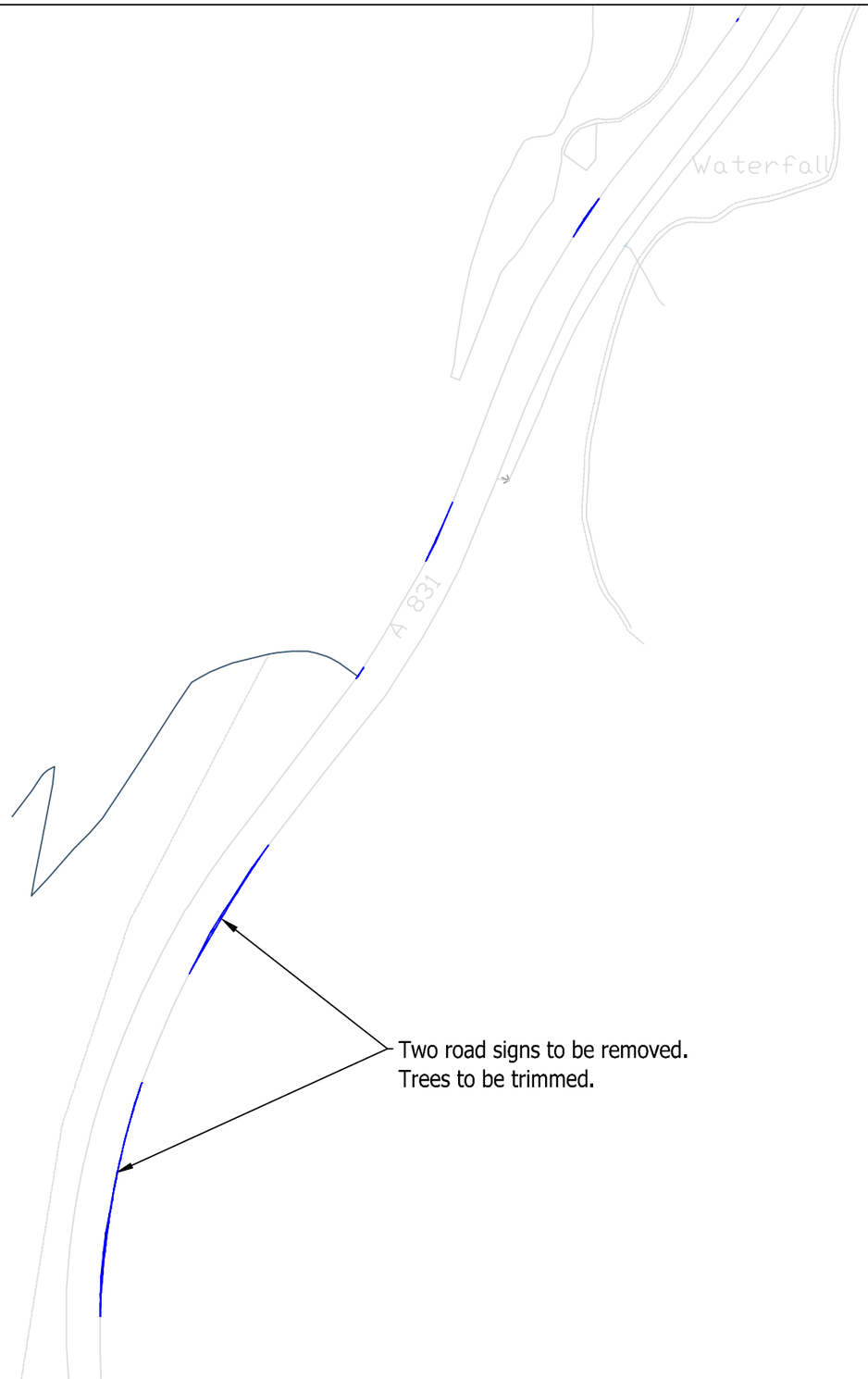
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK27

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, North of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		34

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK27A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		35

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK28

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		35

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

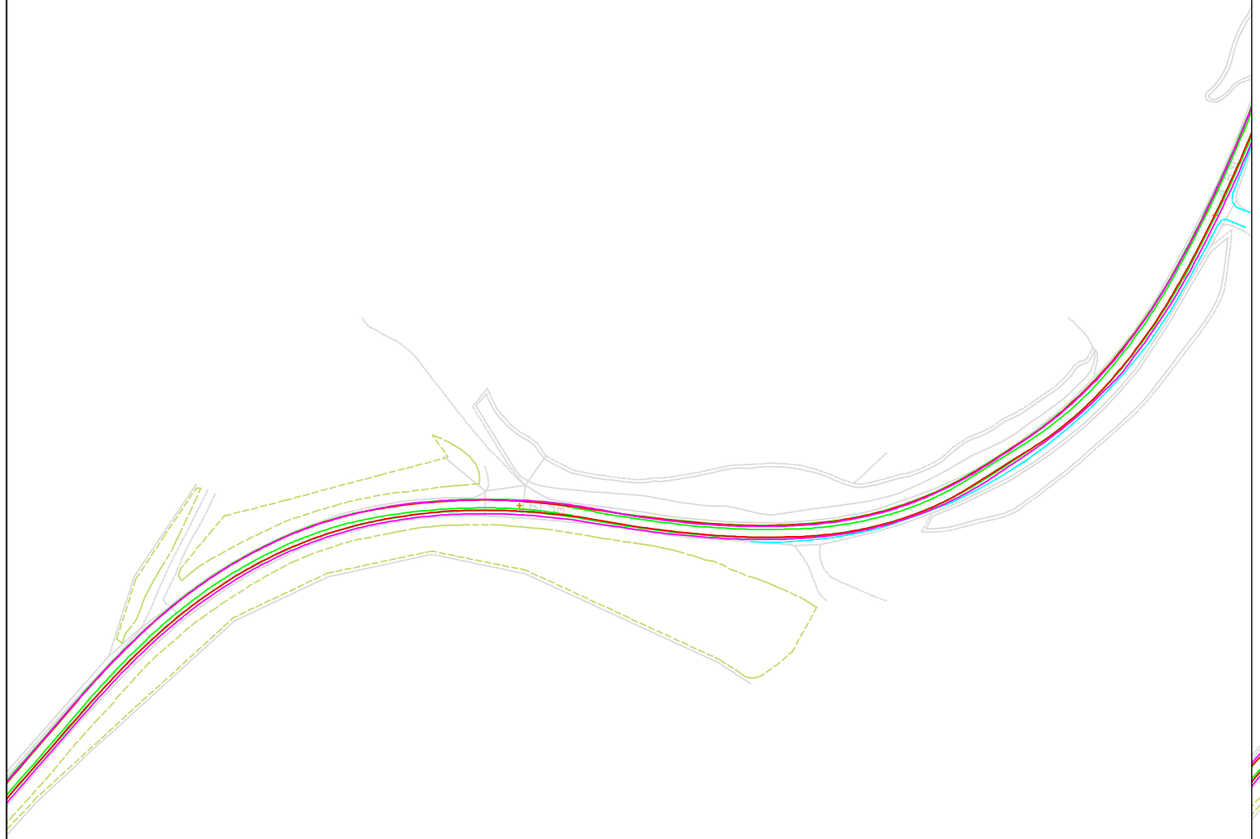
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Drawing No.: SK28A

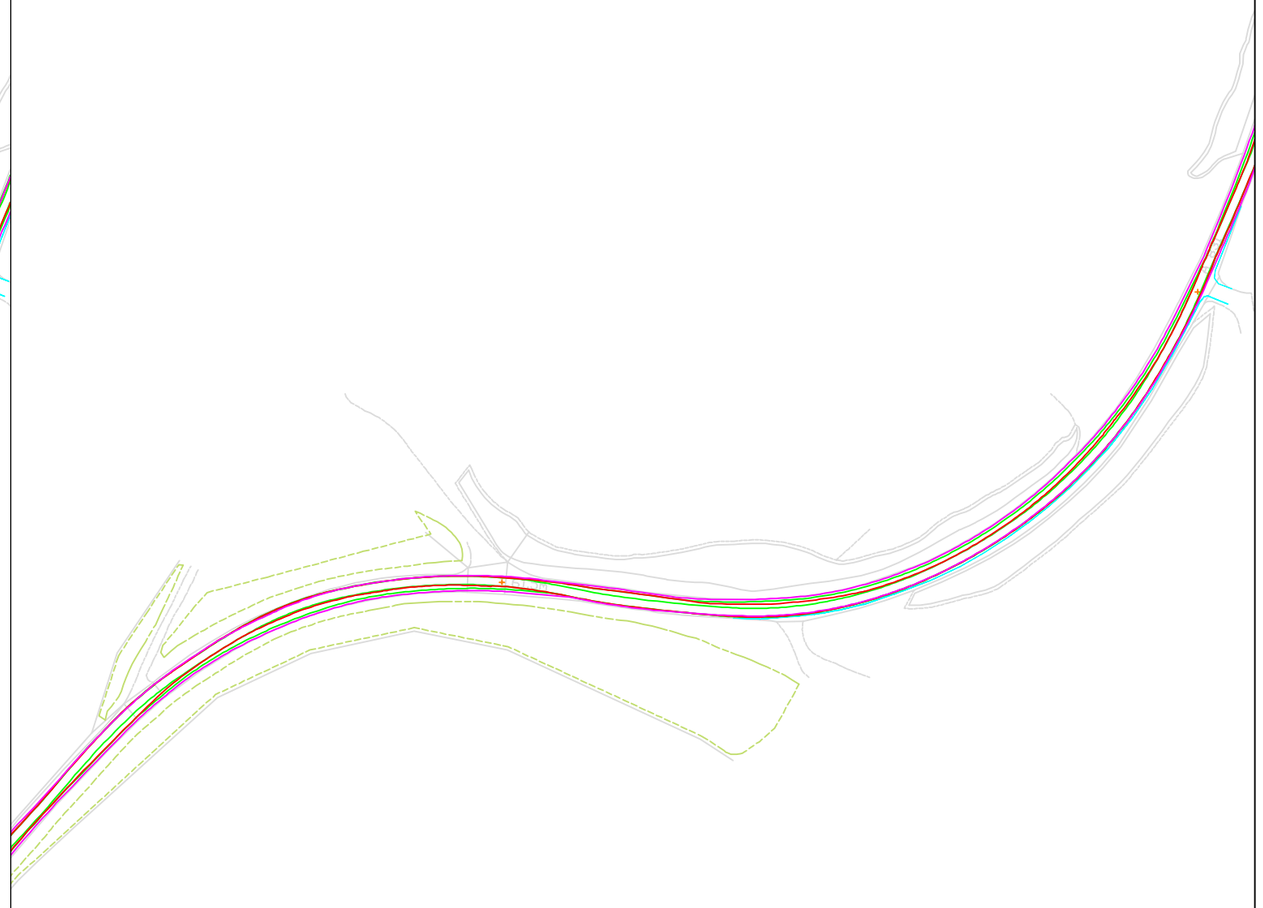
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, South of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		36,37

Scale: 1:2000 @ A3

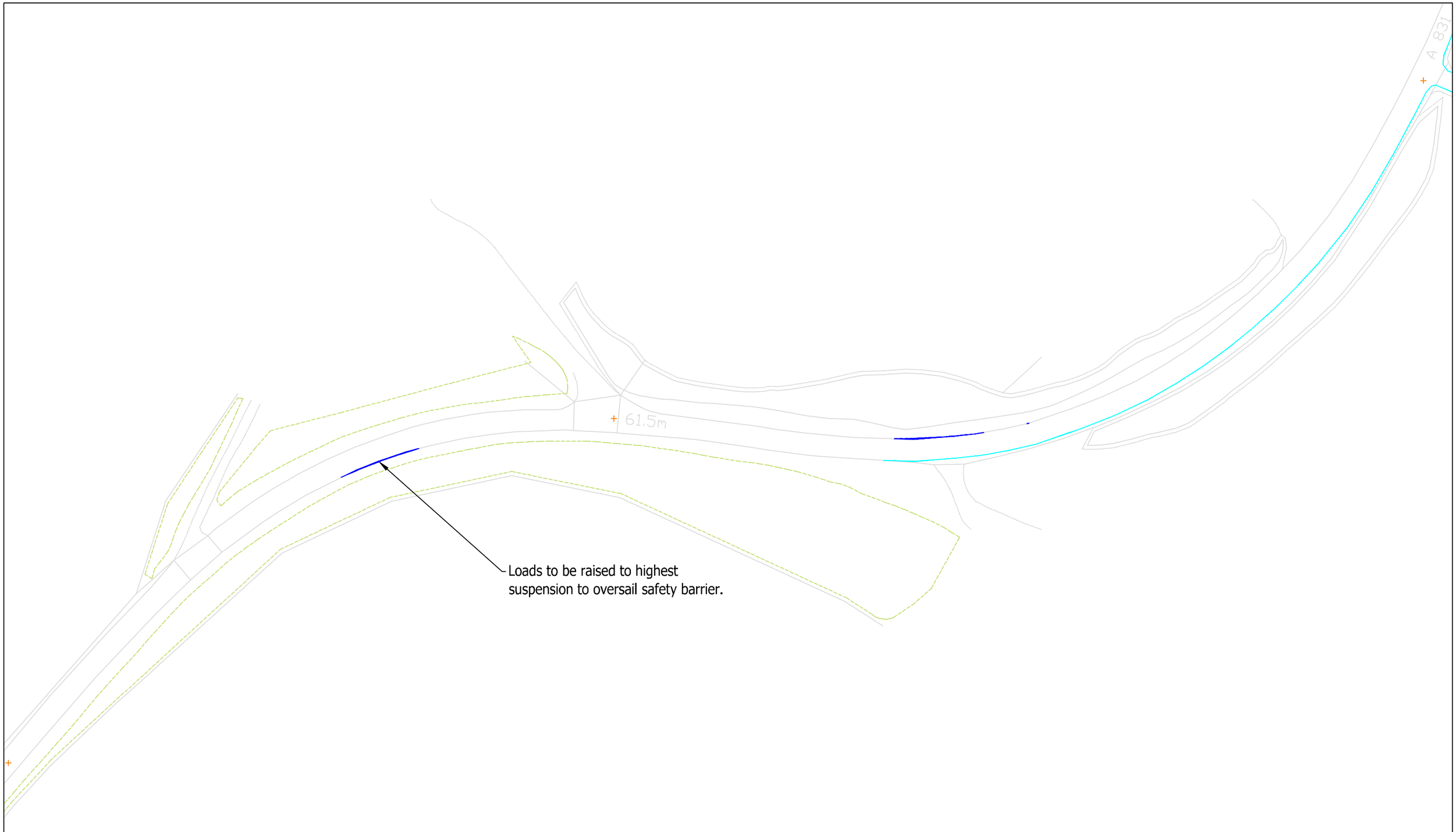
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK29

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, South of Crask of Aigas

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		36,37

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

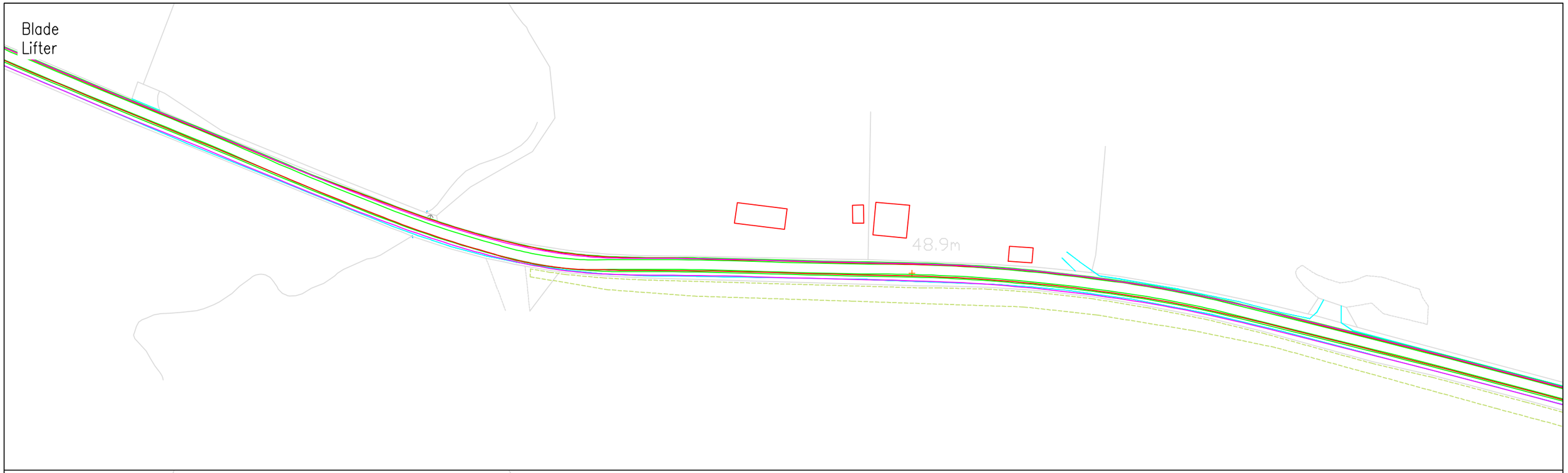
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Drawing No.: SK29A

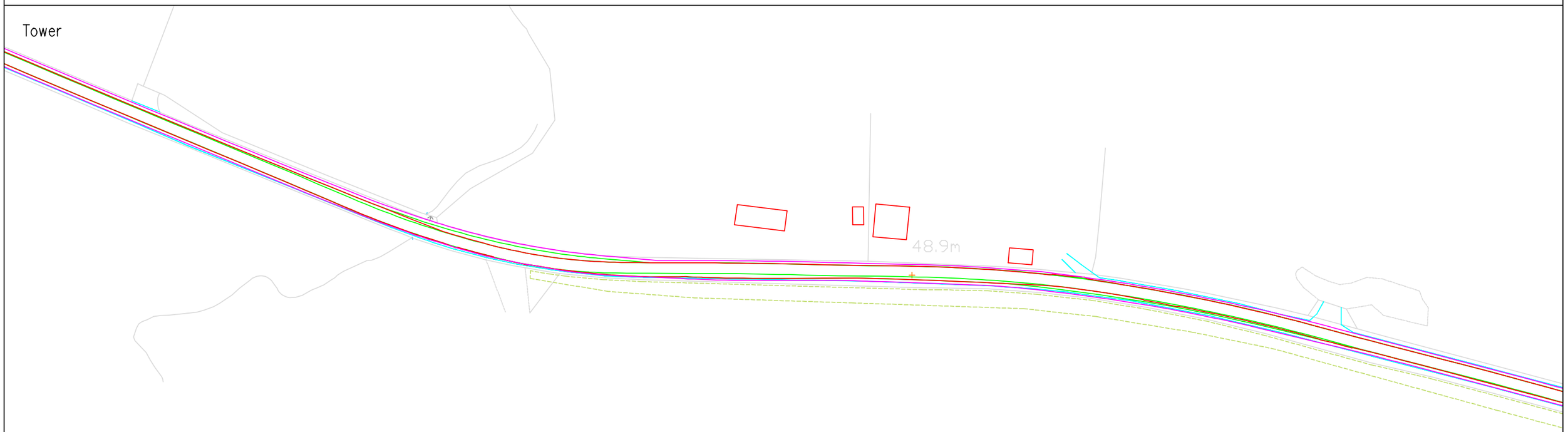
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Revision: 00

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		38

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK30

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		38

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

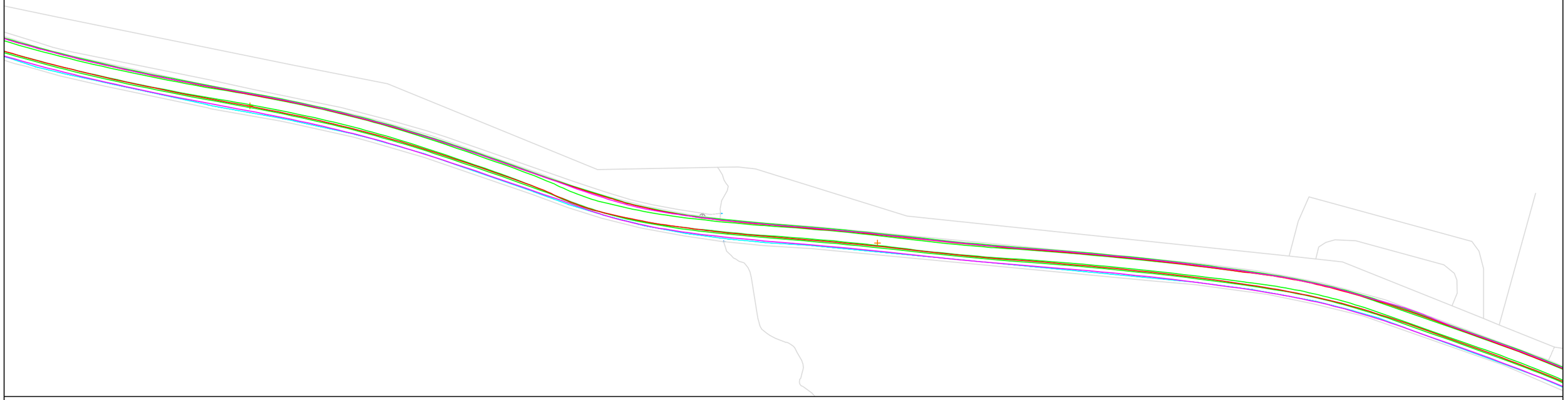
Drawing Status: Draft

Drawing No.: SK30A

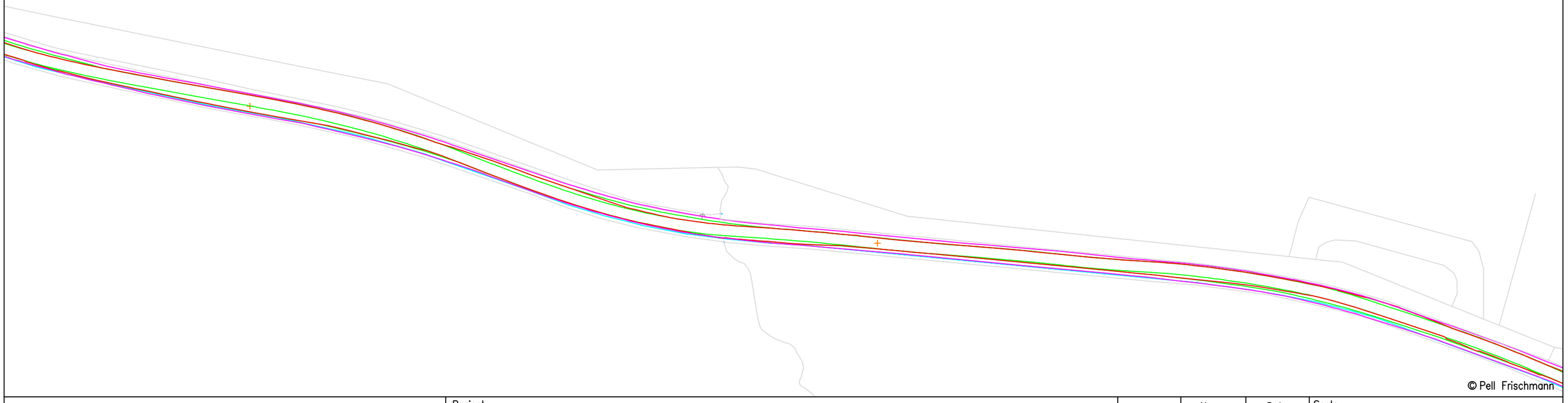
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		39,40

Scale: 1:1000 @ A3

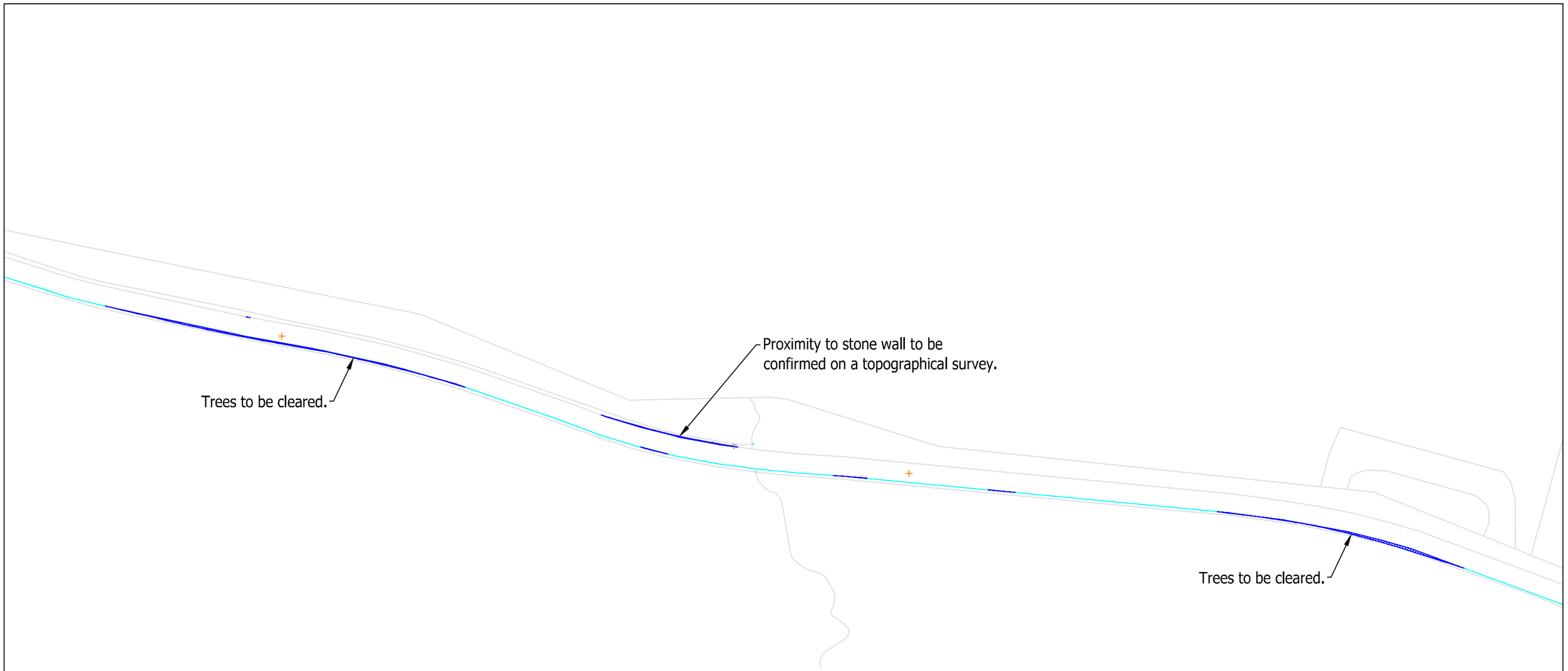
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK31

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		39,40

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

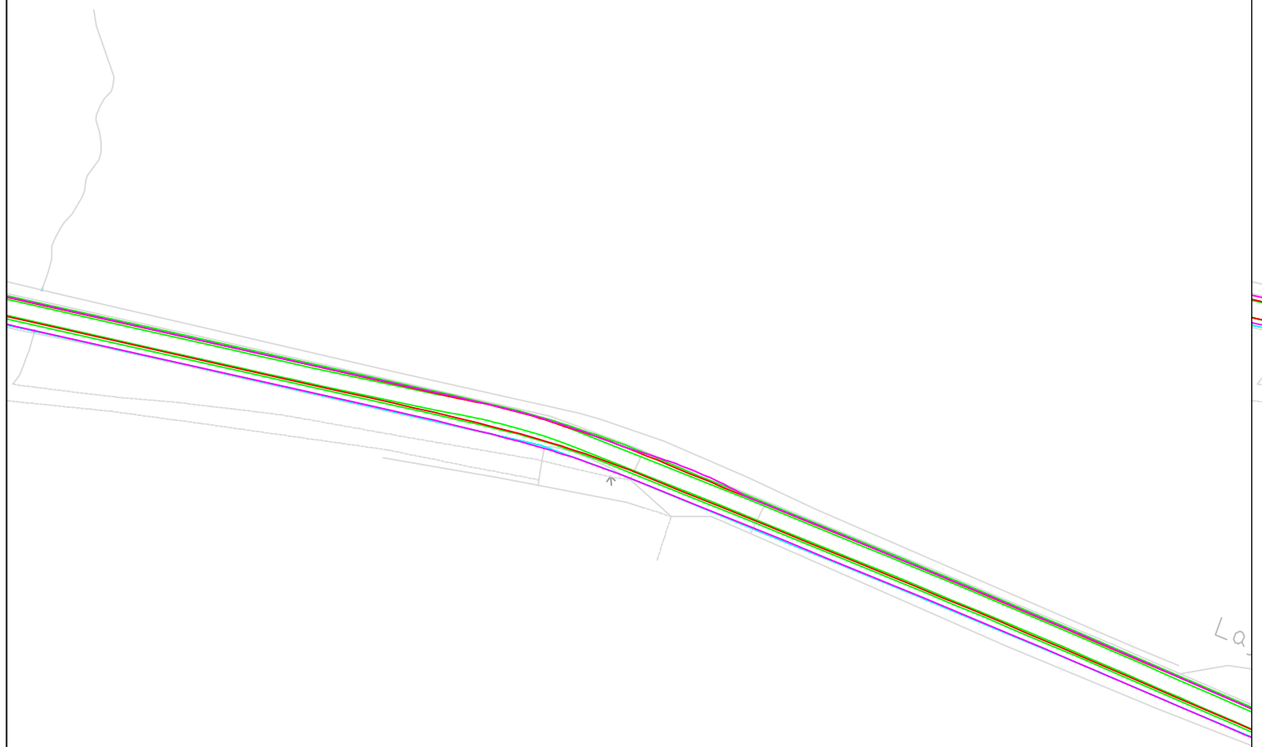
Drawing Status: Draft

Drawing No.: SK31A

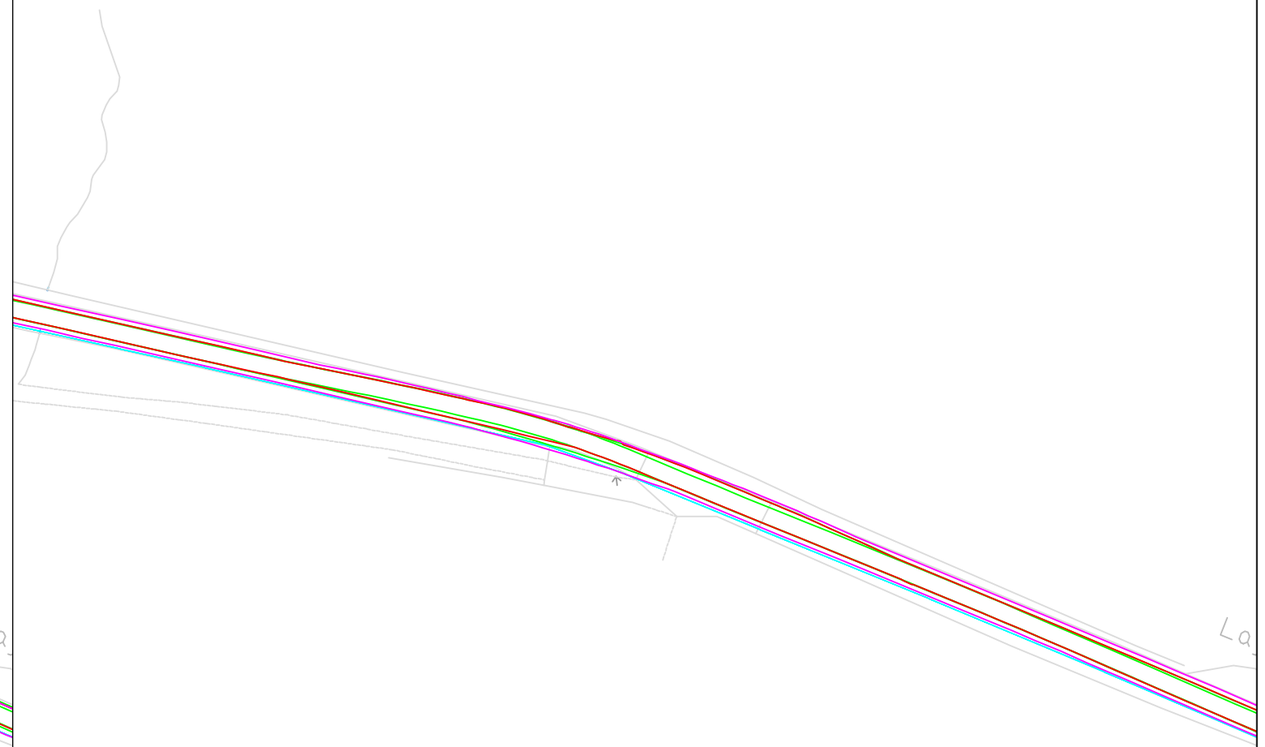
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade
Lifter



Tower



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		41

Scale: 1:1000 @ A3

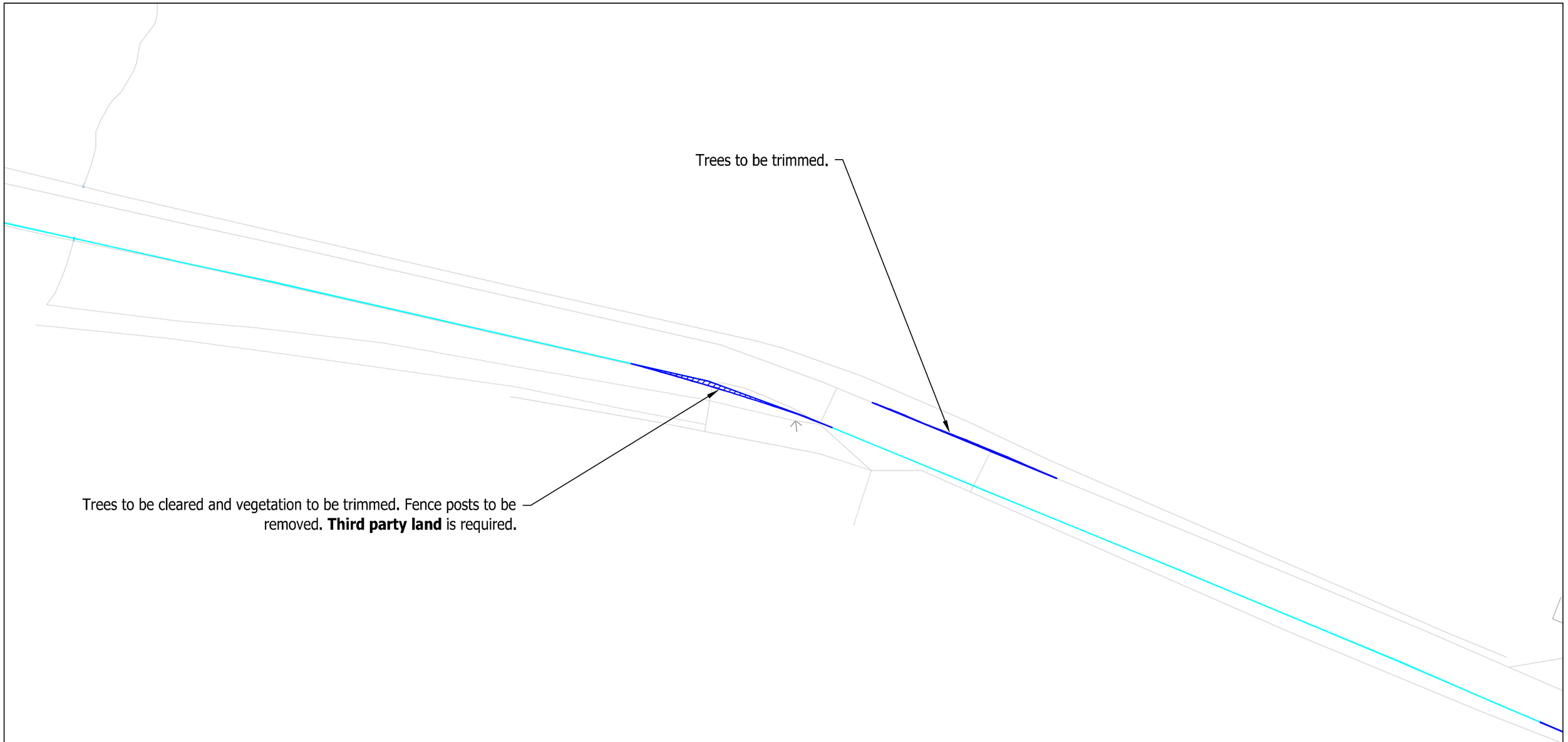
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK32

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		41

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

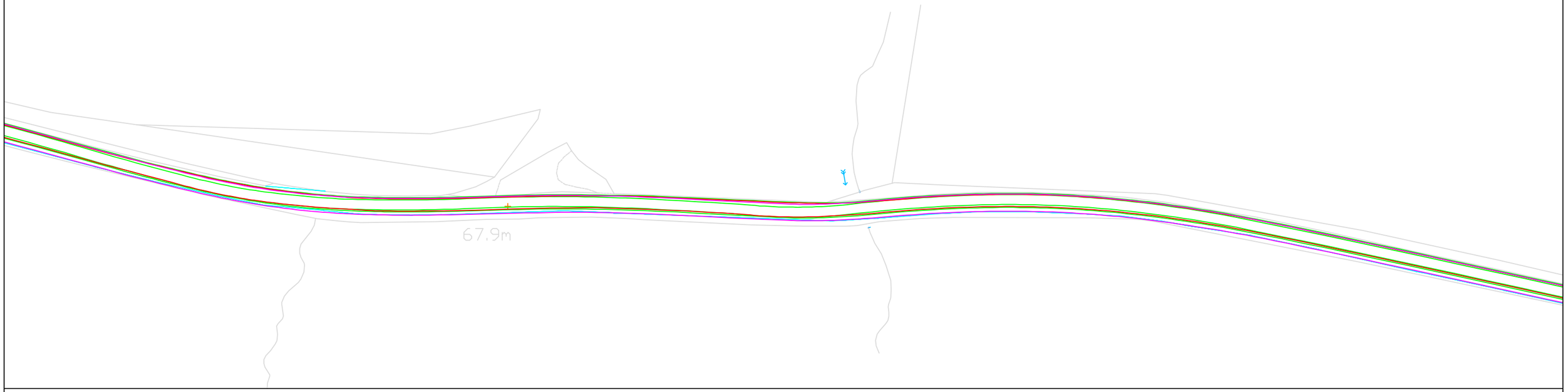
Drawing Status: Draft

Drawing No. SK32A

Notes:
1. All mitigation is subject to confirmation through a test run.
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Revision: 00

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		42,43

Scale: 1:1000 @ A3

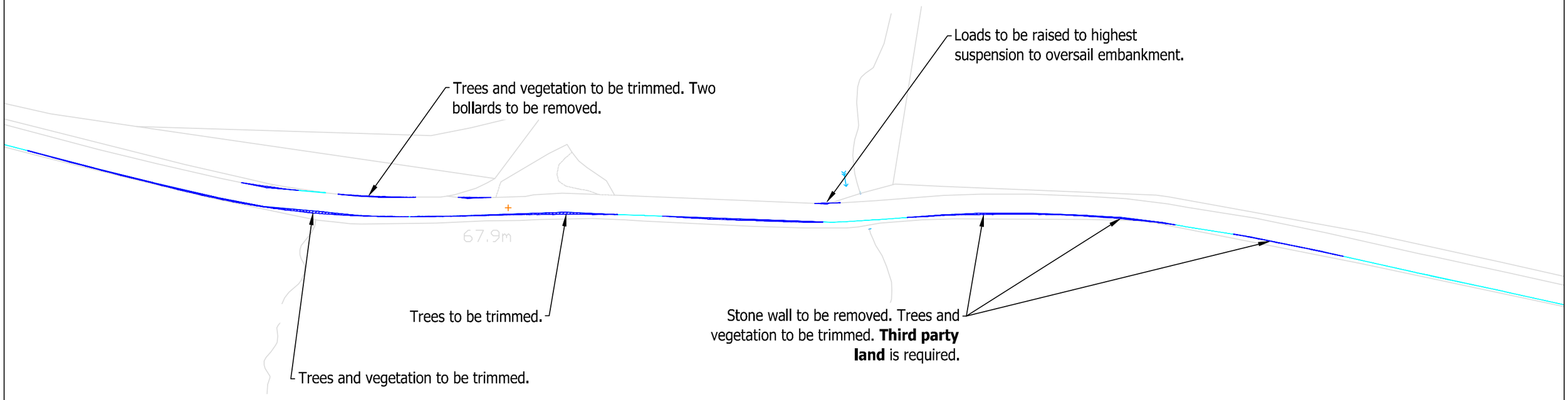
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK33

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, East of Erchless Castle

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		42,43

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK33A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Site Access

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		44

Scale: 1:1000 @ A3

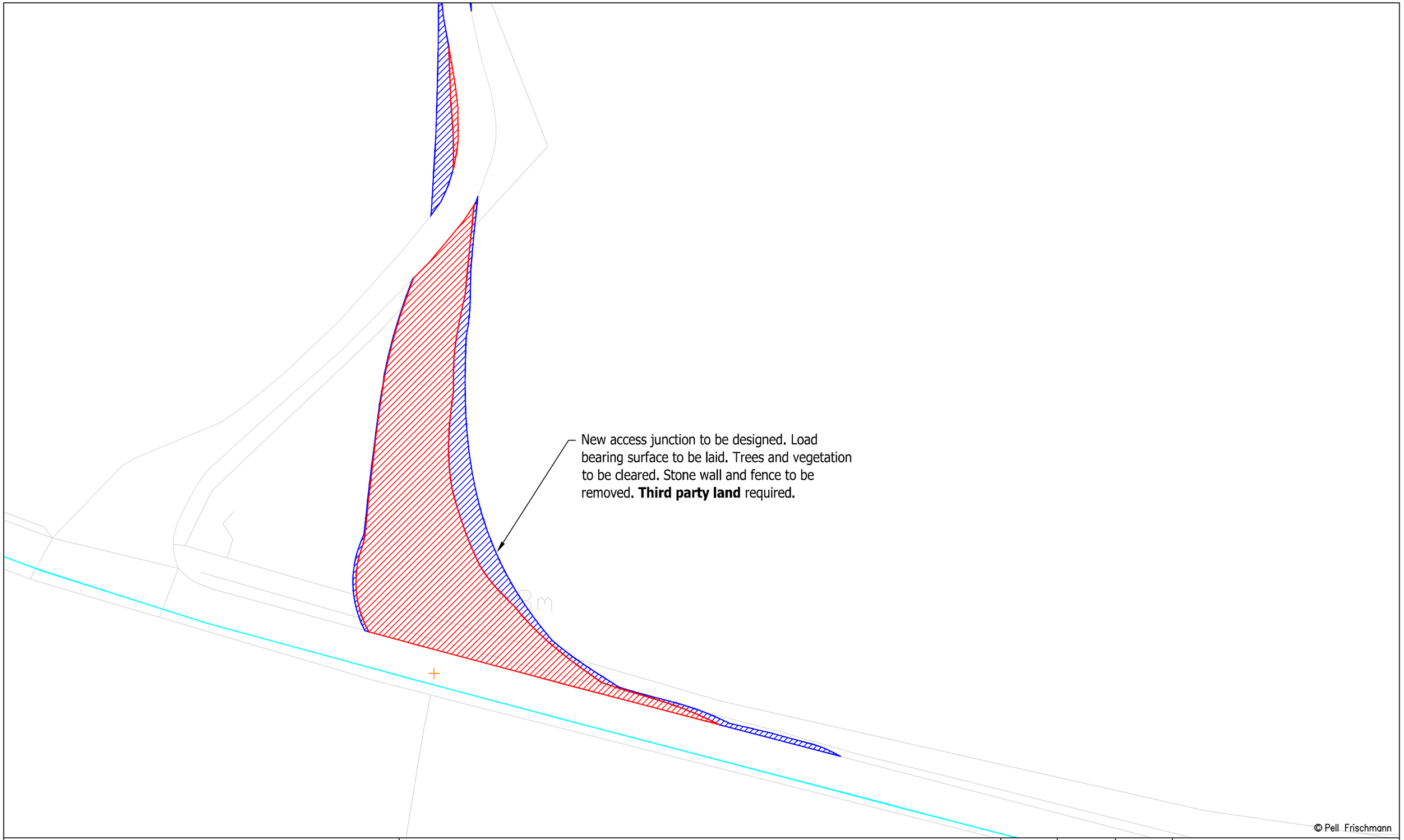
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK34

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A831, Site Access

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		44

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

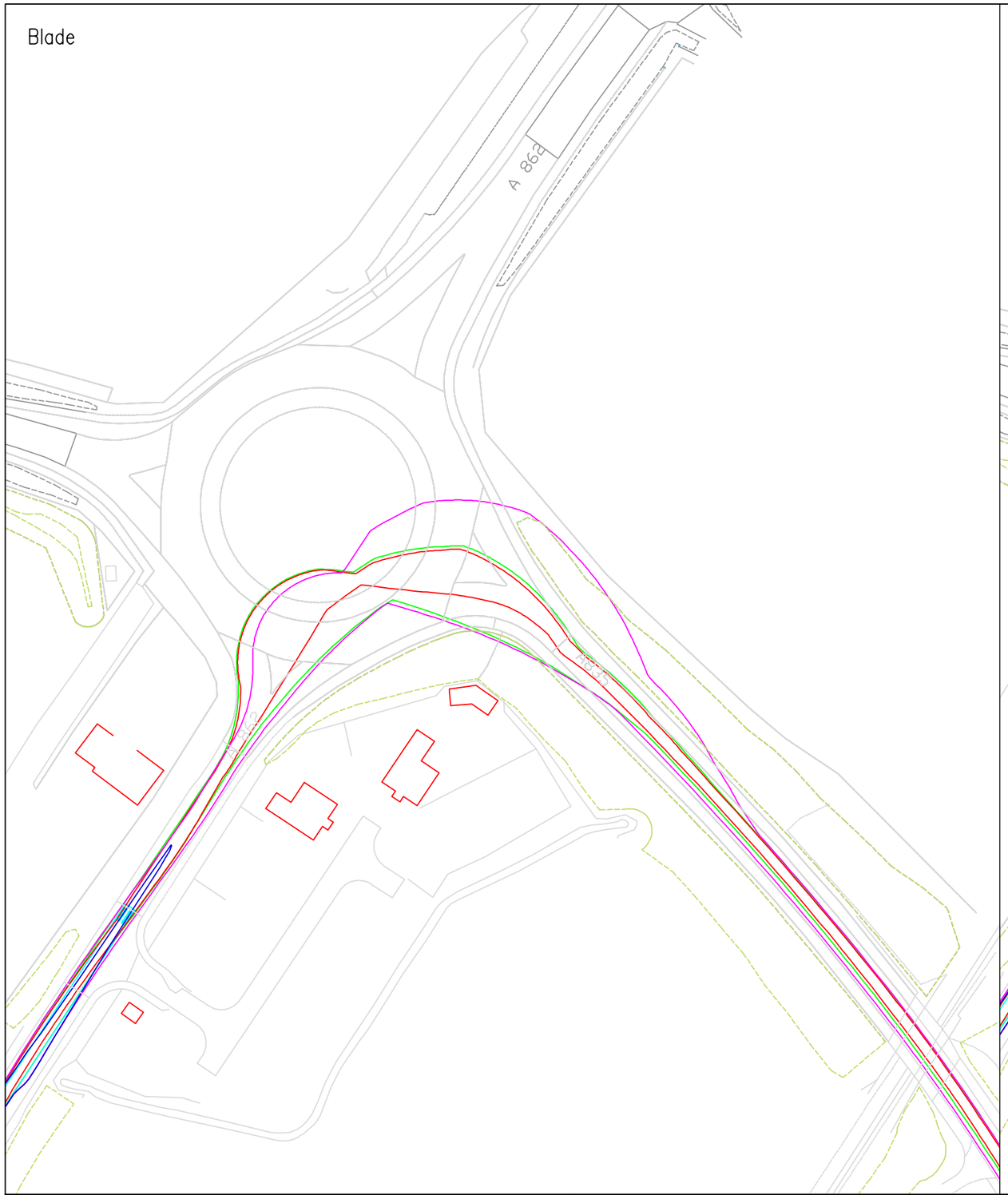
Drawing Status: Draft

Drawing No.: SK34A

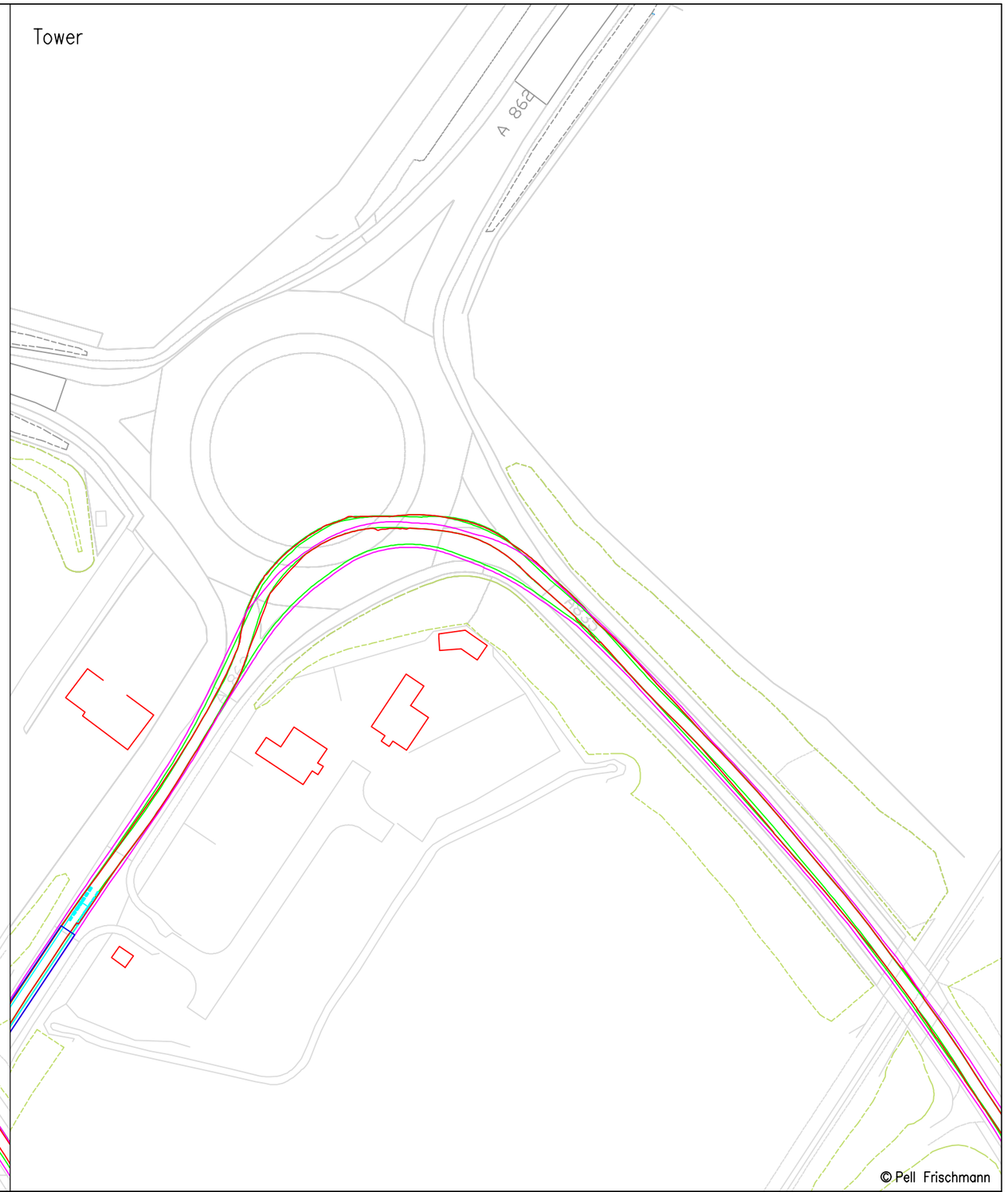
Notes:
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Maryburgh Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		45

Scale: 1:1250 @ A3

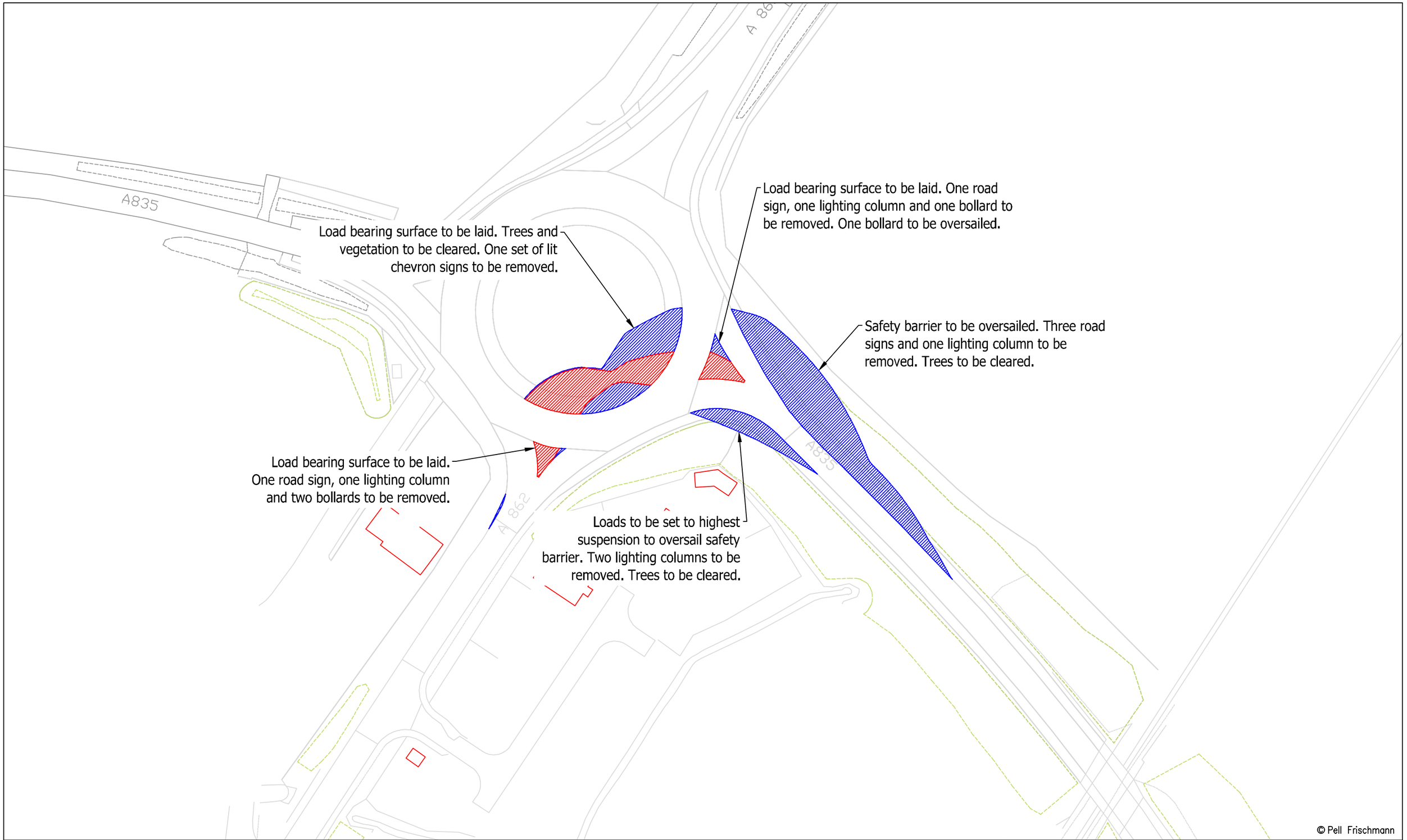
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK35

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Maryburgh Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		45

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK35A

Notes:
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Client: EnergieKontor

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Overrun; Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Maryburgh

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		46

Scale: 1:1500 @ A3

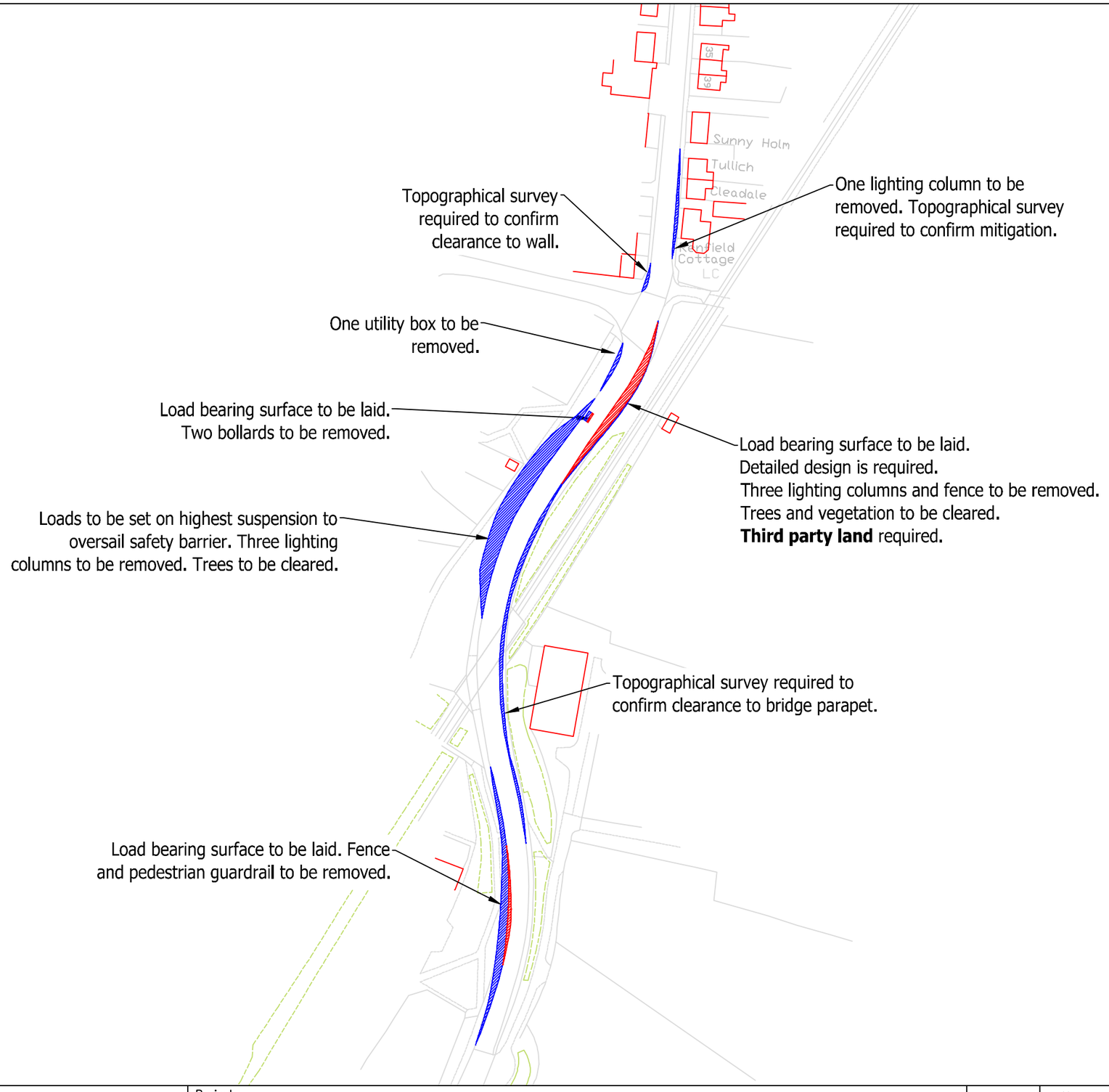
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK36

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Maryburgh

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		46

Scale: 1:1500 @ A3

File No. 250317 Ballach N163 SPA.dwg

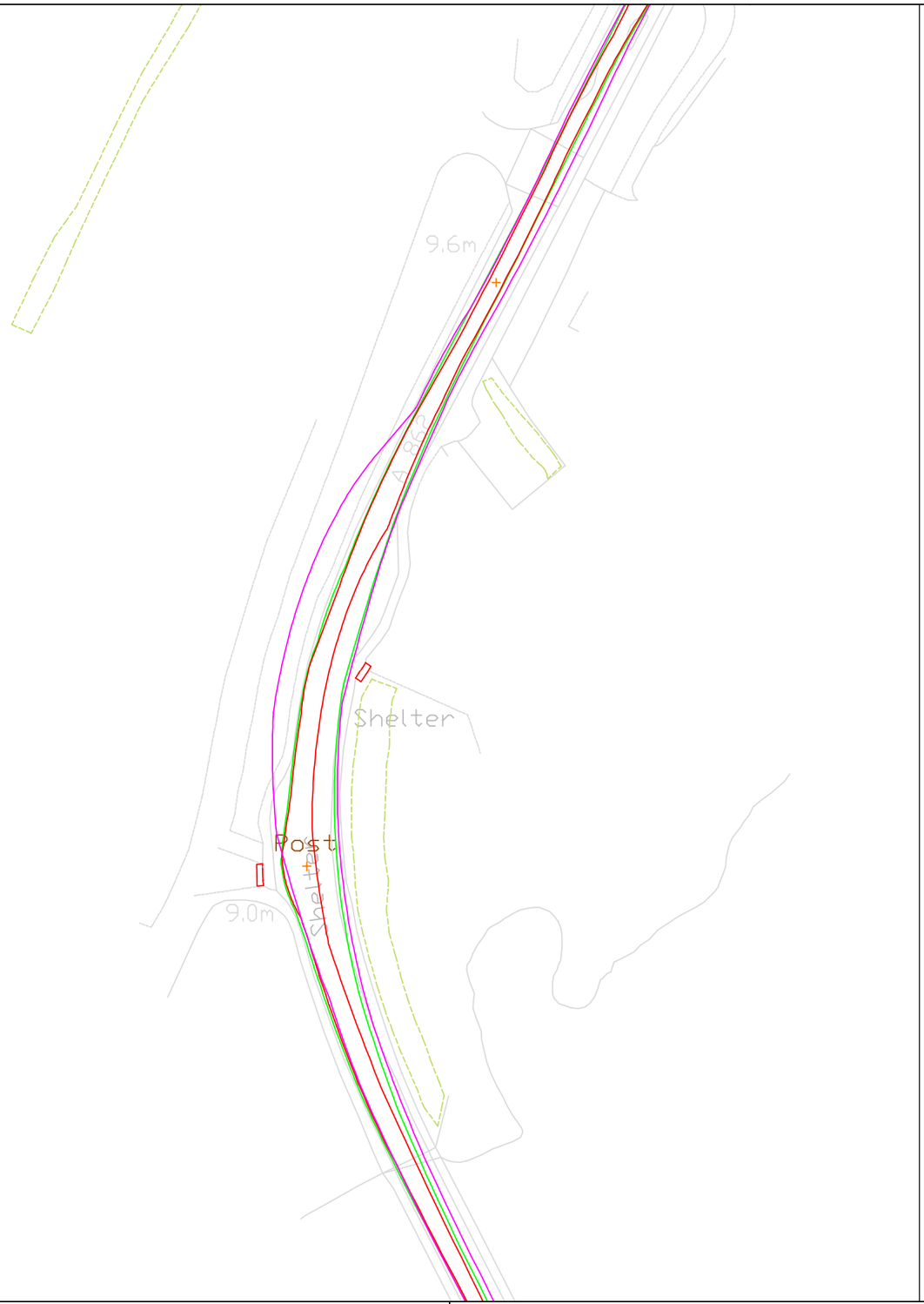
Drawing Status: Draft

Drawing No. SK36A

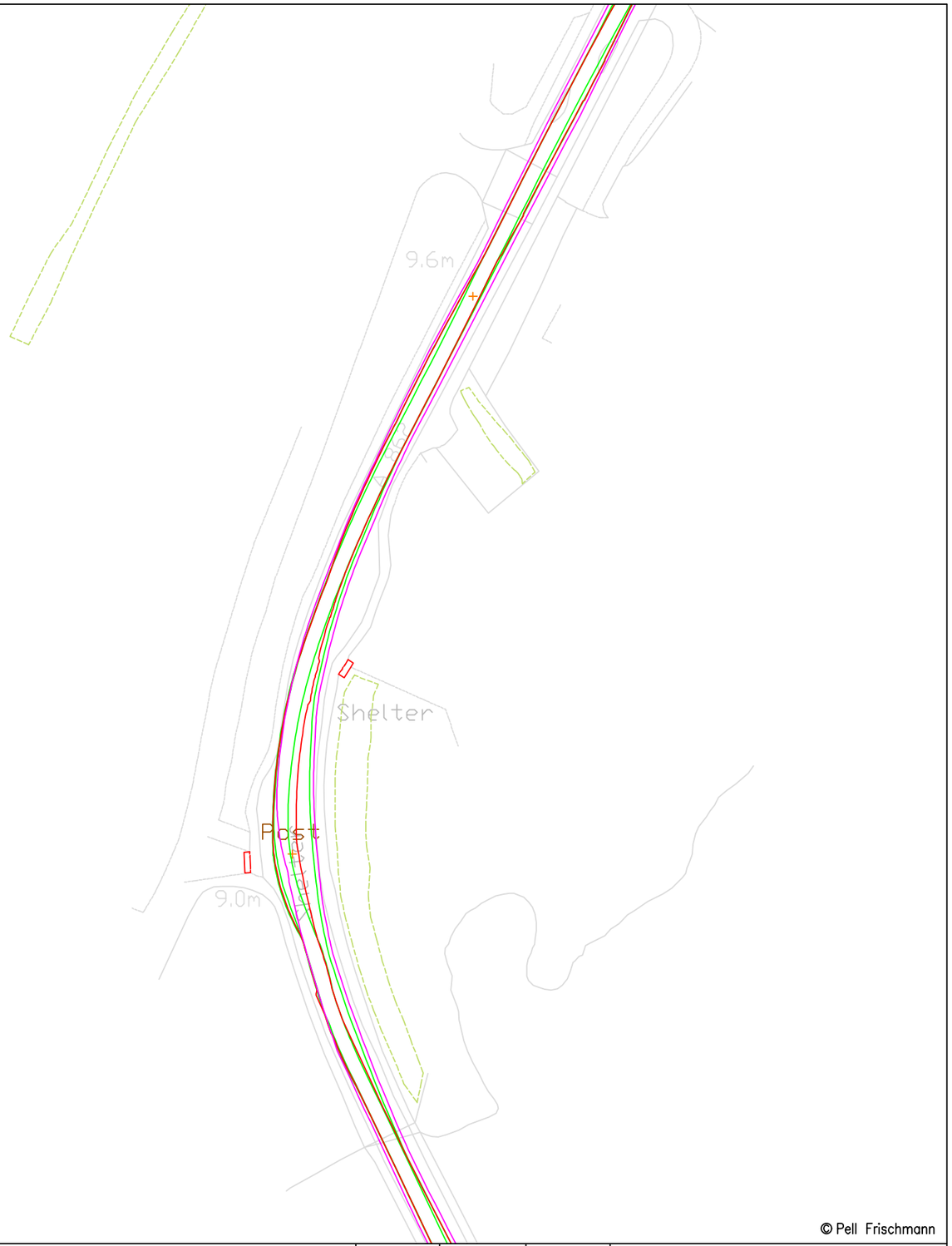
Notes:
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		47

Scale: 1:1000 @ A3

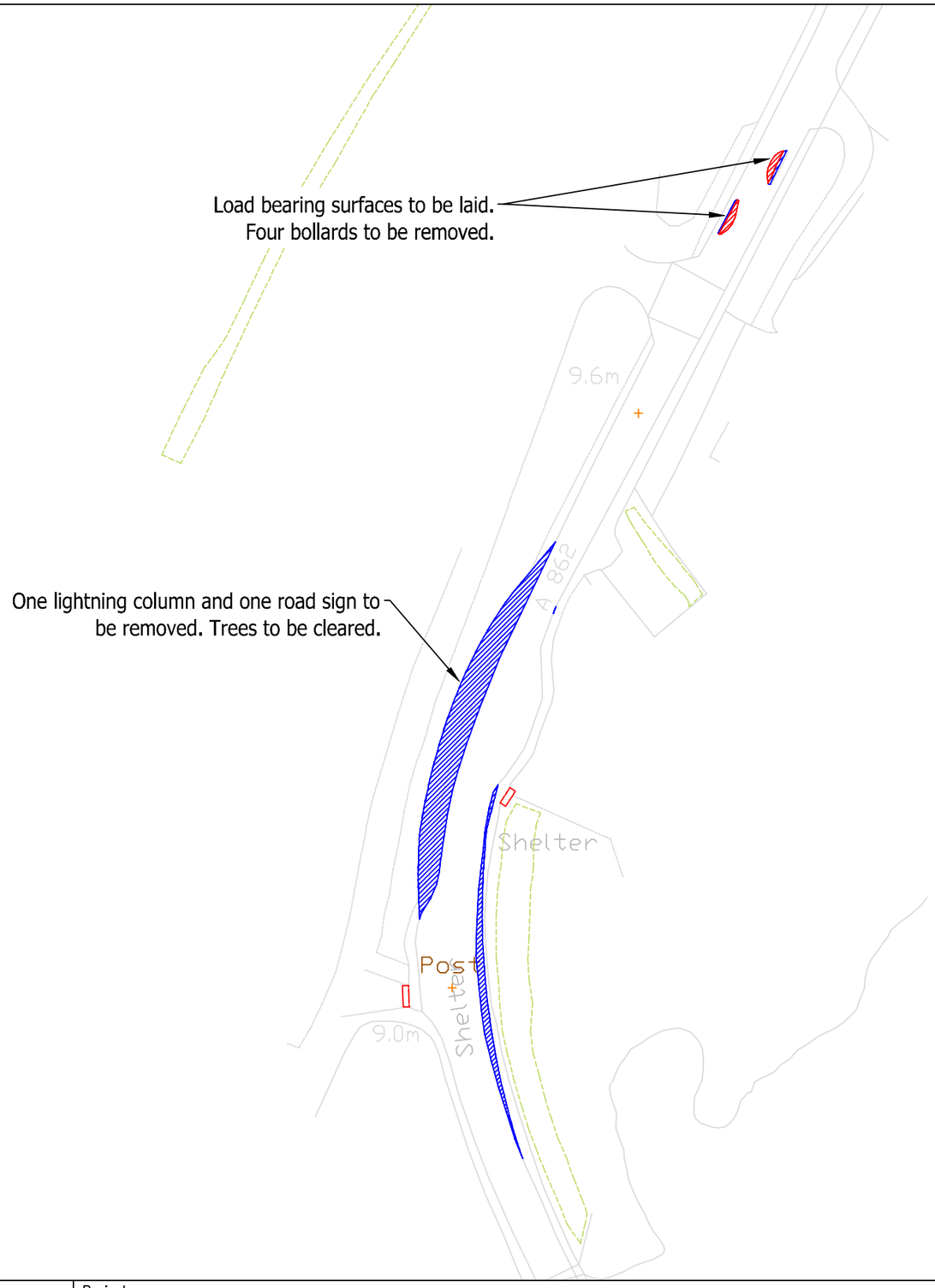
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK37

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		47

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK37A

Notes:
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Blade



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Station Rd, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		48

Scale: 1:1000 @ A3

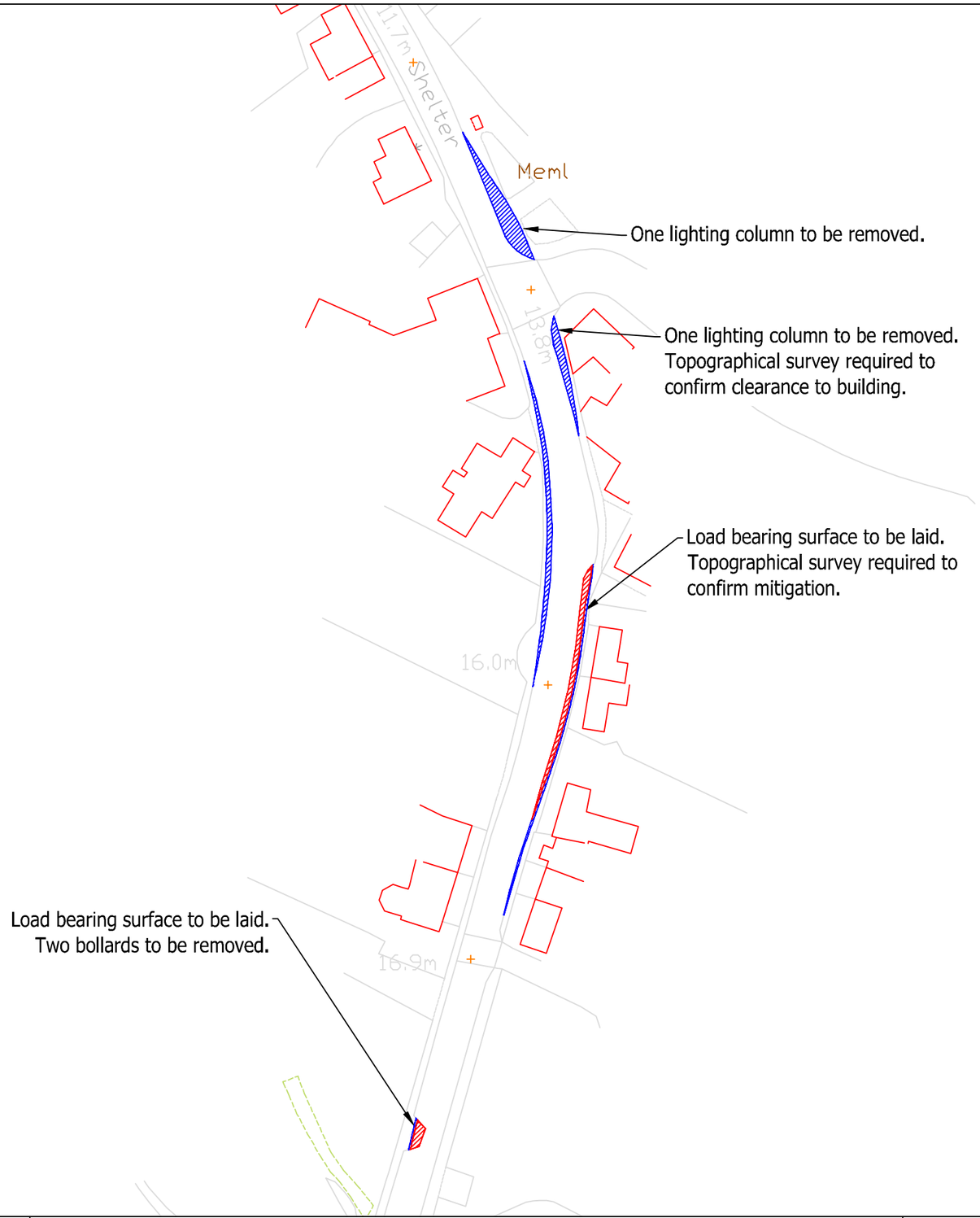
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK38

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Station Rd, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		48

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

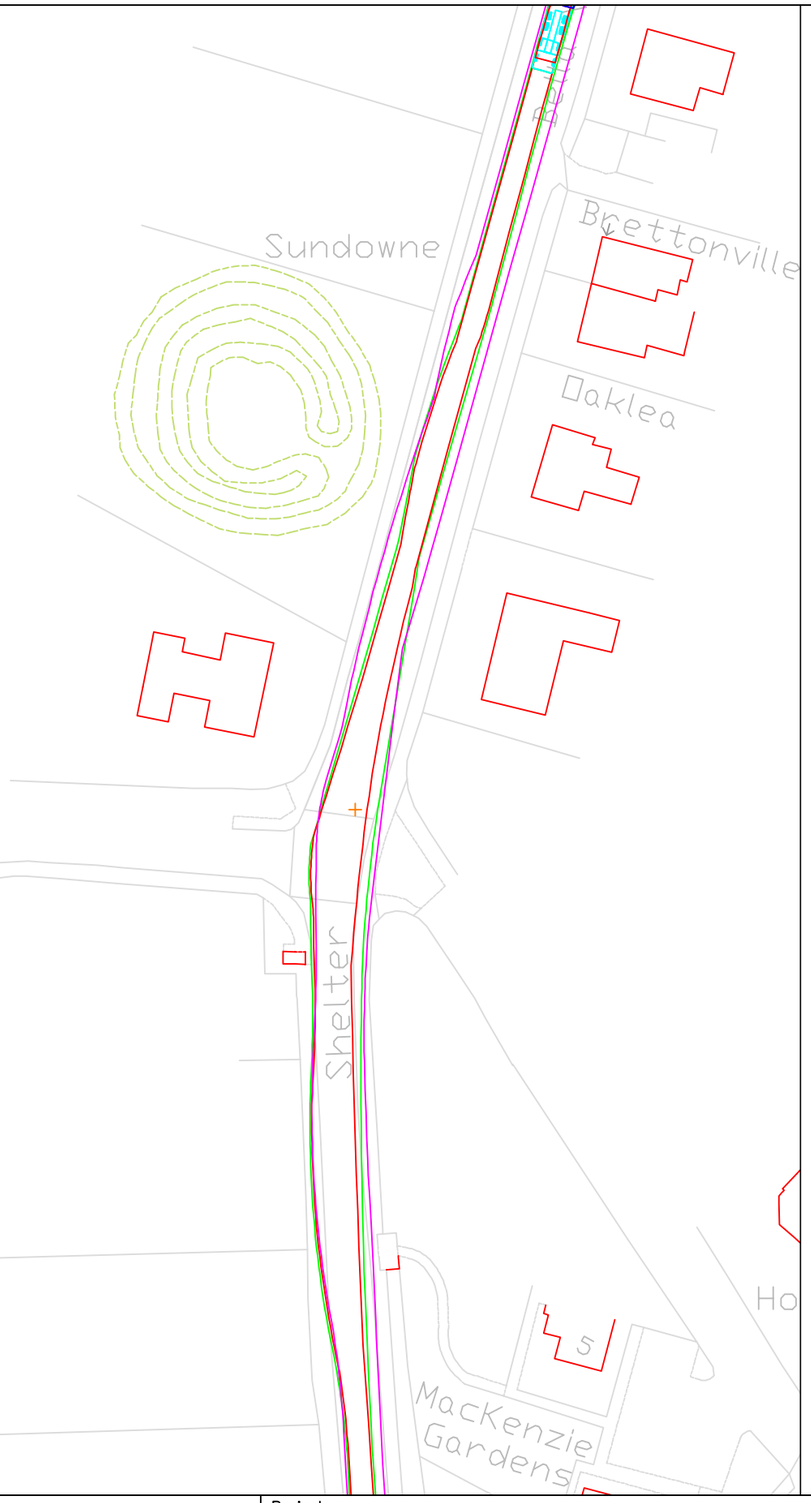
Drawing Status: Draft

Drawing No.: SK38A

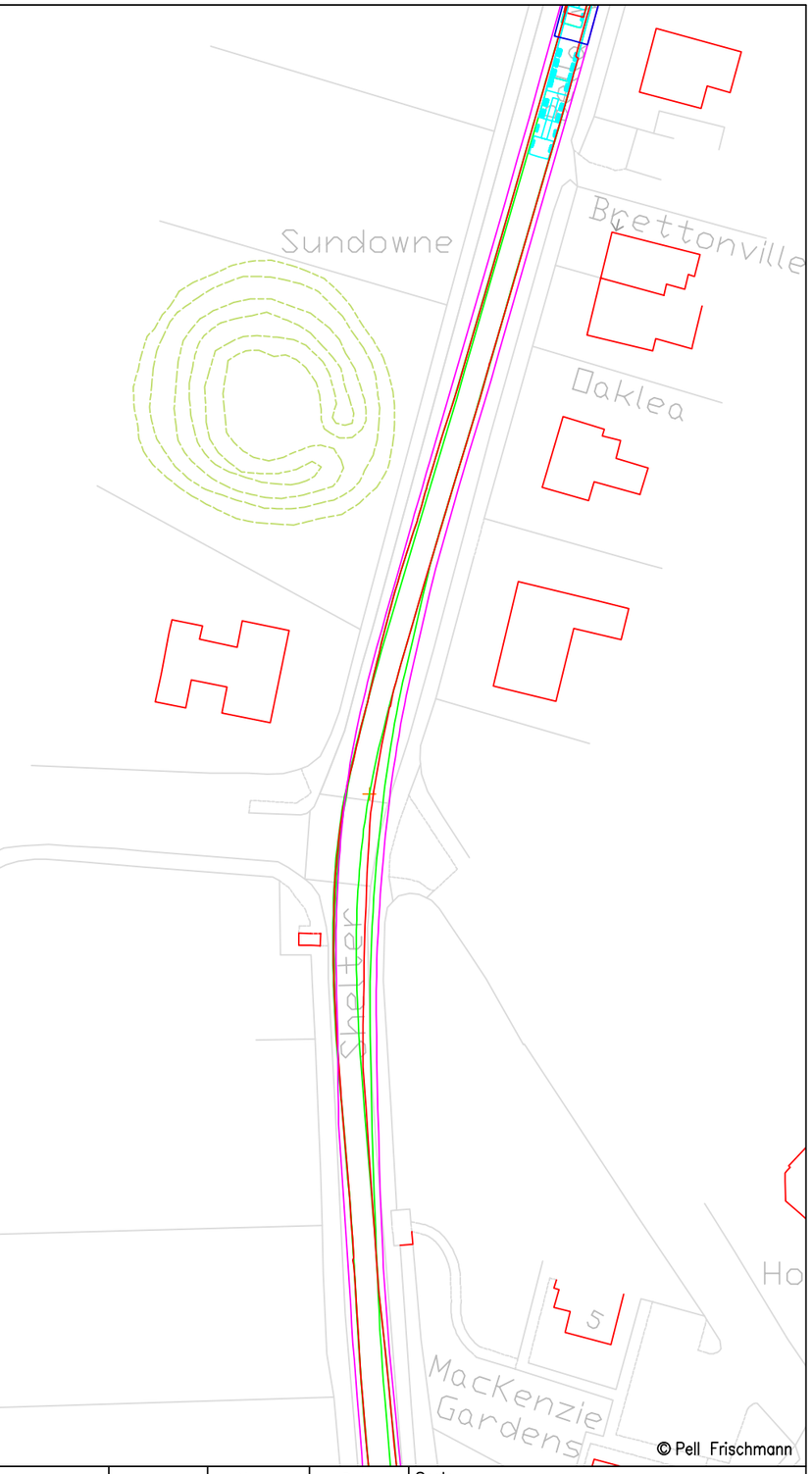
Notes:
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Revision: 00

Blade



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, South of Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		49

Scale: 1:750 @ A3

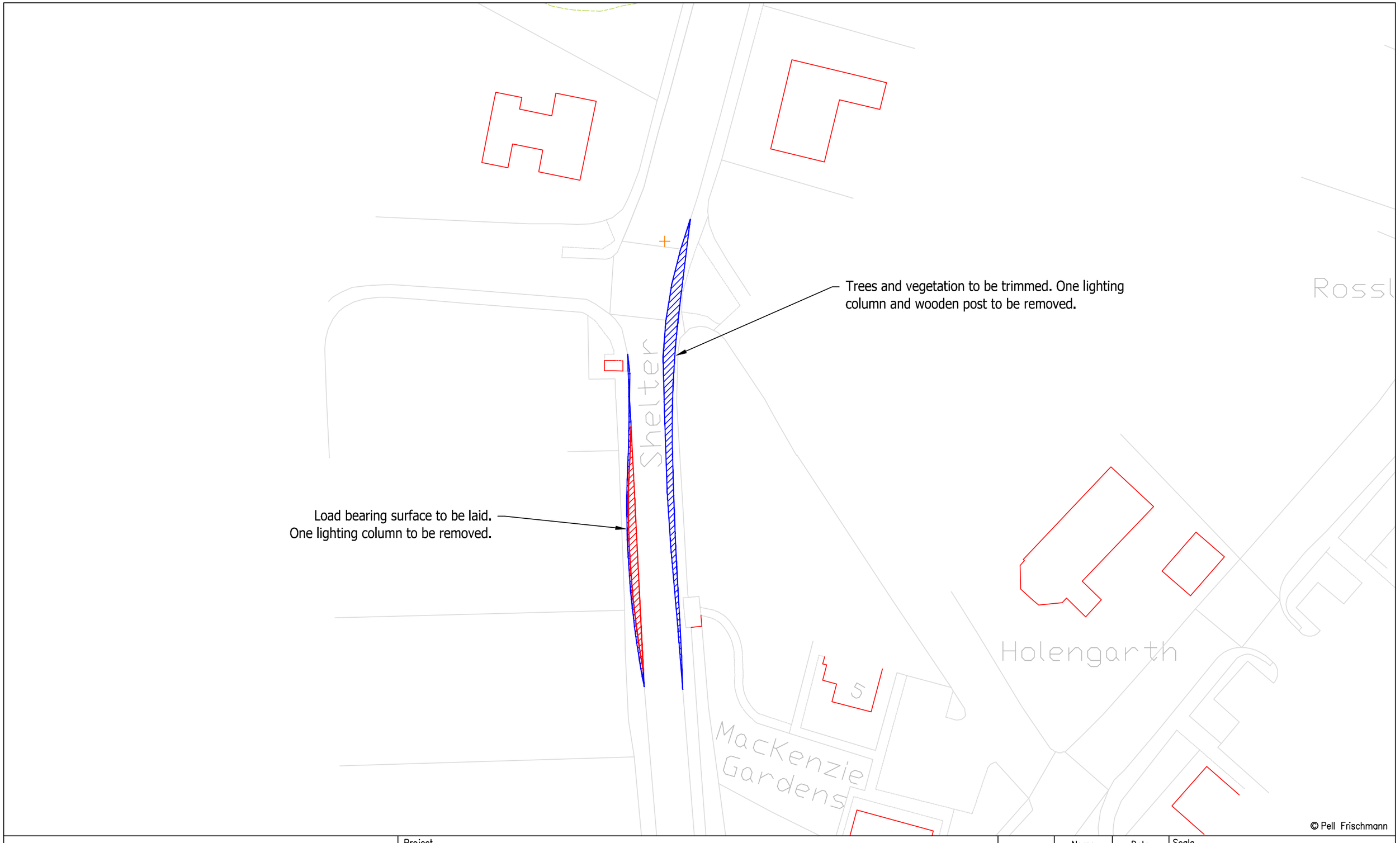
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK39

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, South of Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		49

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK39A

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Northwest of Bishop Kinkell

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		50

Scale: 1:1500 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK40

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, Northwest of Bishop Kinkell

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		50

Scale: 1:1500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK40A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, West of Balvaird

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		51,52

Scale: 1:2000 @ A3

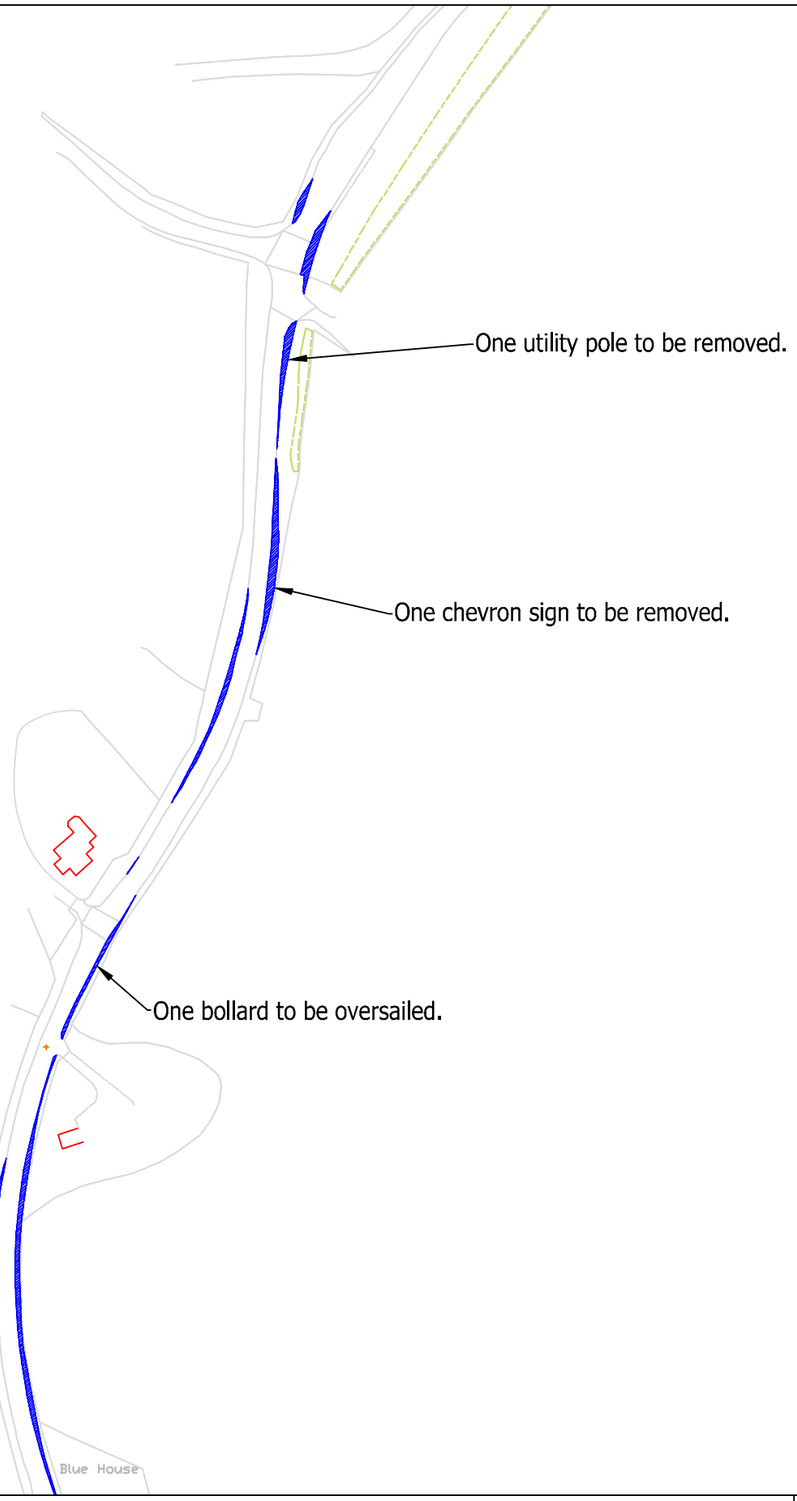
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK41

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862, West of Balvaird

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		51,52

Scale: 1:2000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK41A

Notes:
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Revision: 00

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Great N Rd, Muir of Ord

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		53

Scale: 1:2000 @ A3

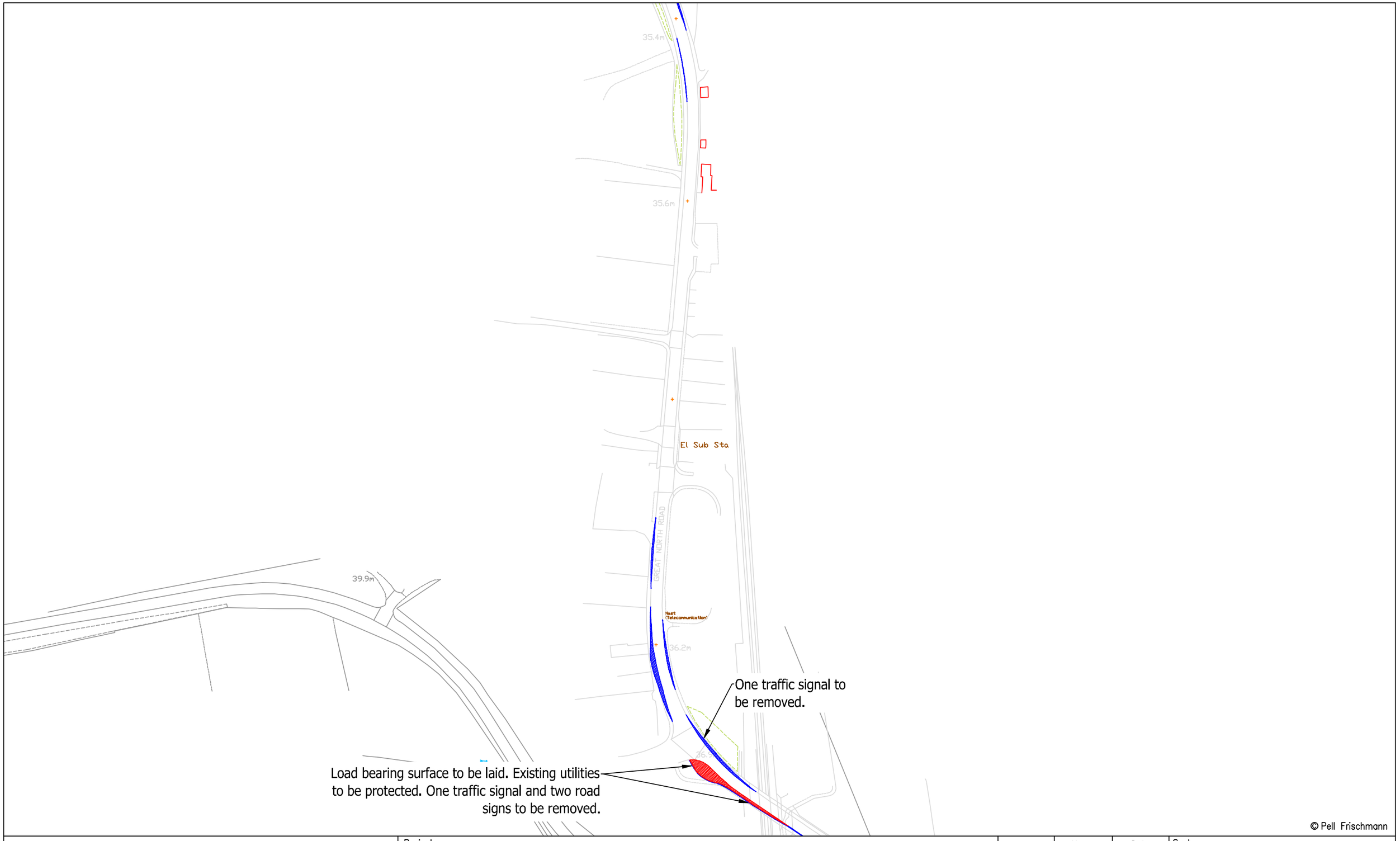
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK42

Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00



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www.pellfrischmann.com

Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Great N Rd, Muir of Ord

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		53

Scale: 1:2000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK42A

Notes:
1. All mitigation is subject to confirmation through a test run.
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832, Muir of Ord Library

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		54

Scale: 1:1500 @ A3

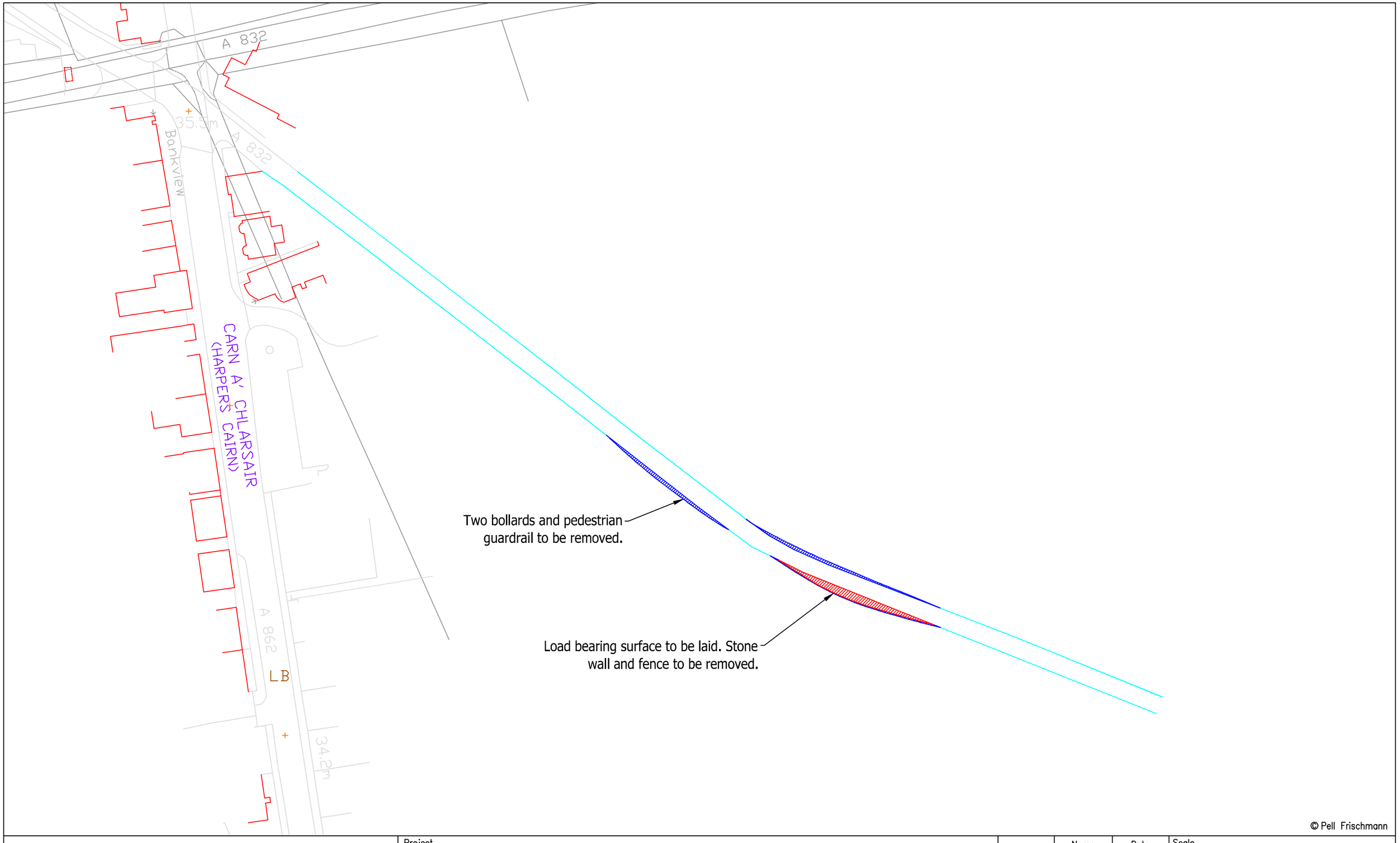
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK43

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832, Muir of Ord Library

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		54

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

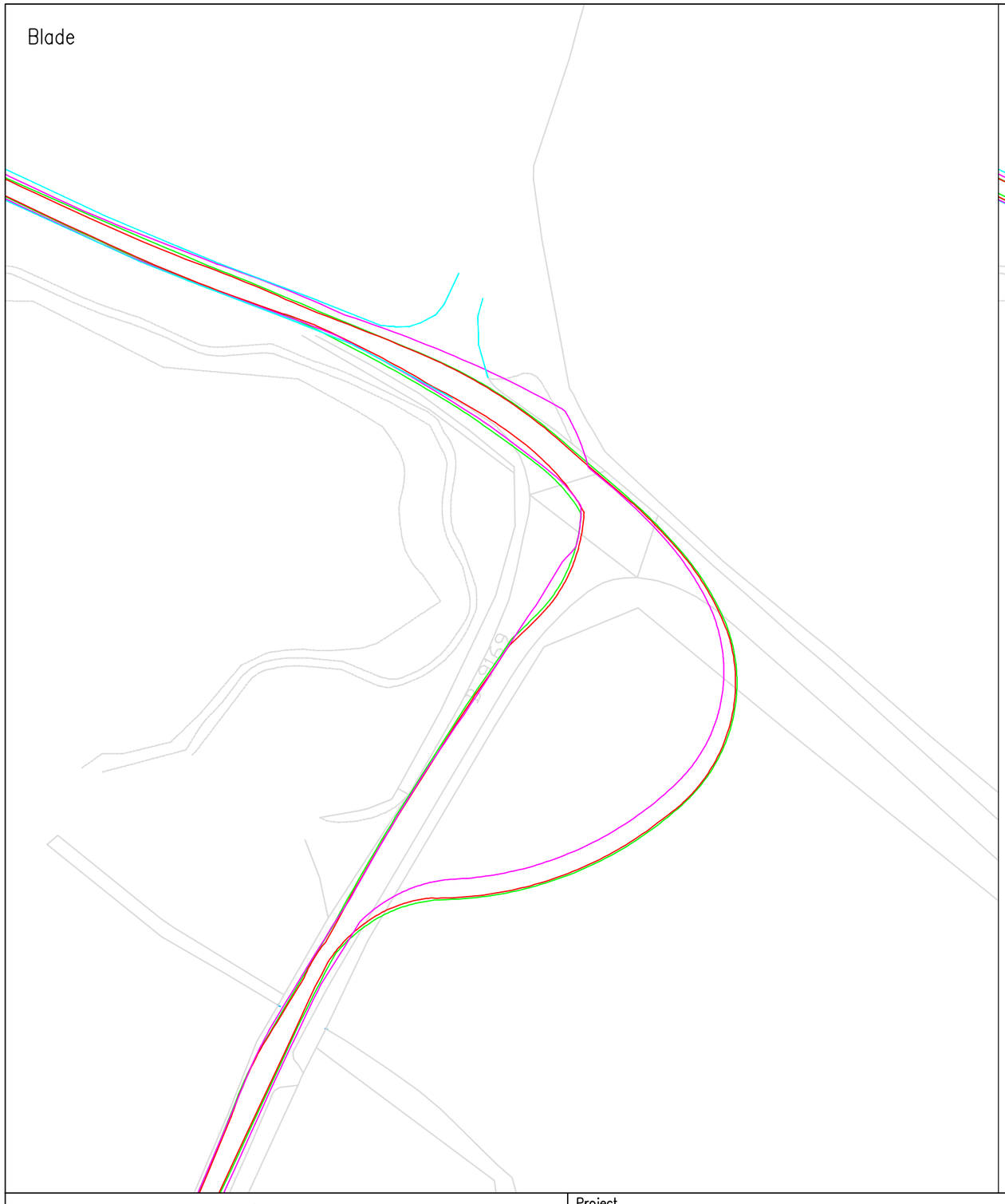
Drawing Status: Draft

Drawing No. SK43A

Notes:
1. All mitigation is subject to confirmation through a test run.
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Revision: 00

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 / B1969 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		15

Scale: 1:1000 @ A3

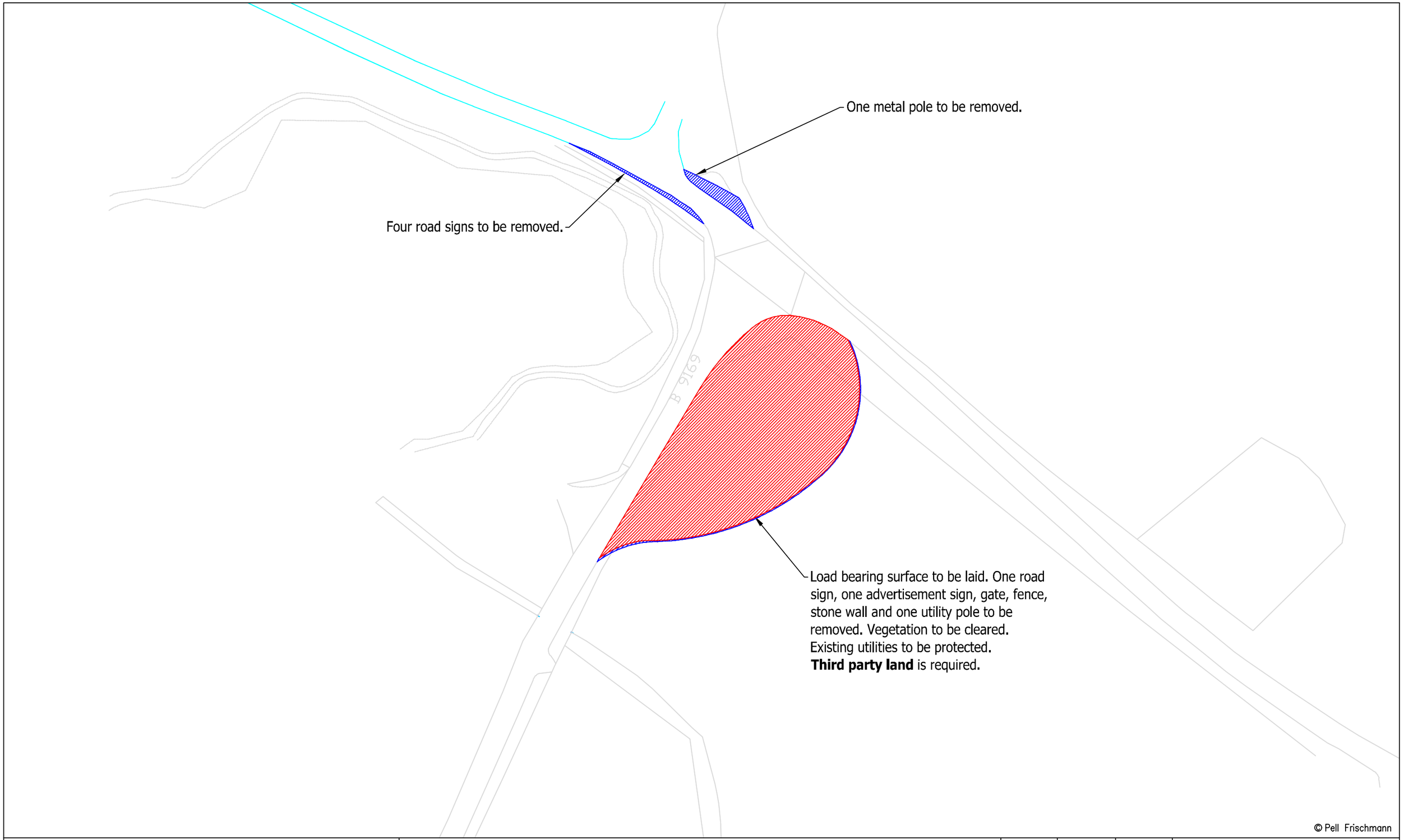
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK44

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A832 / B1969 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		15

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK44A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A835 / B9163 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		55

Scale: 1:750 @ A3

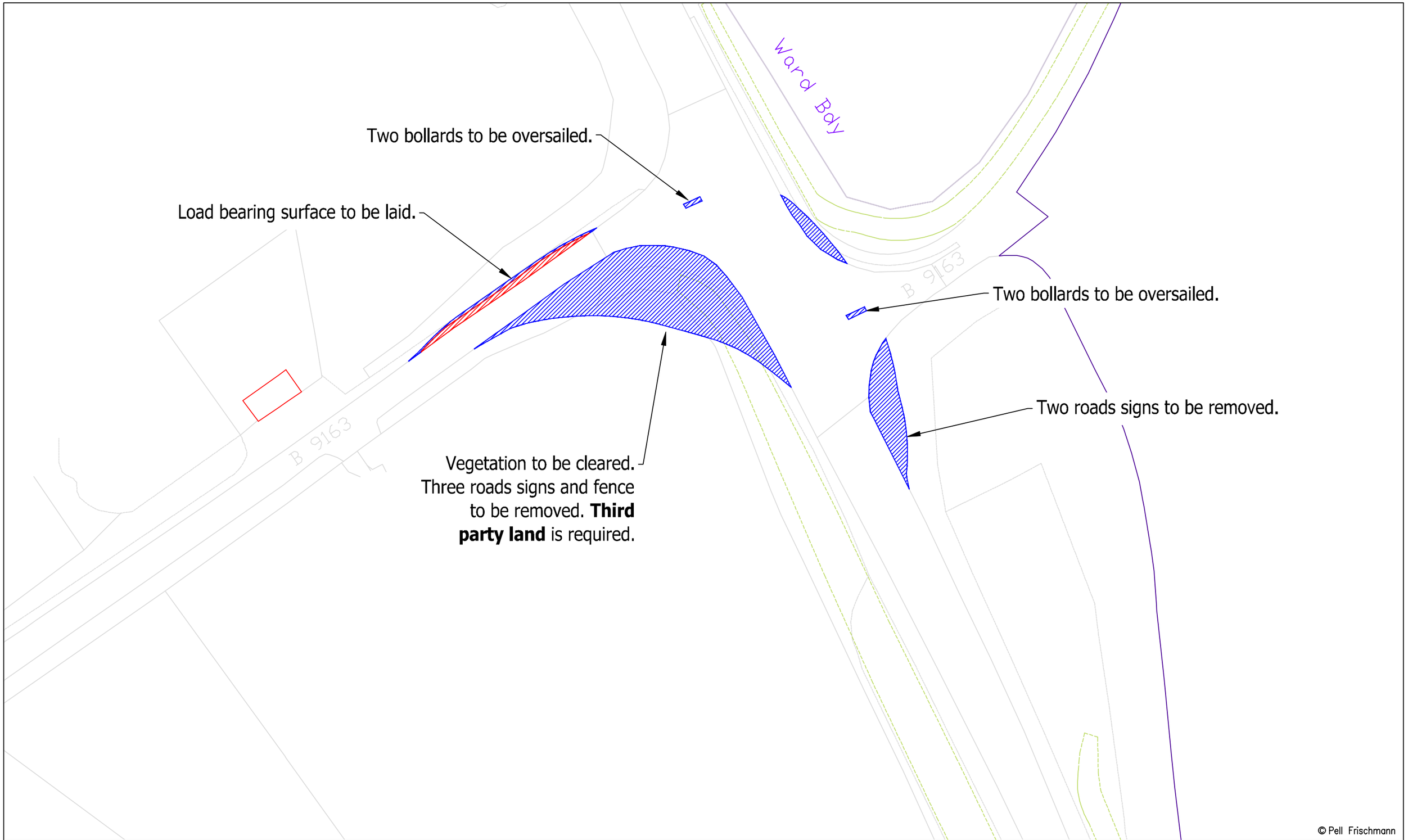
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK45

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A835 / B9163 Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		55

Scale: 1:750 @ A3

File No.: 250317 Ballach N163 SPA.dwg

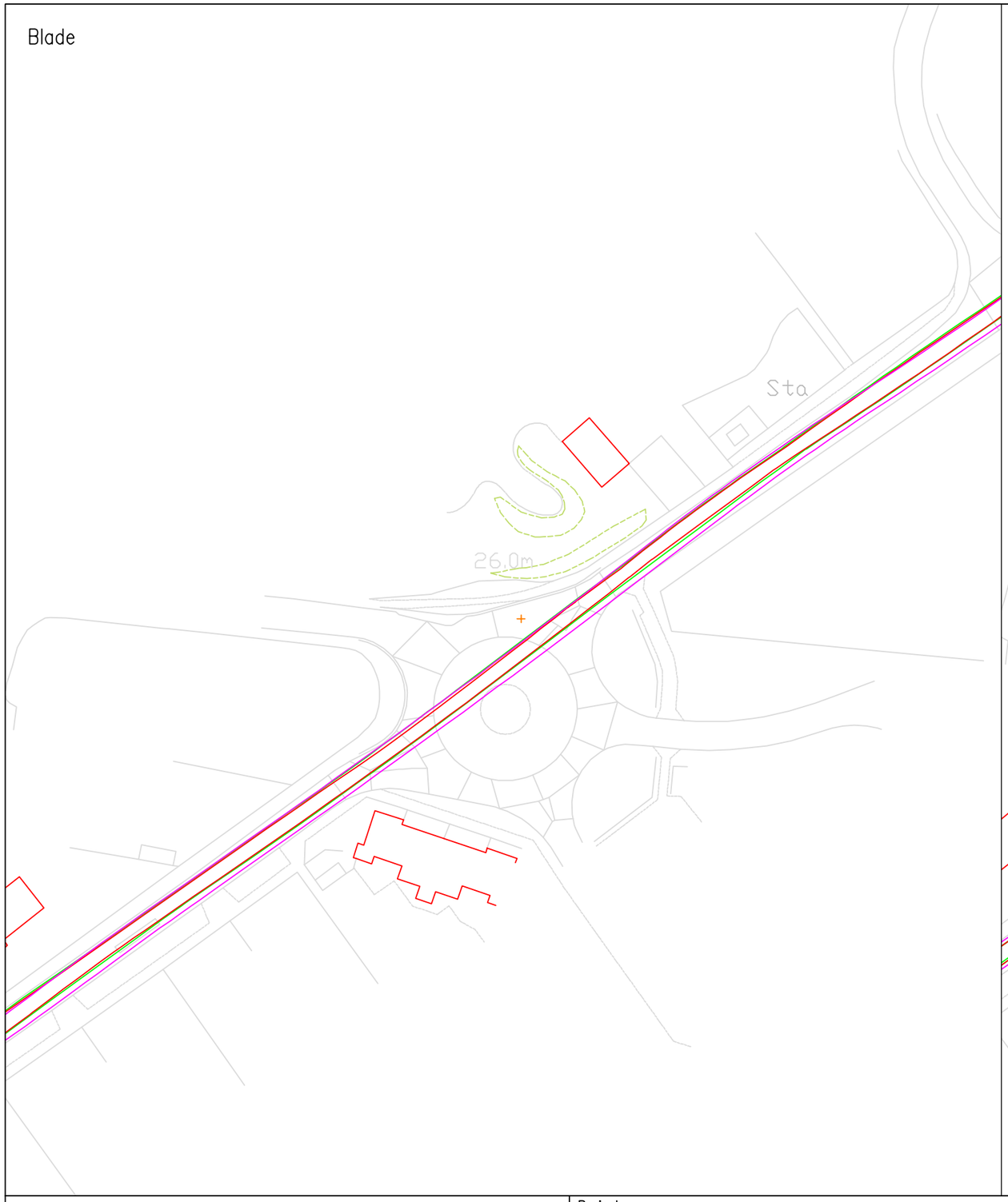
Drawing Status: Draft

Drawing No.: SK45A

Notes:
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Revision: 00

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9163/B162 Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		56

Scale: 1:1000 @ A3

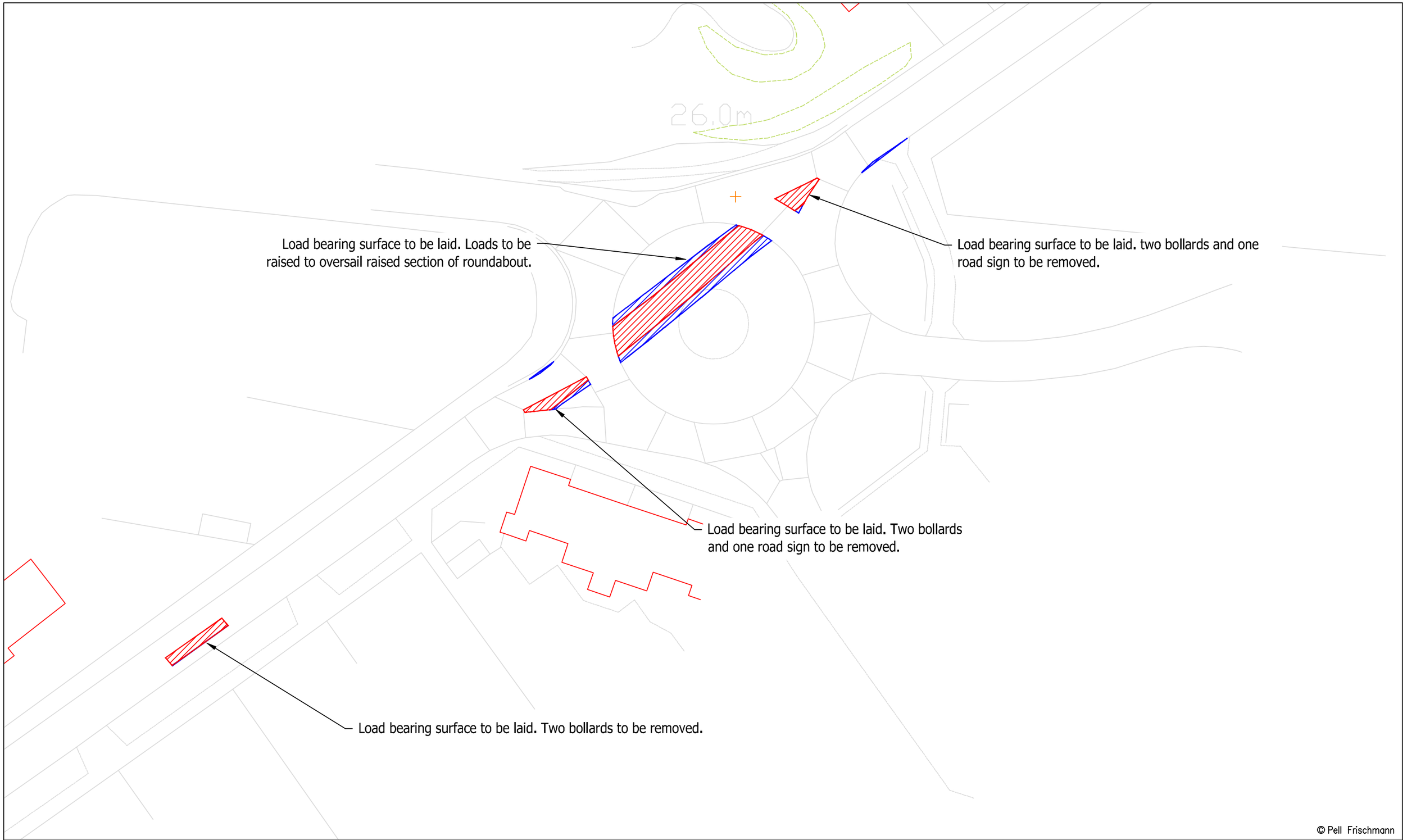
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK46

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: B9163/B162 Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		56

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

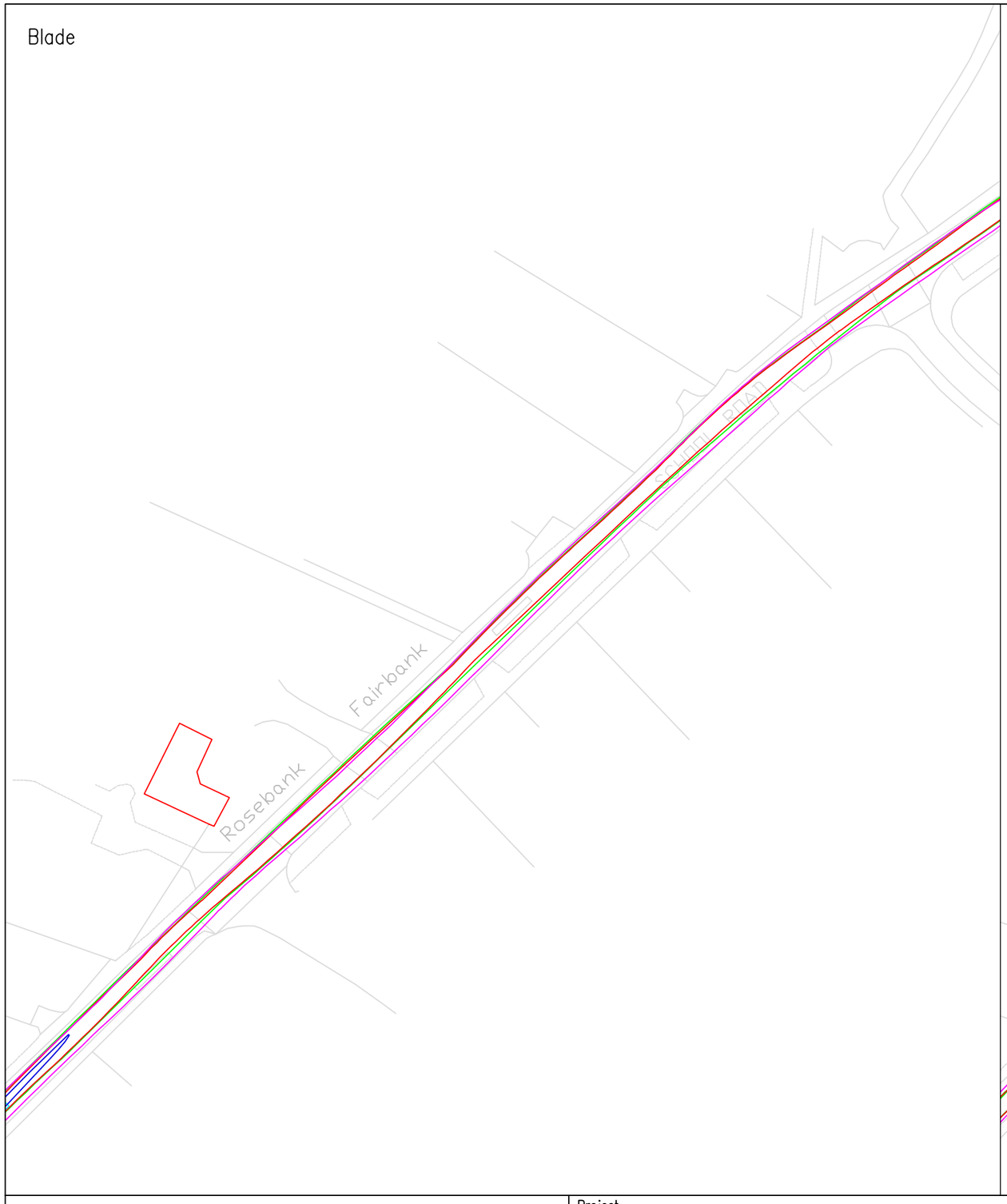
Drawing Status: Draft

Drawing No.: SK46A

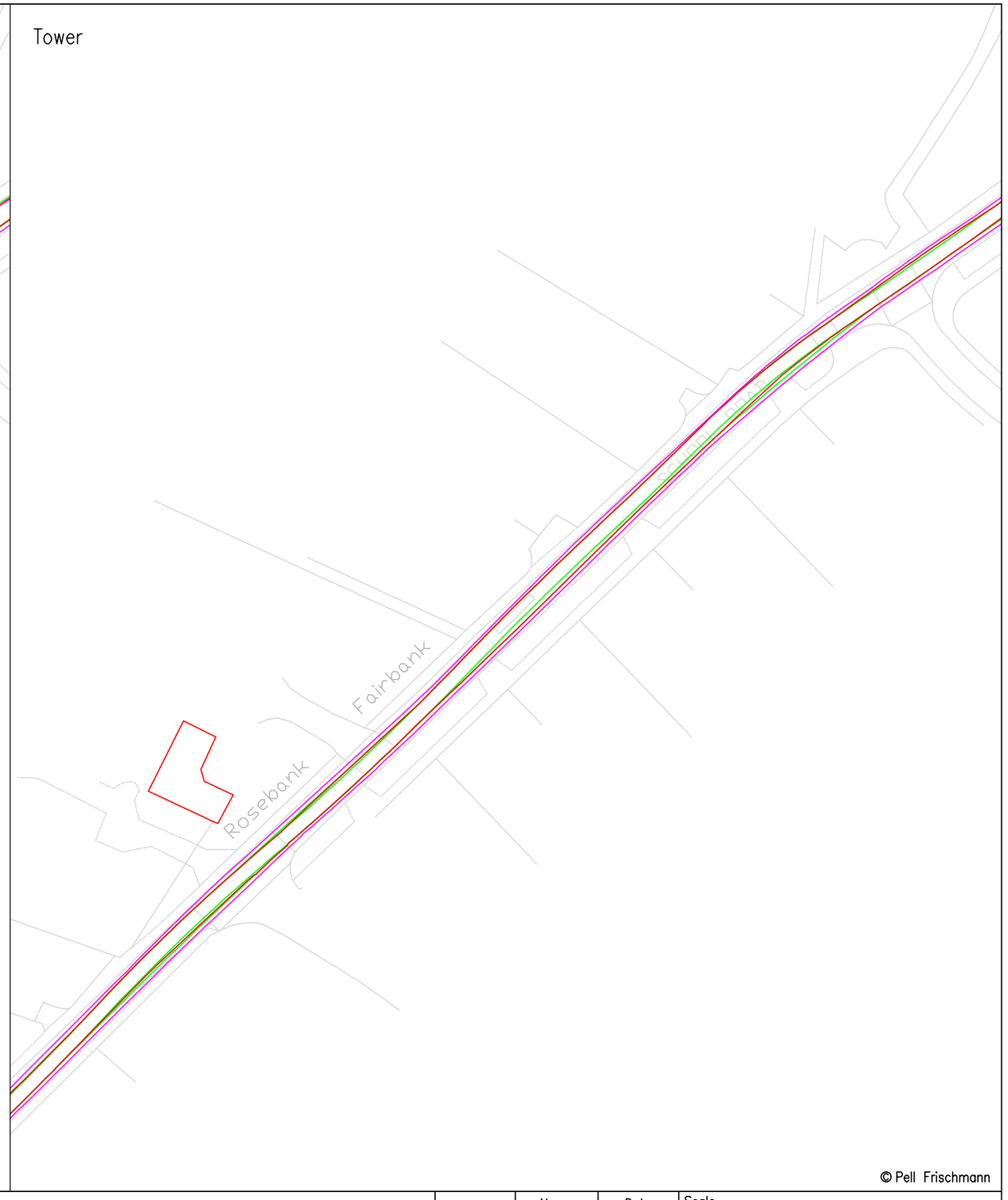
Notes:
1. All mitigation is subject to confirmation through a test run.
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: School Road, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		57

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK47

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: School Road, Conon Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		57

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK47A

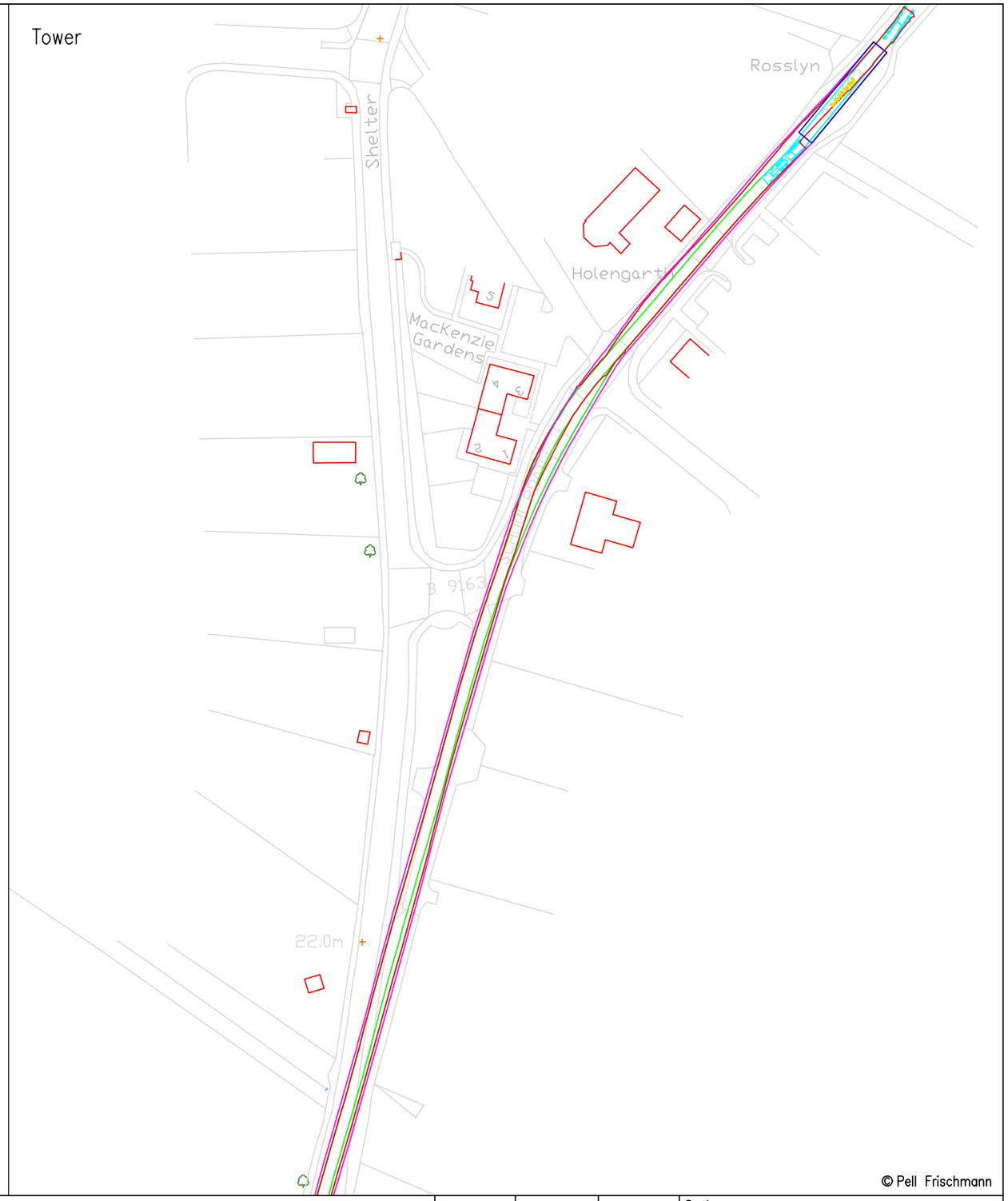
Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: School Rd/A862

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		58

Scale: 1:1250 @ A3

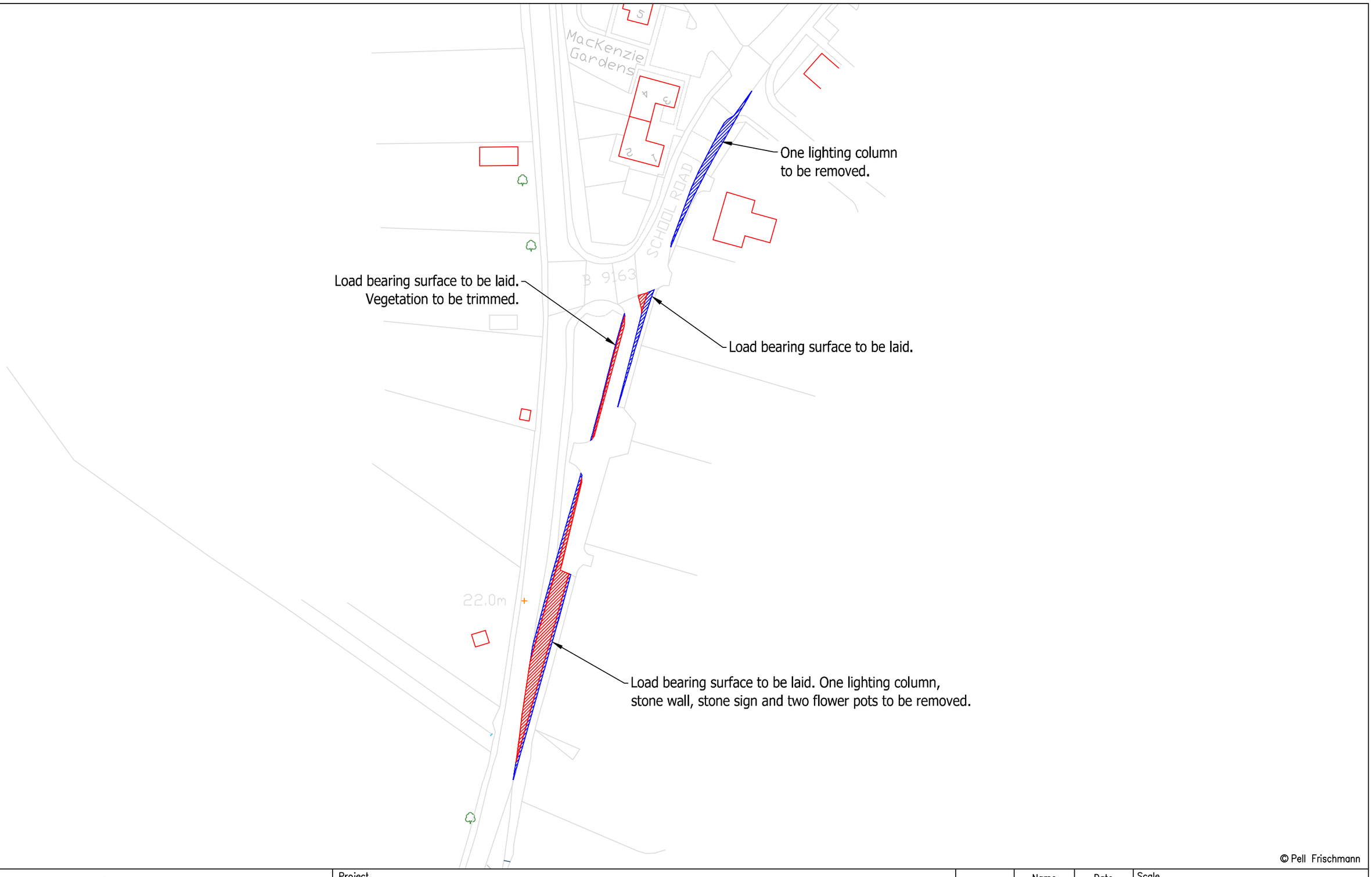
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK48

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: School Rd/A862

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		58

Scale: 1:1000 @ A3

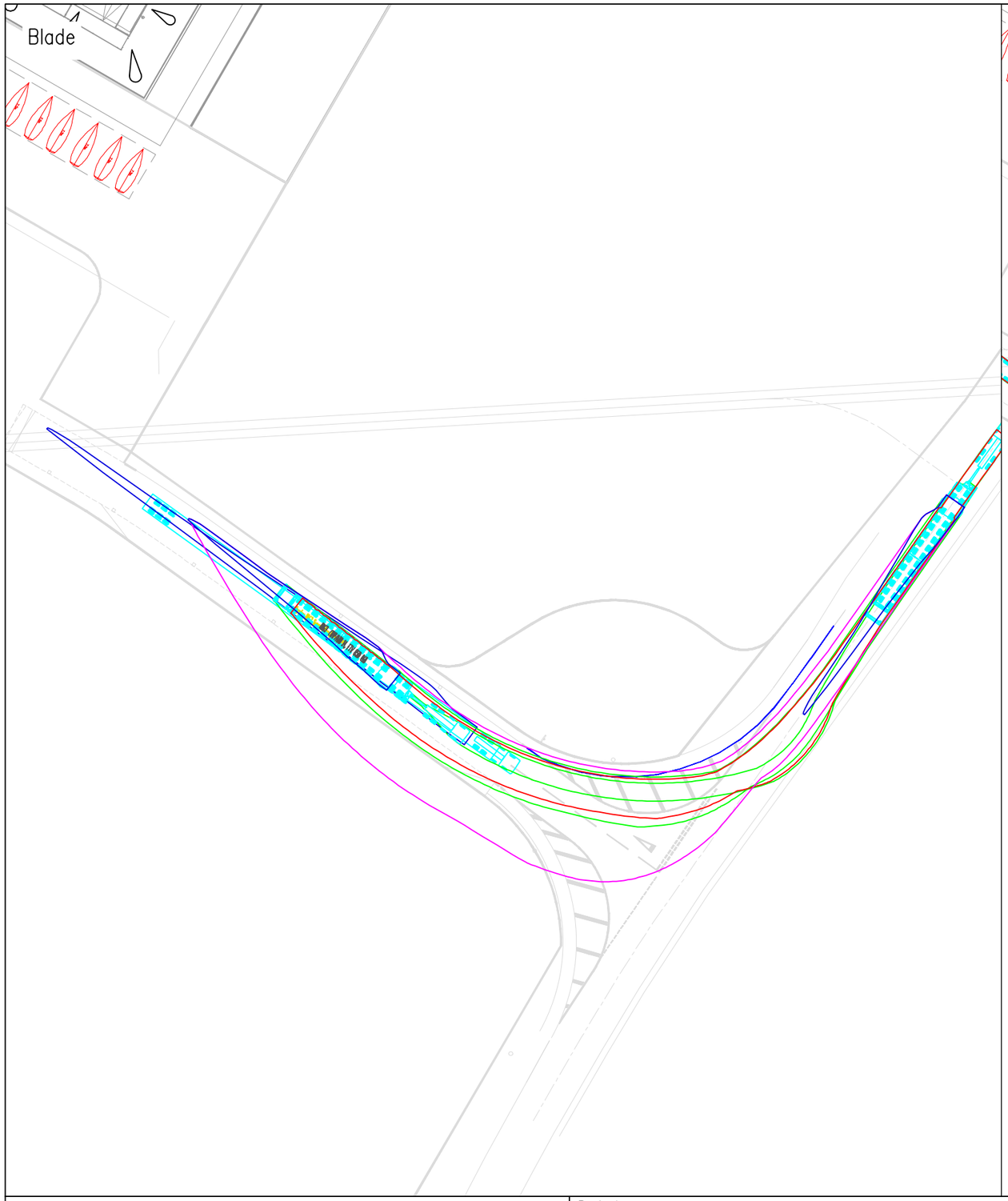
File No.: 250317 Ballach N163 SPA.dwg

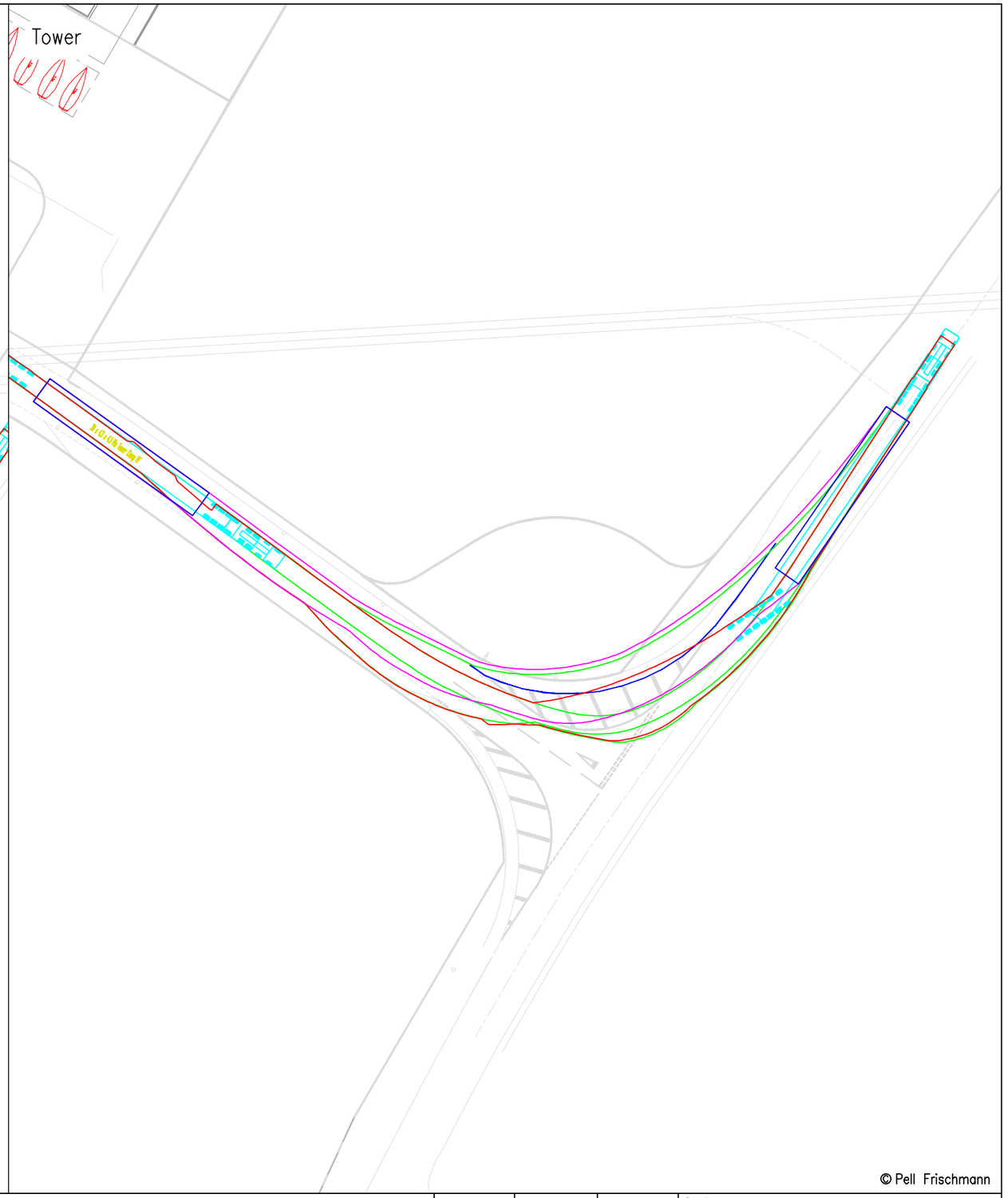
Drawing Status: Draft

Drawing No.: SK48A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Inverness Harbour Exit

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR01

Scale: 1:750 @ A3

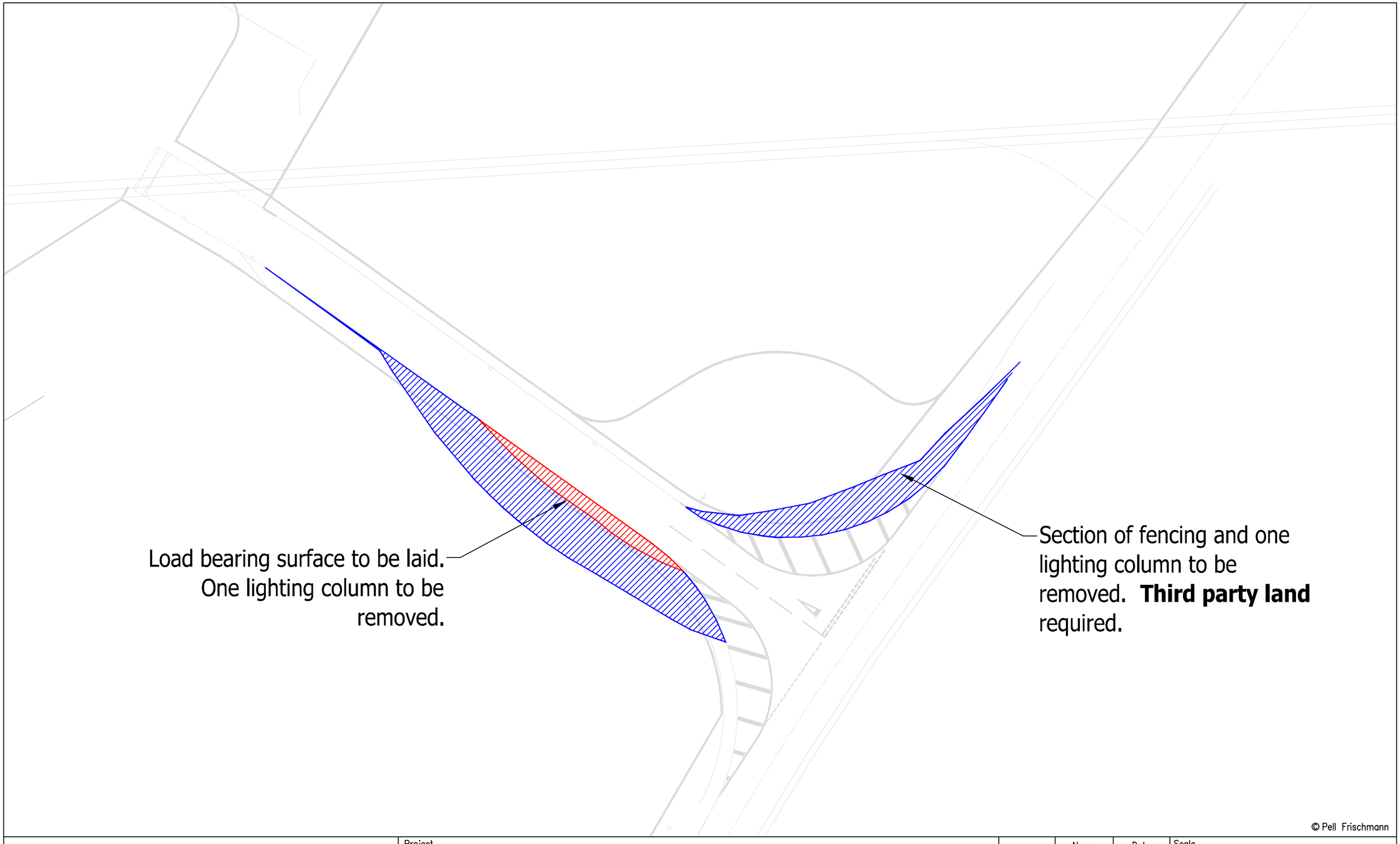
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK50

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Inverness Harbour Exit

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR01

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

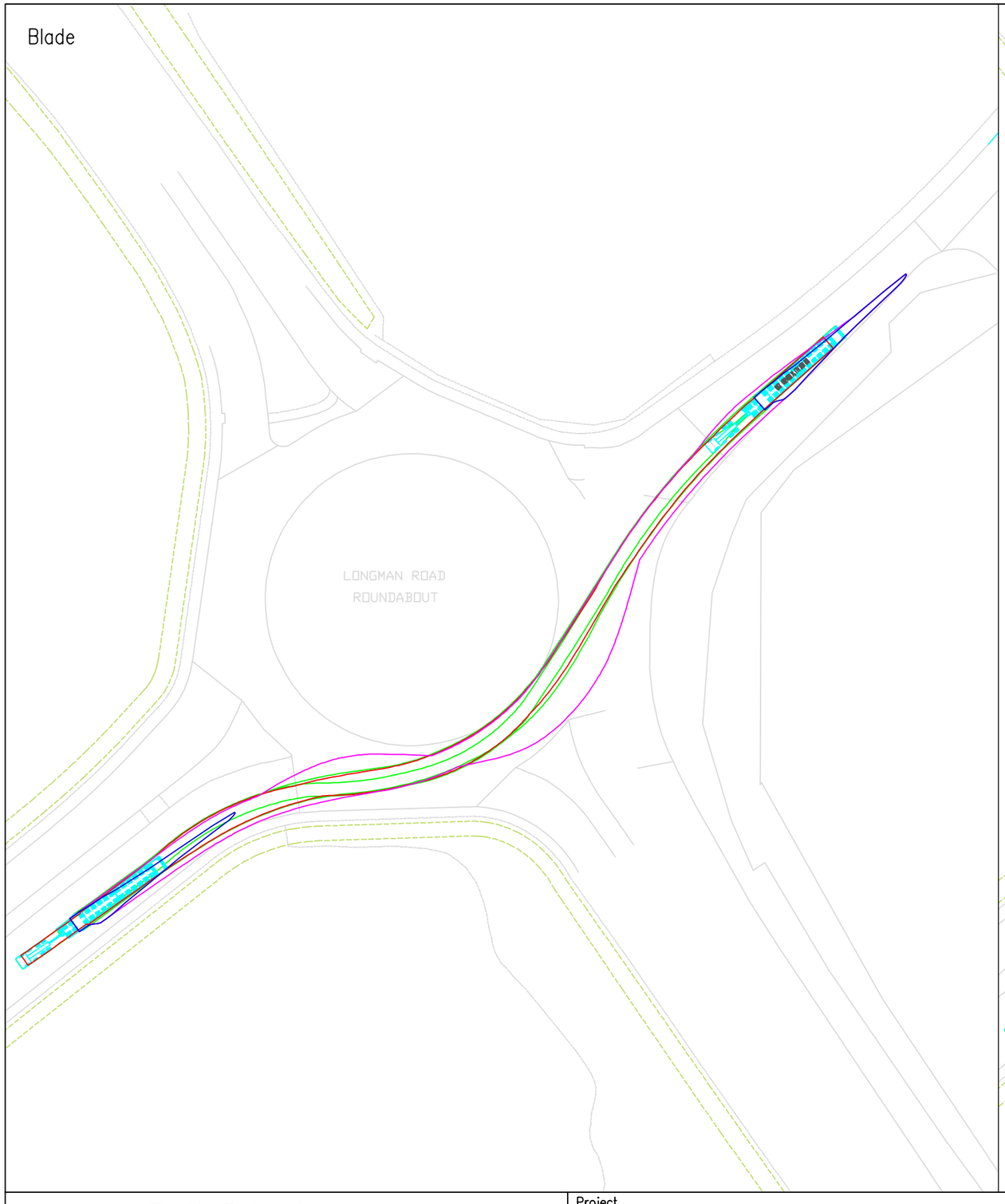
Drawing Status: Draft

Drawing No. SK50A

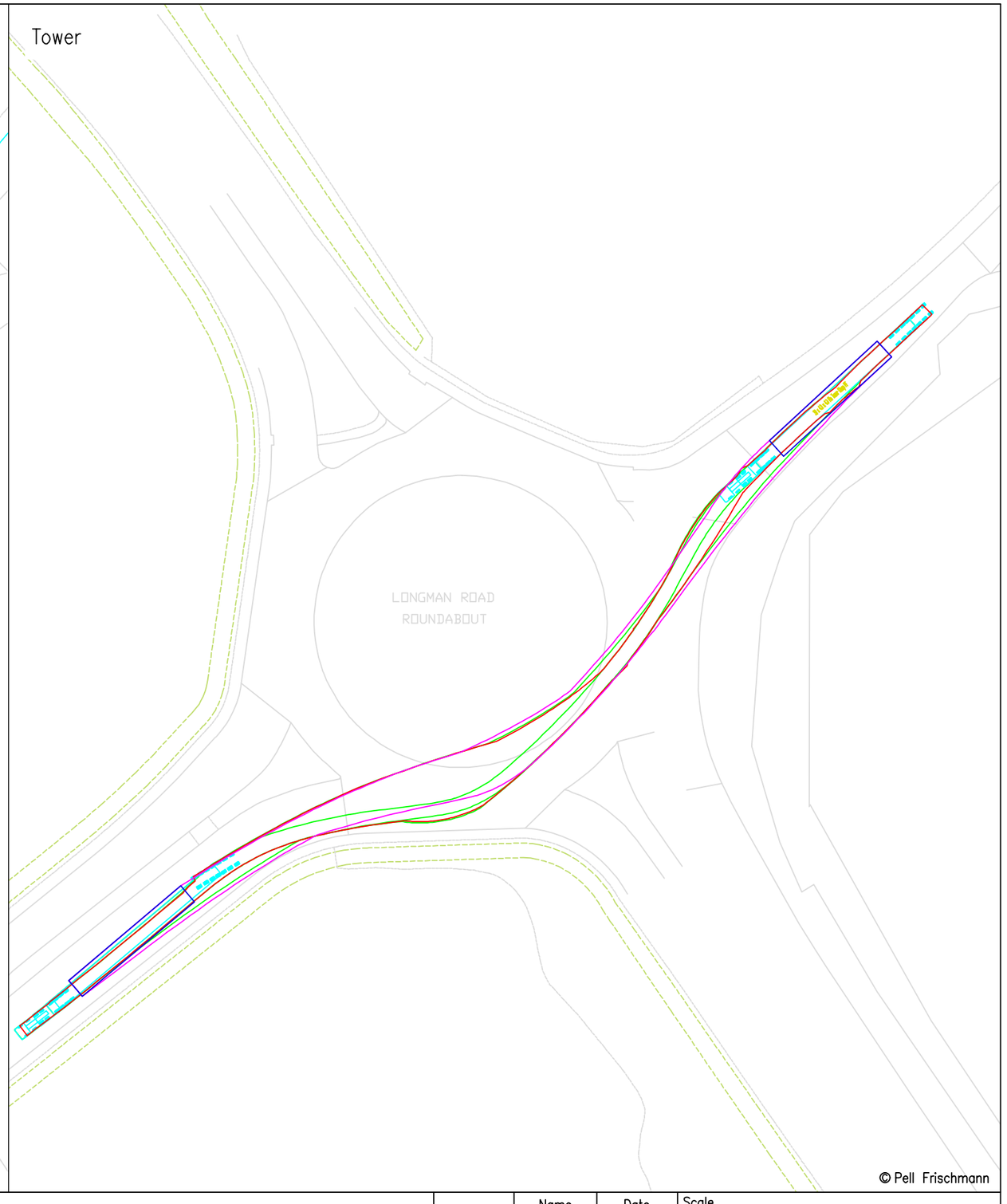
Notes:
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Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 / A82 Longman Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR02

Scale: 1:1000 @ A3

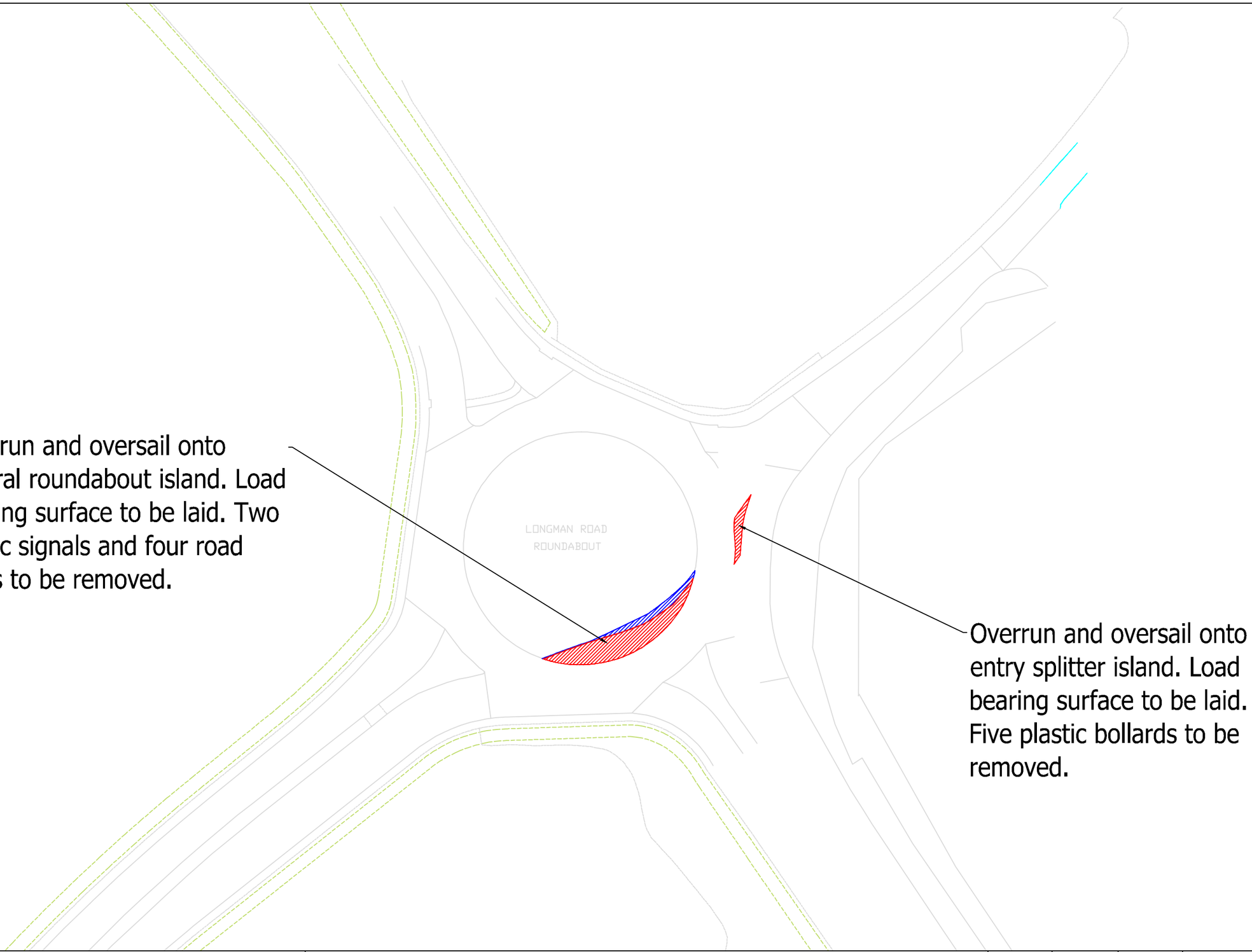
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK51

Notes:
1. All mitigation is subject to confirmation through a test run.
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Revision: 00



Overrun and oversail onto central roundabout island. Load bearing surface to be laid. Two traffic signals and four road signs to be removed.

Overrun and oversail onto entry splitter island. Load bearing surface to be laid. Five plastic bollards to be removed.

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 / A82 Longman Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR02

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK51A

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Harbour Rd Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR03

Scale: 1:750 @ A3

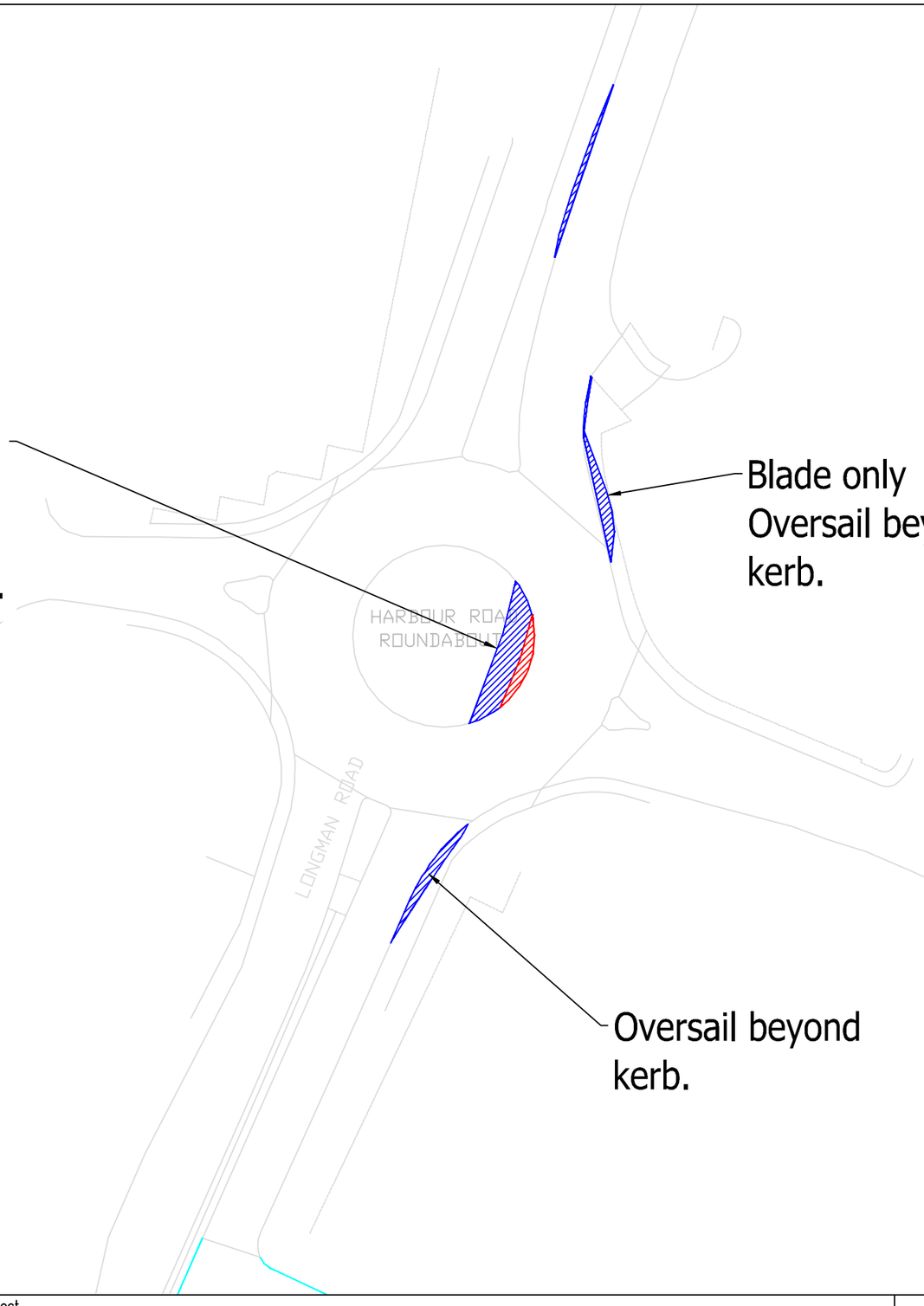
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK52

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A9 / A82 Longman Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR03

Scale: 1:750 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK52A

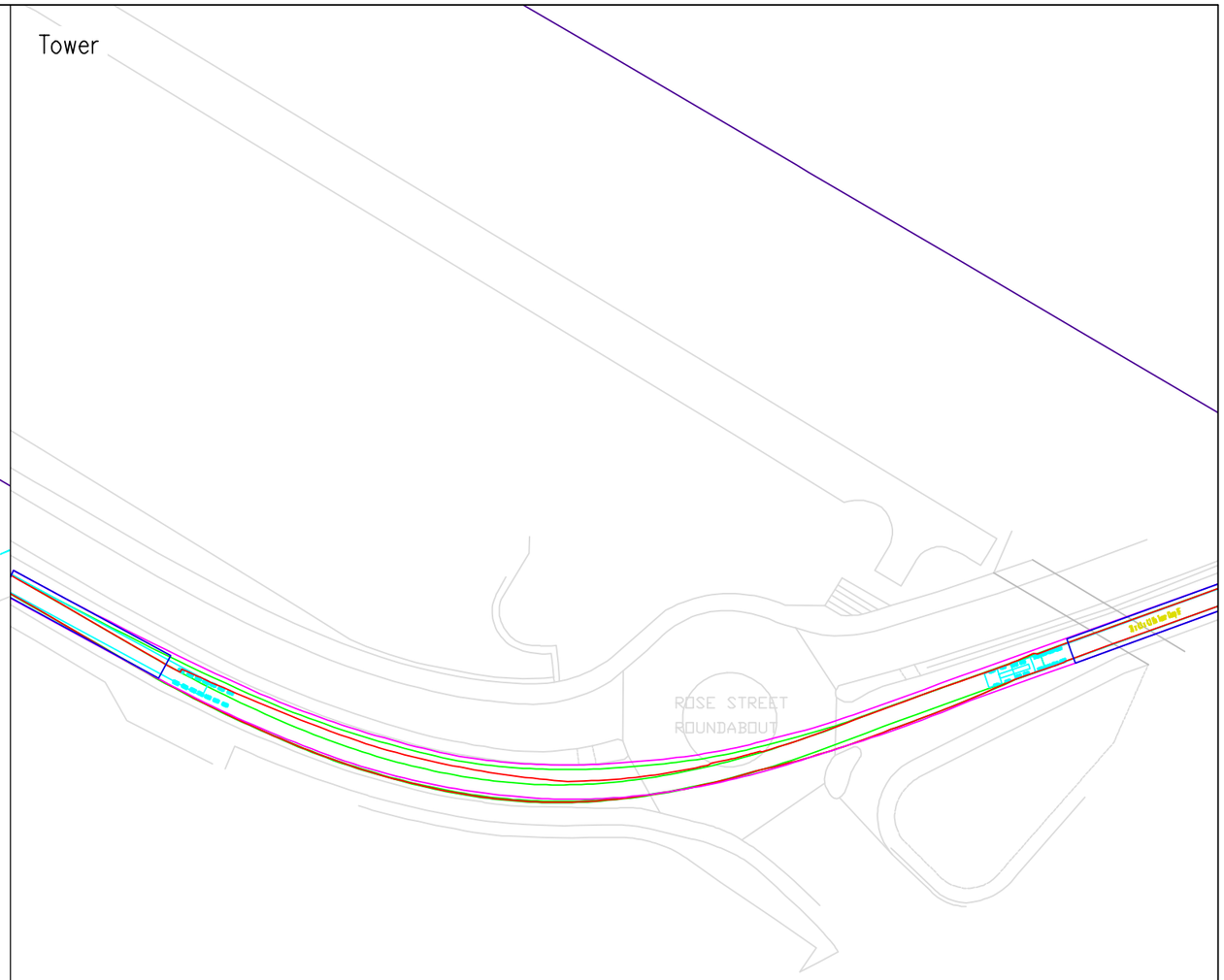
Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade



Tower



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Rose Street Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR04

Scale: 1:1000 @ A3

File No.: 250317 Ballach N163 SPA.dwg

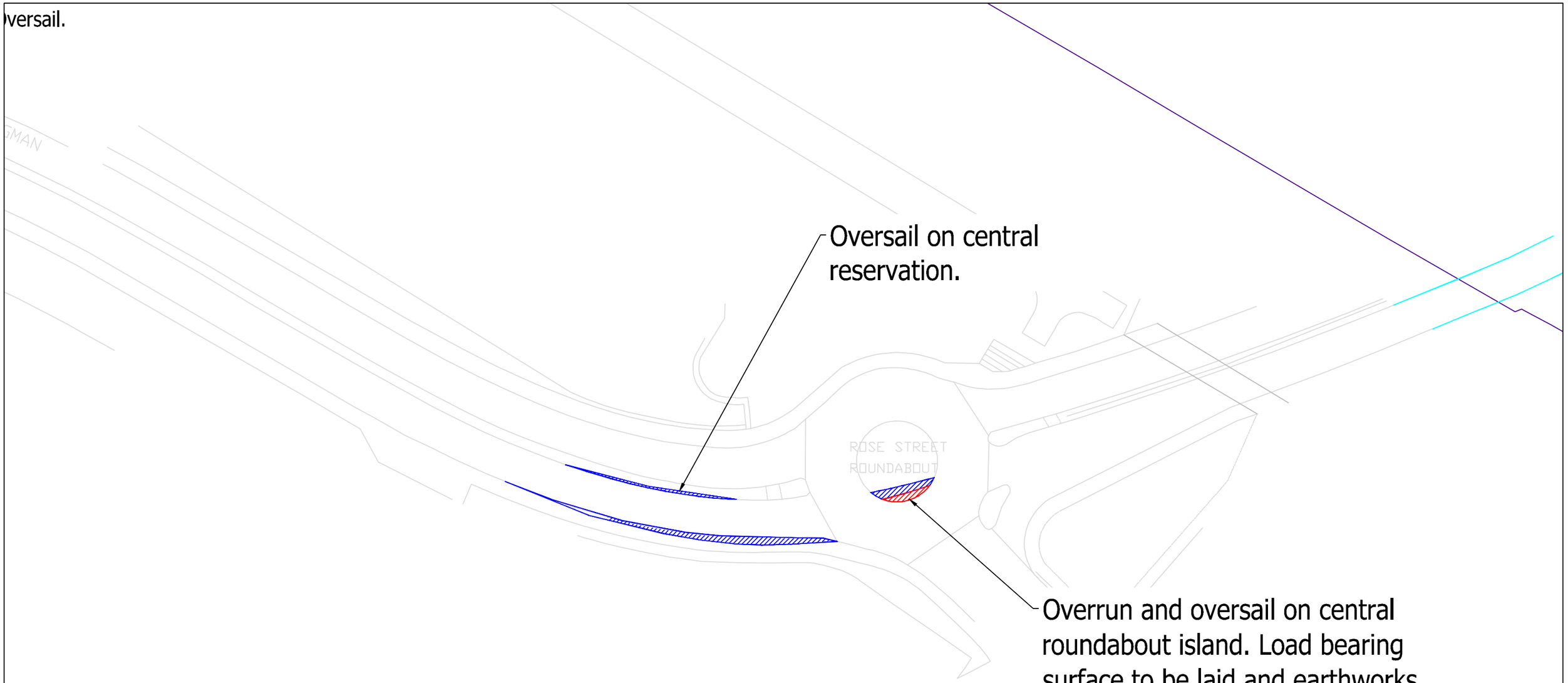
Drawing Status: Draft

Drawing No.: SK53

Notes:
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versail.



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: Rose Street Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR04

Scale: 1:750 @ A3

File No. 250317 Ballach N163 SPA.dwg

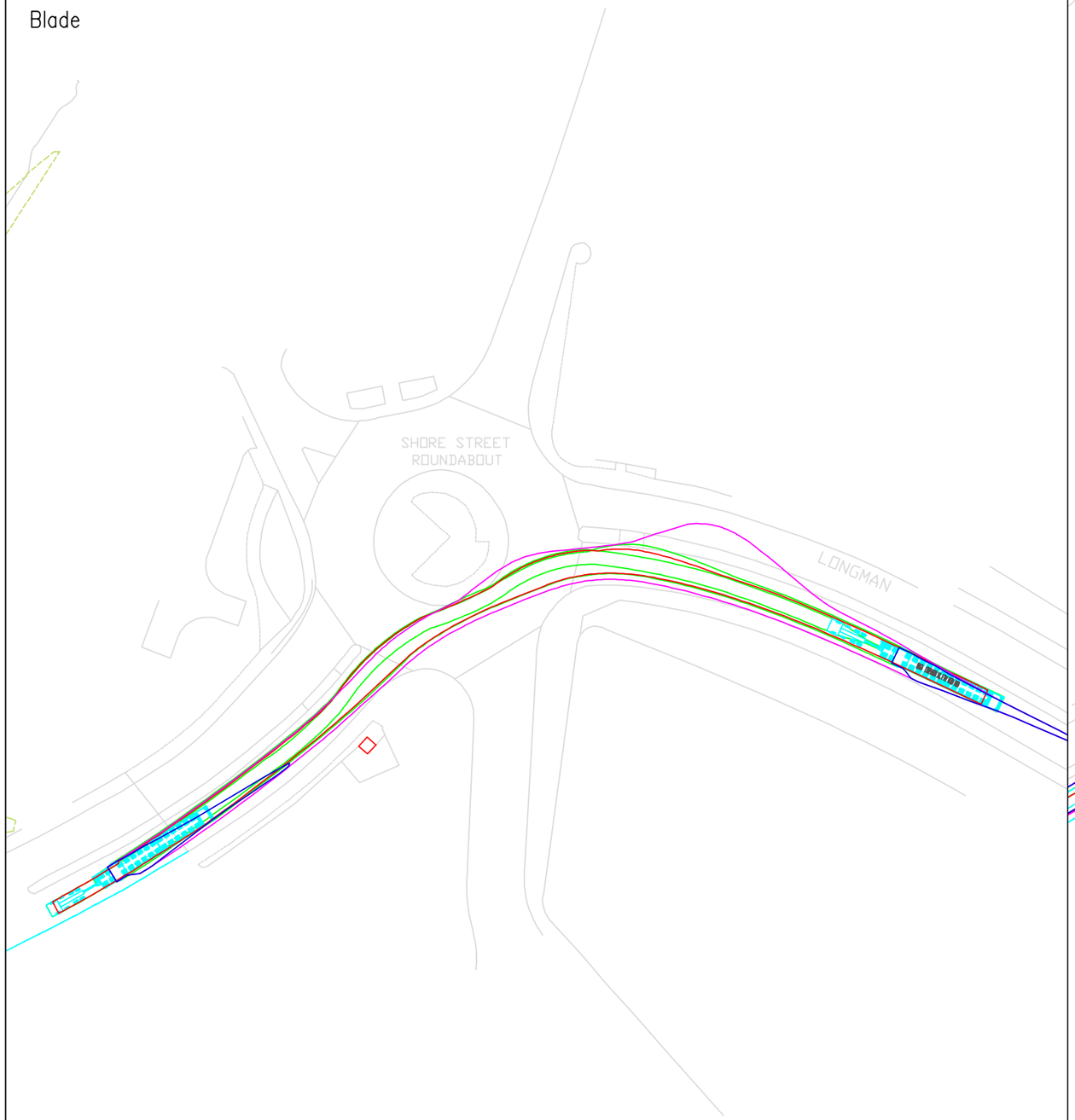
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Drawing No.: SK53A

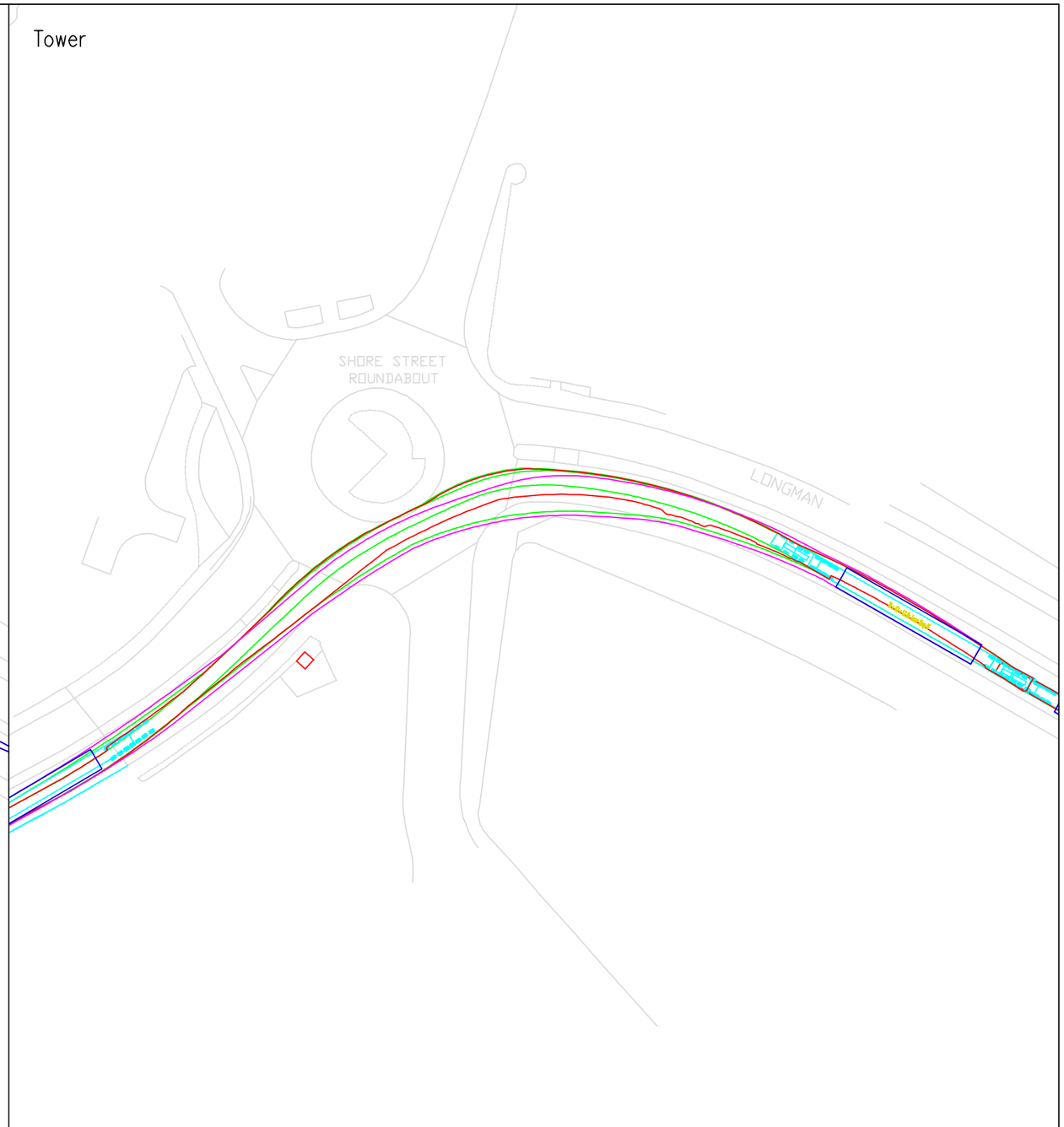
Notes:
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Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Shore Road Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR05

Scale: 1:1000 @ A3

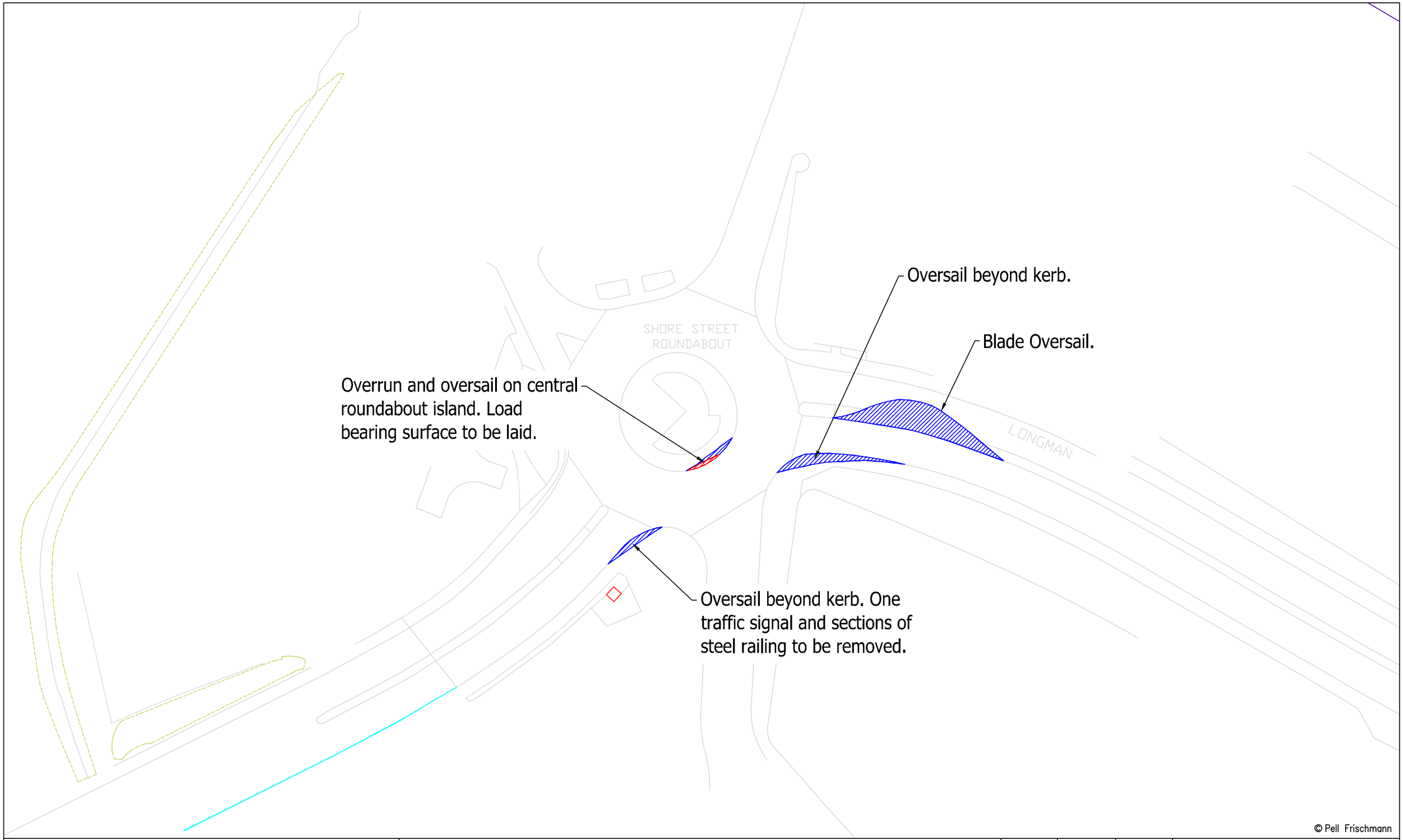
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK54

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Shore Road Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR05

Scale: 1:750 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK54A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Telford Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR06

Scale: 1:1000 @ A3

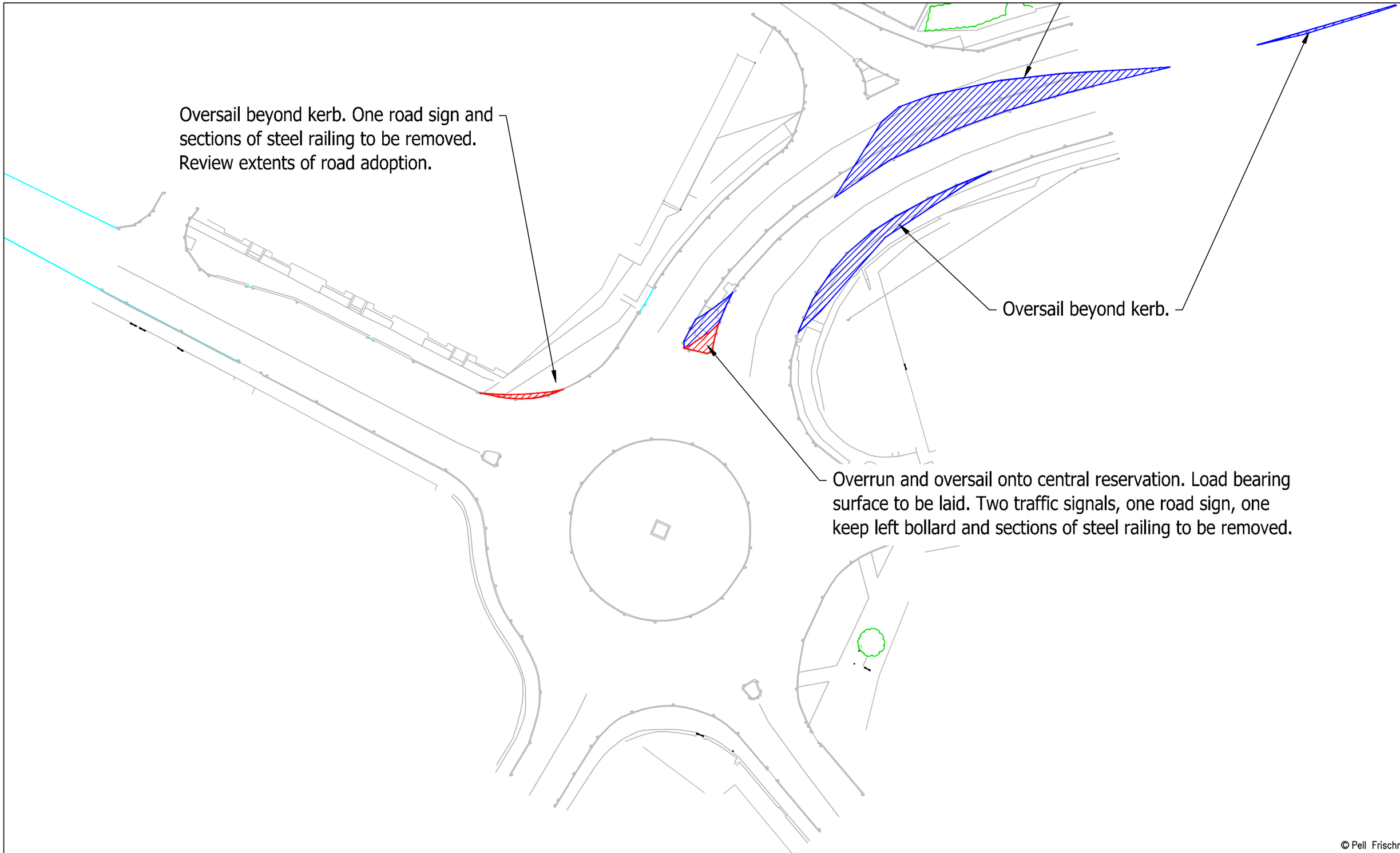
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK55

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A82 Telford Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR06

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK55A

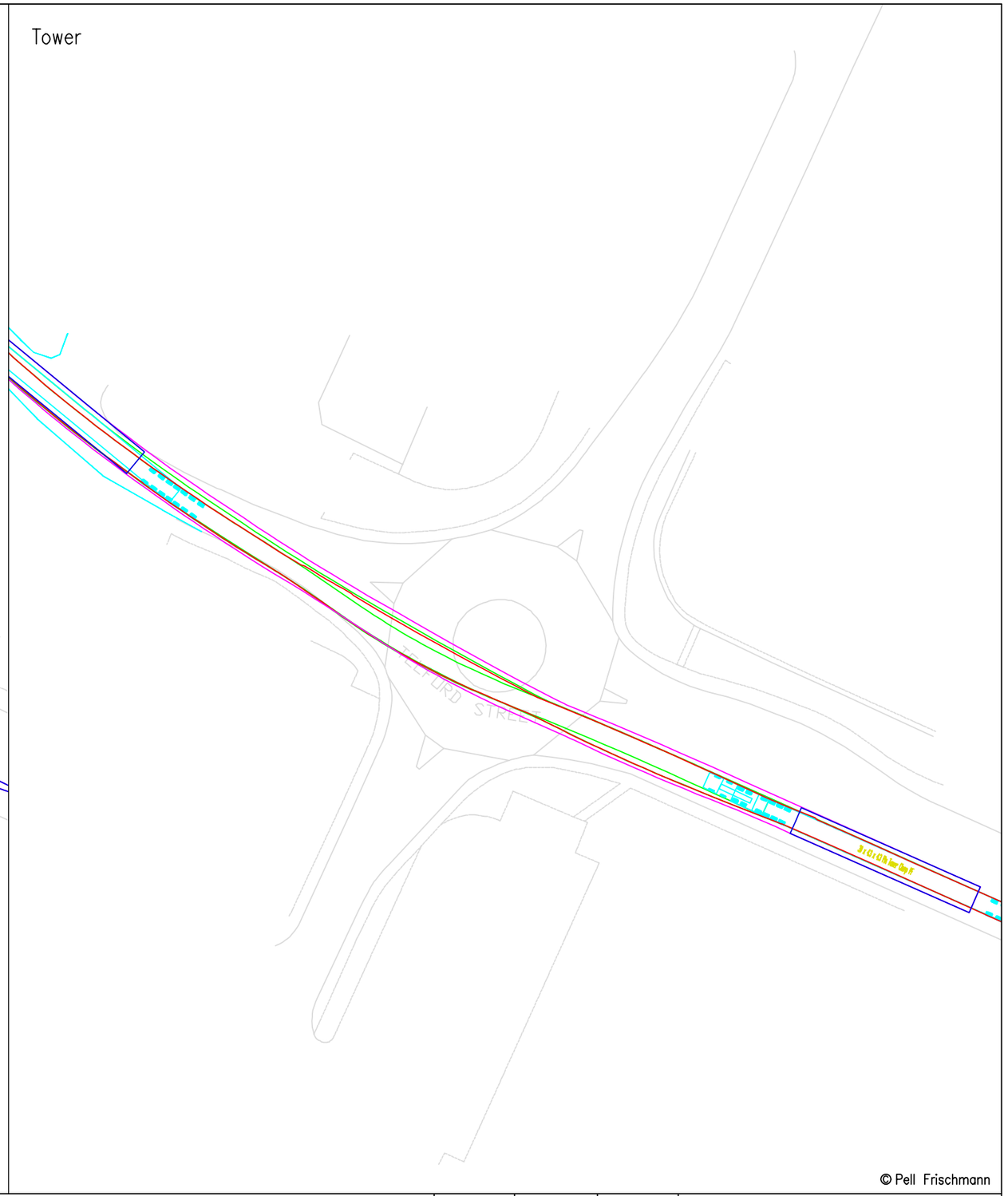
Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Telford St / Carsegate Rd Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR08

Scale: 1:750 @ A3

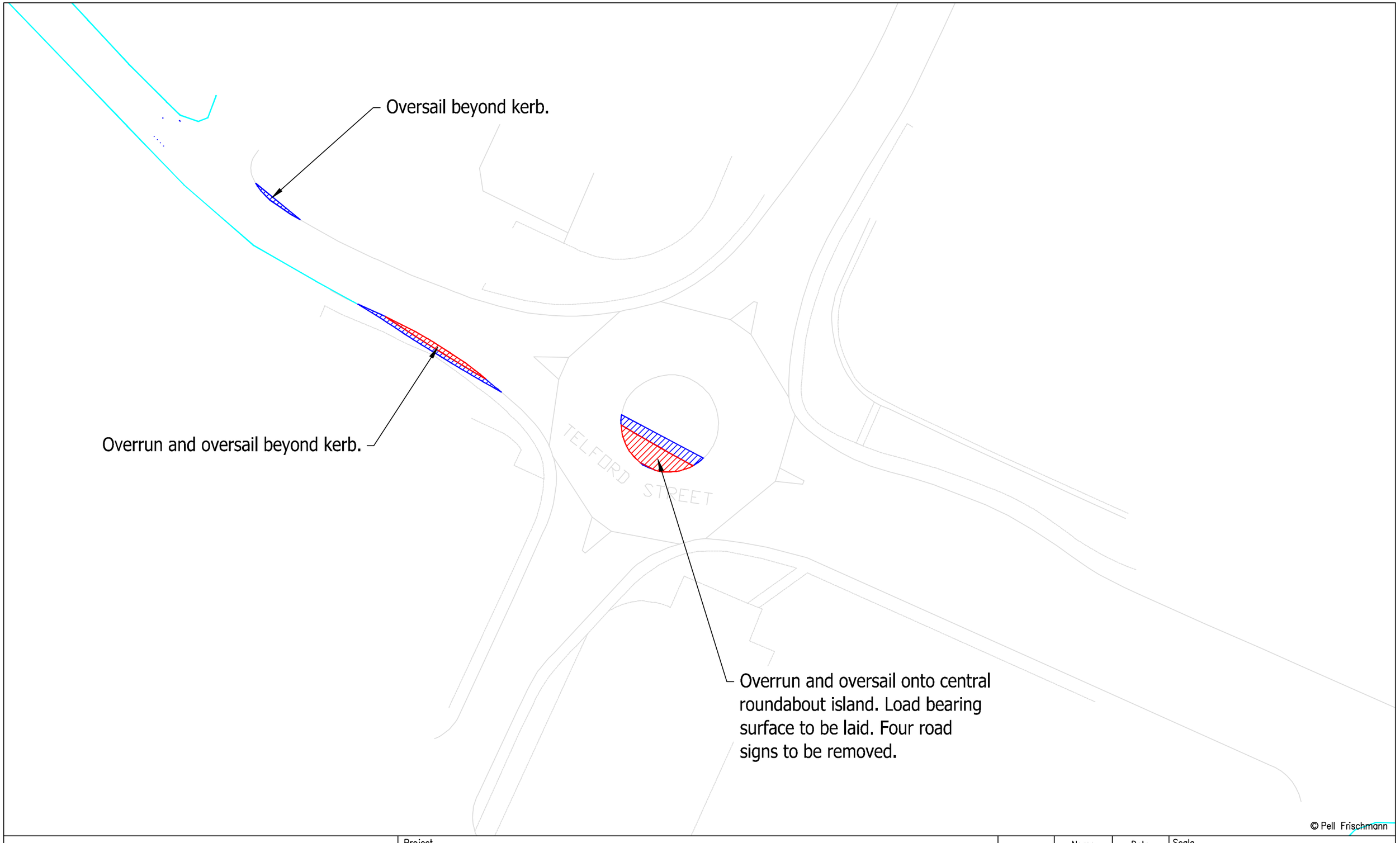
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK56

Notes:
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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Telford St / Carsegate Rd Roundabout

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR08

Scale: 1:500 @ A3

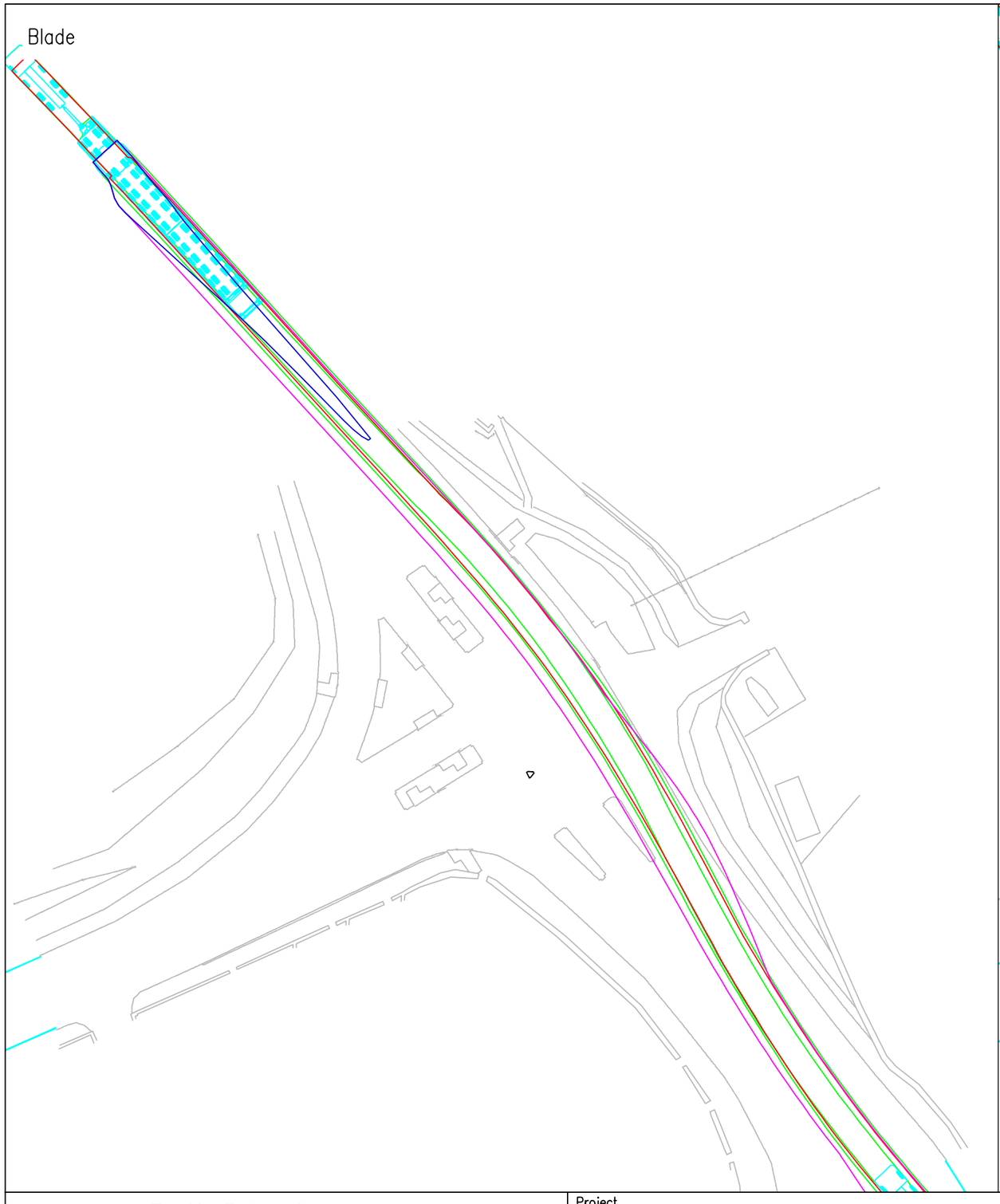
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK56A

Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Clachnaharry Rd/King Brude Rd Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR10

Scale: 1:500 @ A3

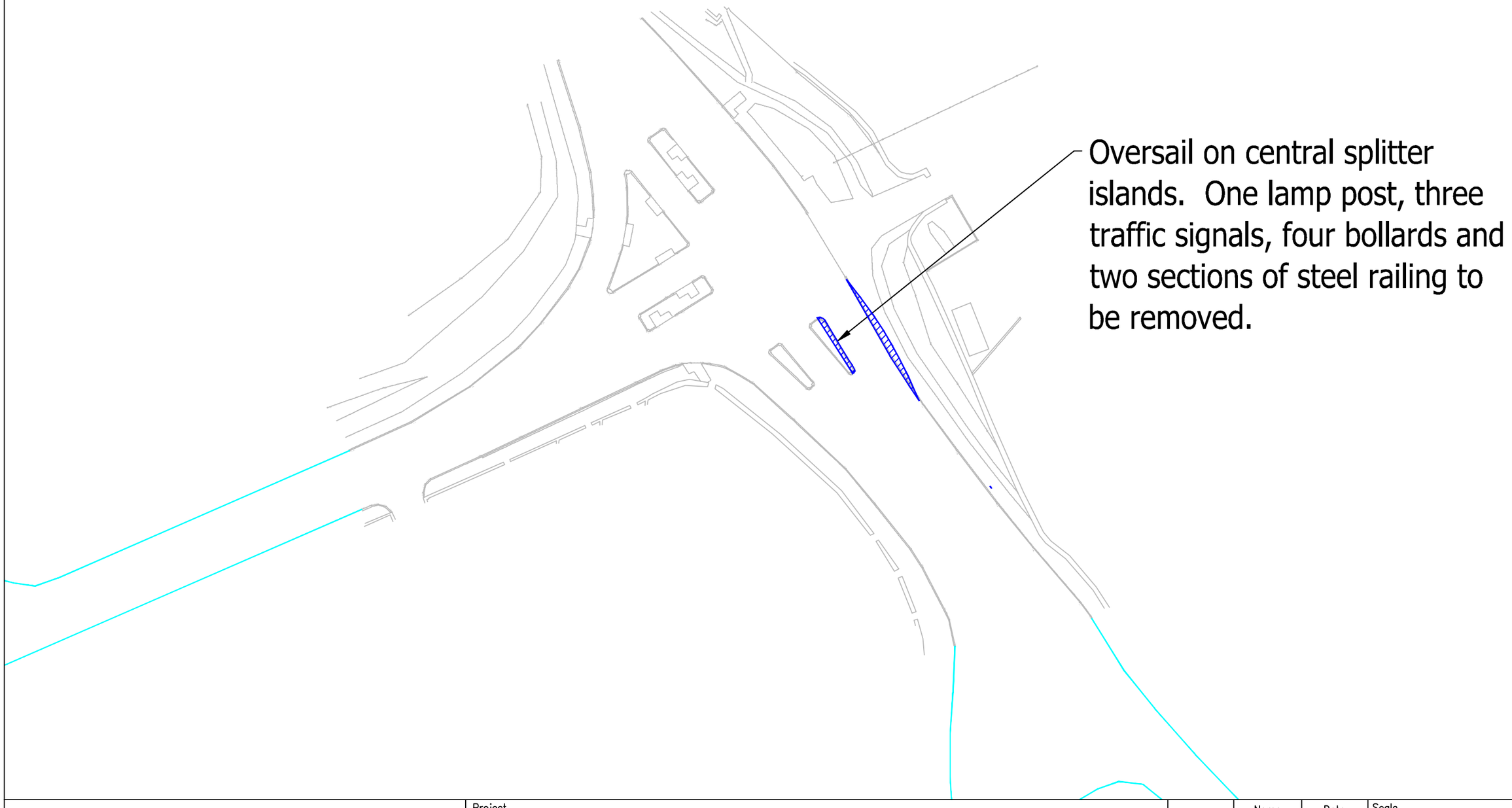
File No.: 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK57

Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Clachnaharry Rd/King Brude Rd Junction

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR10

Scale: 1:500 @ A3

File No.: 250317 Ballach N163 SPA.dwg

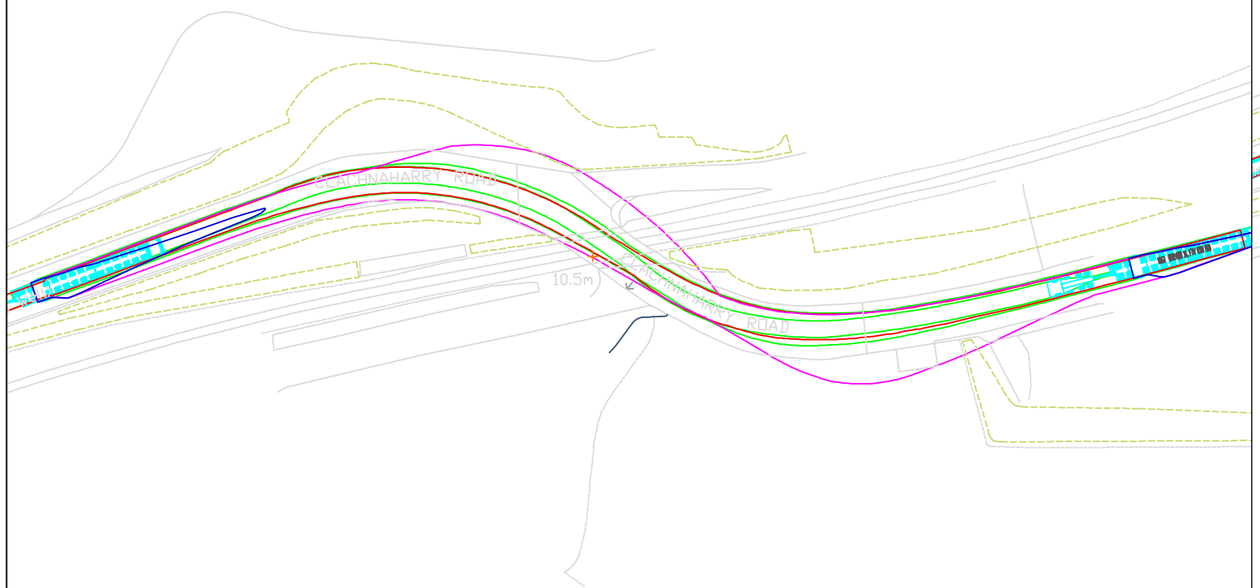
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Drawing No.: SK57A

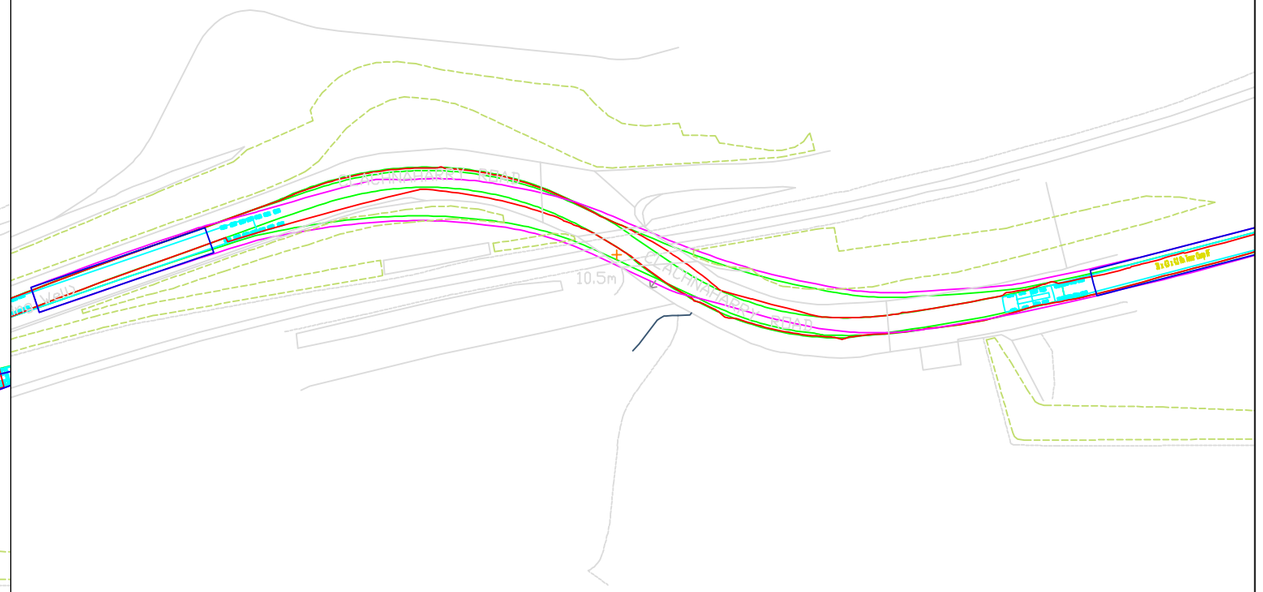
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade



Tower



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Clachnaharry Rd/High Street Rail Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR11

Scale: 1:1000 @ A3

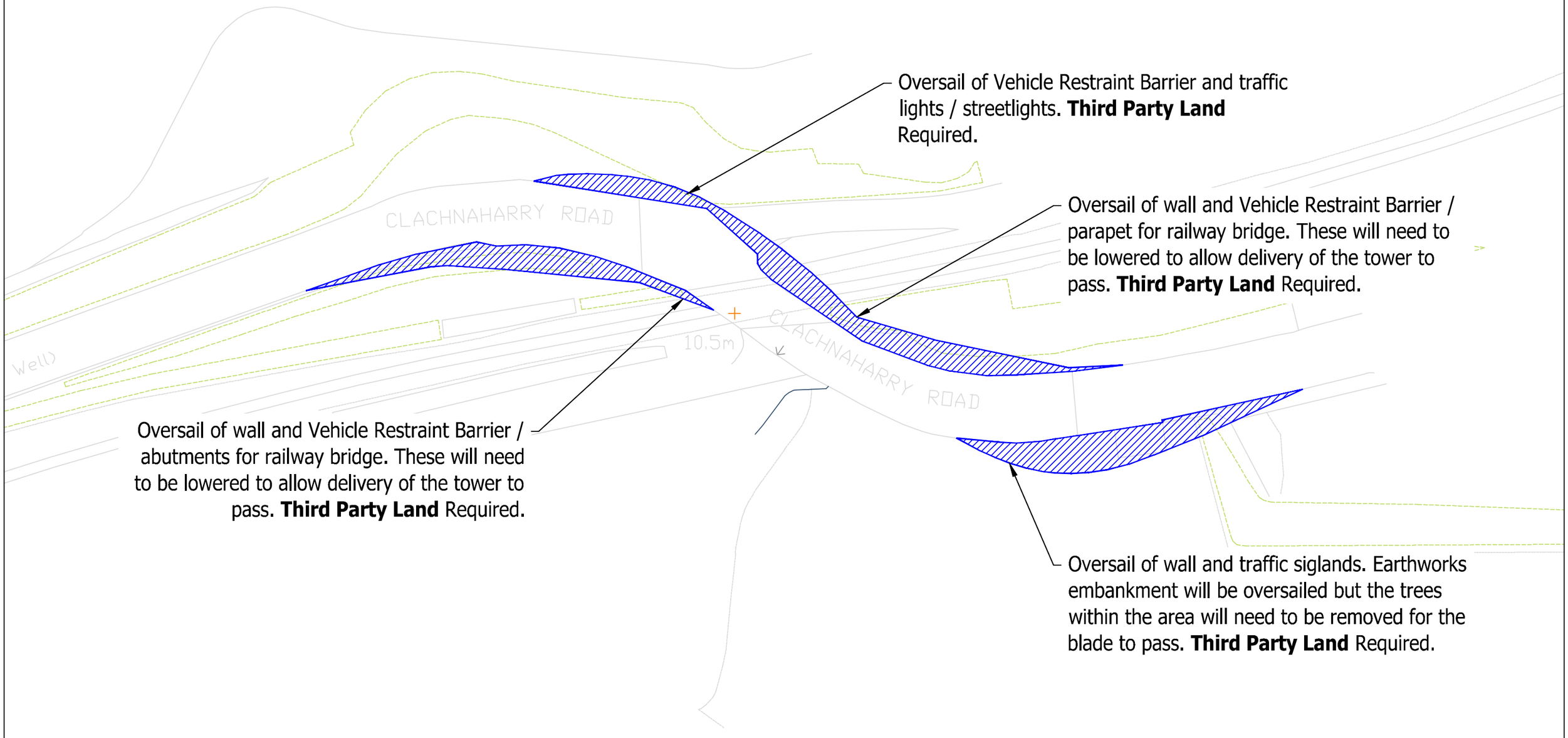
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Drawing Status: Draft

Drawing No.: SK58

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00



Oversail of Vehicle Restraint Barrier and traffic lights / streetlights. **Third Party Land** Required.

Oversail of wall and Vehicle Restraint Barrier / parapet for railway bridge. These will need to be lowered to allow delivery of the tower to pass. **Third Party Land** Required.

Oversail of wall and Vehicle Restraint Barrier / abutments for railway bridge. These will need to be lowered to allow delivery of the tower to pass. **Third Party Land** Required.

Oversail of wall and traffic siglands. Earthworks embankment will be oversailed but the trees within the area will need to be removed for the blade to pass. **Third Party Land** Required.

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Clachnaharry Rd/High Street Rail Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR11

Scale: 1:500 @ A3

File No. 250317 Ballach N163 SPA.dwg

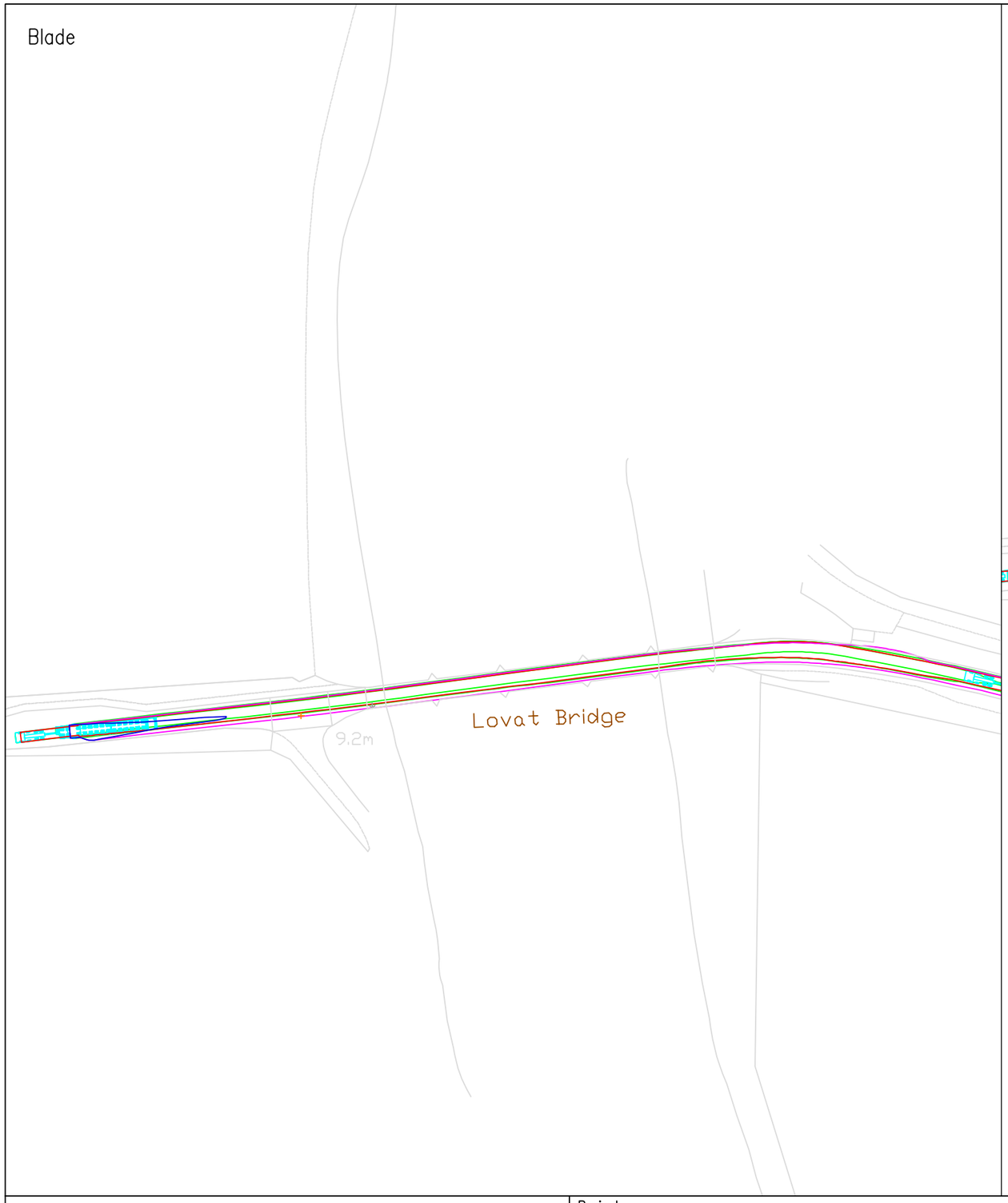
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Drawing No. SK58A

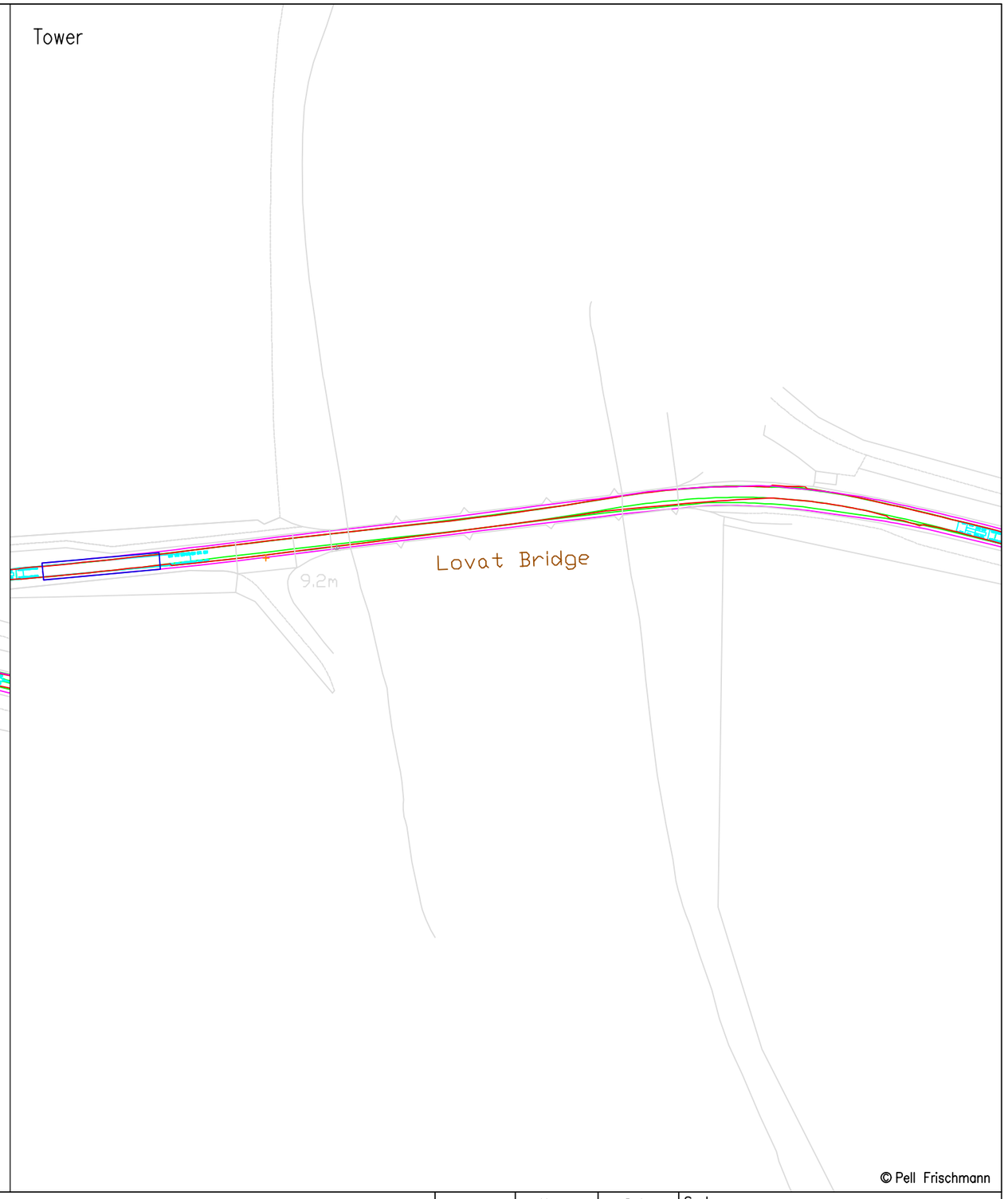
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Blade



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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Lovat Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR013

Scale: 1:1250 @ A3

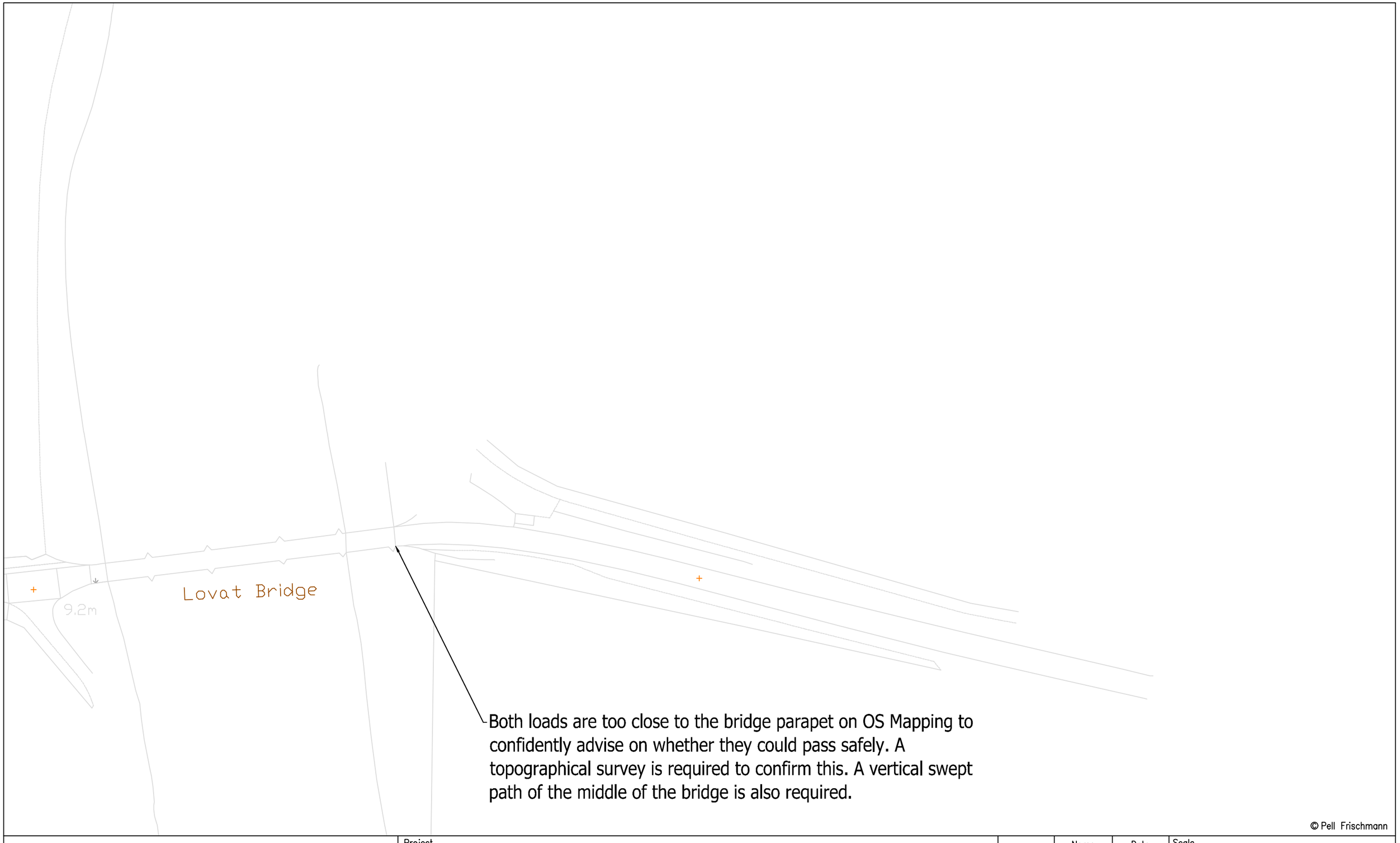
File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No.: SK59

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Client: EnergieKontor

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Overrun | Oversail

Project: Ballach Wind Farm

Drawing Title: N163 Blade & Tower

SPA Location: A862 Lovat Bridge

	Name	Date
Drawn	TO	26/06/2025
Designed	TO	26/06/2025
Checked	SMG	26/06/2025
Point of Interest		SR013

Scale: 1:1000 @ A3

File No. 250317 Ballach N163 SPA.dwg

Drawing Status: Draft

Drawing No. SK59A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: 00

Annex C ESDAL Correspondence

Outlook

RE: Wind Farm ESDAL

From Stephen Oakley <SOakley@bearscotland.co.uk>
Date Mon 03/02/2025 1:39 PM
To 'Tamara Otchereh' <TOtchereh@pellfrischmann.com>
Cc NW AbnormalLoad <NWAbnormalLoad@bearscotland.co.uk>

Good afternoon,

Although the structures on the A9 and A835 sections of the proposed routes are suitable for the proposed vehicle there are planned construction works on the A9 Cromarty bridge that will impose weight restrictions below the weight of the proposed vehicle. The works on Cromarty bridge are proceeding in phases and it is possible that future schemes may have similar restrictions. The height of the overbridges on the A9 is sufficient for the proposed vehicle height.

May 2025- Onwards due to planned bridge construction works. Expected duration is about four months.

Abnormal Load Range	Restriction
Below SV80*	No restrictions.
Between SV80 and SV100**	Can cross the spans centrally with no other traffic on piers 8, 9 and 10. This will require traffic management to coordinate.
Above SV100	Not permitted.

* SV80 are typical abnormal vehicles with a maximum gross weight of 80 tonnes and a maximum basic axle load of 12.5 tonnes.

** SV100 are typical abnormal vehicles with a maximum gross weight of 100 tonnes and a maximum basic axle load of 16.5 tonnes.

Regards

Stephen Oakley
Bridge Engineer | BEAR Scotland | North West Unit
Telephone: 07876 825865 | Visit us @ www.bearscot.com

BEAR Think Safe Home Safe experience that delivers

Outlook

RE: AB-66056/SM Wind Farm ESDAL

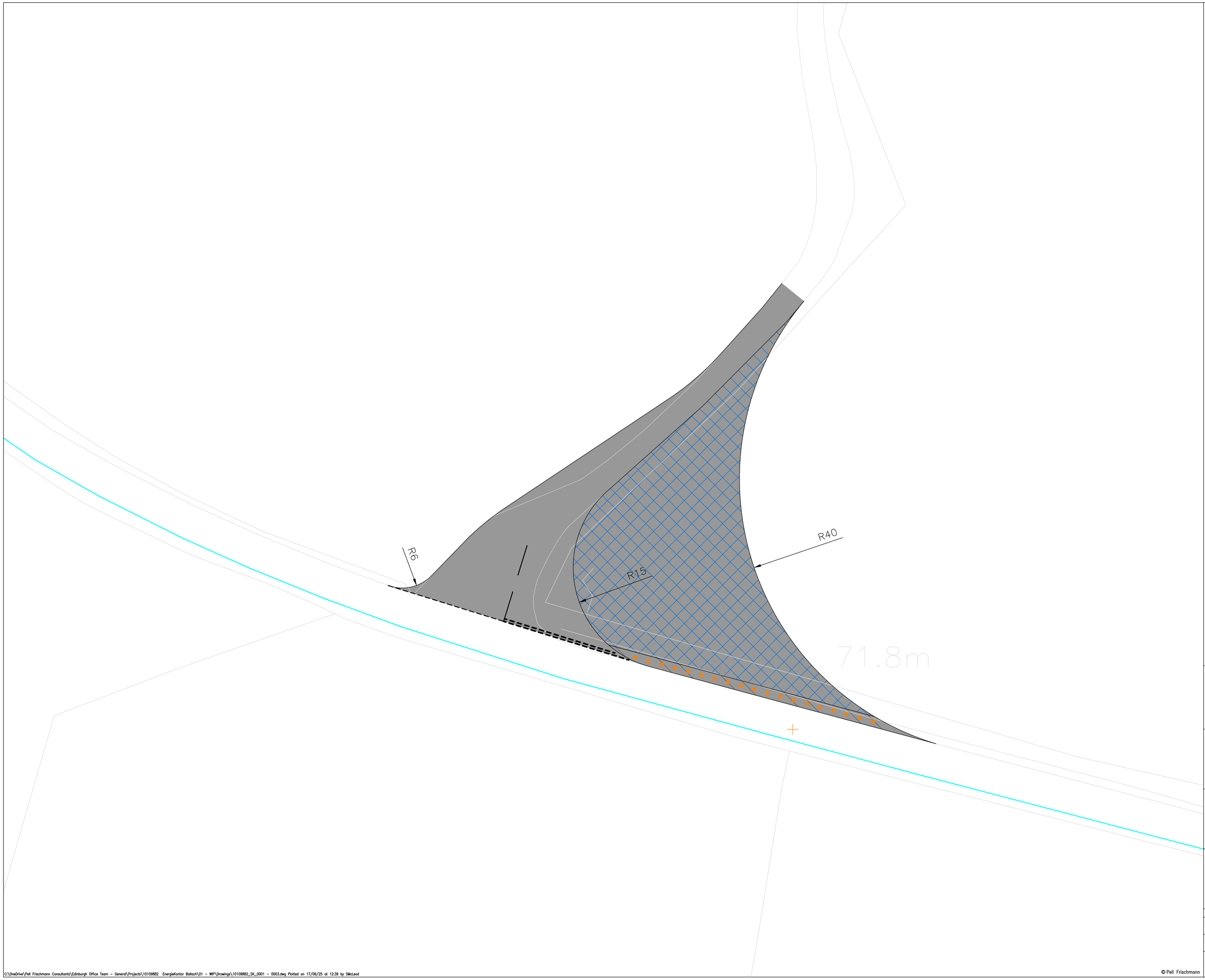
From Abnormal Loads Enquiries <AbnormalLoadsEnquiries@networkrail.co.uk>
Date Wed 05/02/2025 12:41 PM
To Tamara Otchereh <TOtchereh@pellfrischmann.com>

Hi Tamara
We have no objections to this particular route enquiry as it does not affect any road over rail Network Rail owned structures. Please note this only applies to this route enquiry.
We check the load carrying capacity of Network Rail owned road over rail bridges affected. We do not check anything else, including:

* Load carrying capacity of level crossings
* Clearance to bridge parapets
* Clearance under a rail bridge
* Clearance to overhead wires at level crossings

Many Thanks

Sunil Maniraj
Abnormal Loads Clerk
Abnormal Loads Help Desk: 07395 391628
Abnormal Loads Team – Part of the National Records Group



NOTE:

1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION FOR HIGHWAY WORKS AND THE TURBINE MANUFACTURERS STANDARDS AND ALL RELEVANT DRAWINGS WITHIN THE PROJECT DESIGN PACKAGE.
2. ALL WORKS TO BE EXECUTED IN ACCORDANCE WITH THE DMRB, THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, DESIGN MANUAL FOR ROADS AND BRIDGES, AND TRAFFIC SIGNS MANUAL.
3. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE. ALL LEVELS ARE IN METRES AND RELATE TO ORDNANCE DATUM.
4. DO NOT SCALE FROM ANY DRAWING. WORK TO FIGURED DIMENSIONS ONLY. ANY DISCREPANCIES IN DIMENSIONS ARE TO BE REFERRED TO THE DESIGNER BEFORE WORK IS PUT TO HAND.
5. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
6. ALL WORKS BY THE CONTRACTOR MUST BE CARRIED OUT IS SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
7. ALL WORKS ARE TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENT OF THE STATUTORY AUTHORITIES AND CONSTRUCTION DESIGN MANAGEMENT REGULATIONS.
8. CONTRACTOR TO VERIFY LOCATION OF ANY EXISTING UTILITIES. IF ANY UTILITIES ARE ENCOUNTERED RELEVANT APPROVALS FROM PROVIDERS WILL BE REQUIRED PRIOR TO CONSTRUCTION.

KEY:

- PROPOSED ASPHALT JUNCTION
- PROPOSED ASPHALT HARDSTRIP
- PROPOSED TYPE 1 ABNORMAL LOAD WIDENING
- PROPOSED REMOVABLE BOLLARD

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Client

ENERGIE KONTOR

Project

BALLACH WIND FARM

Drawing Title

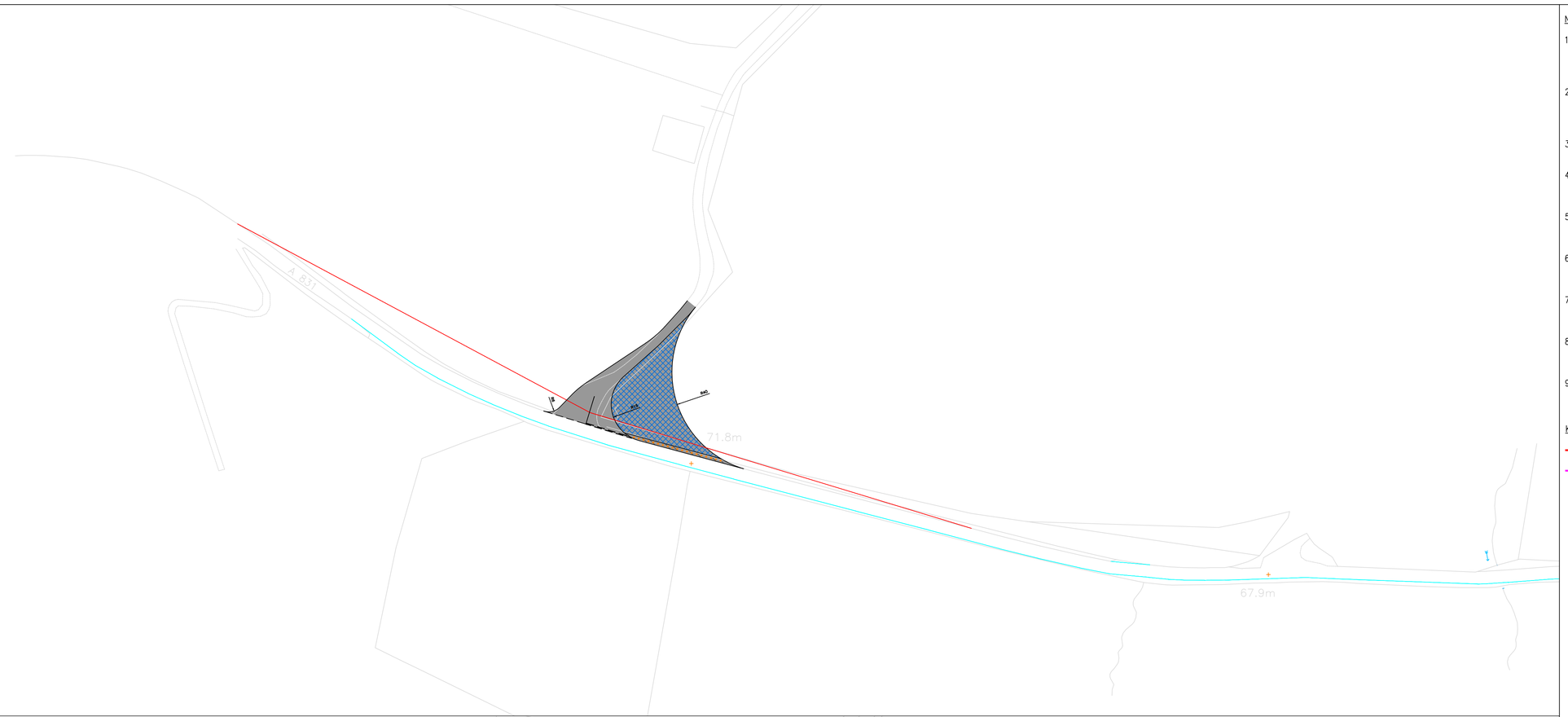
PROPOSED SITE ACCESS
GENERAL ARRANGEMENT

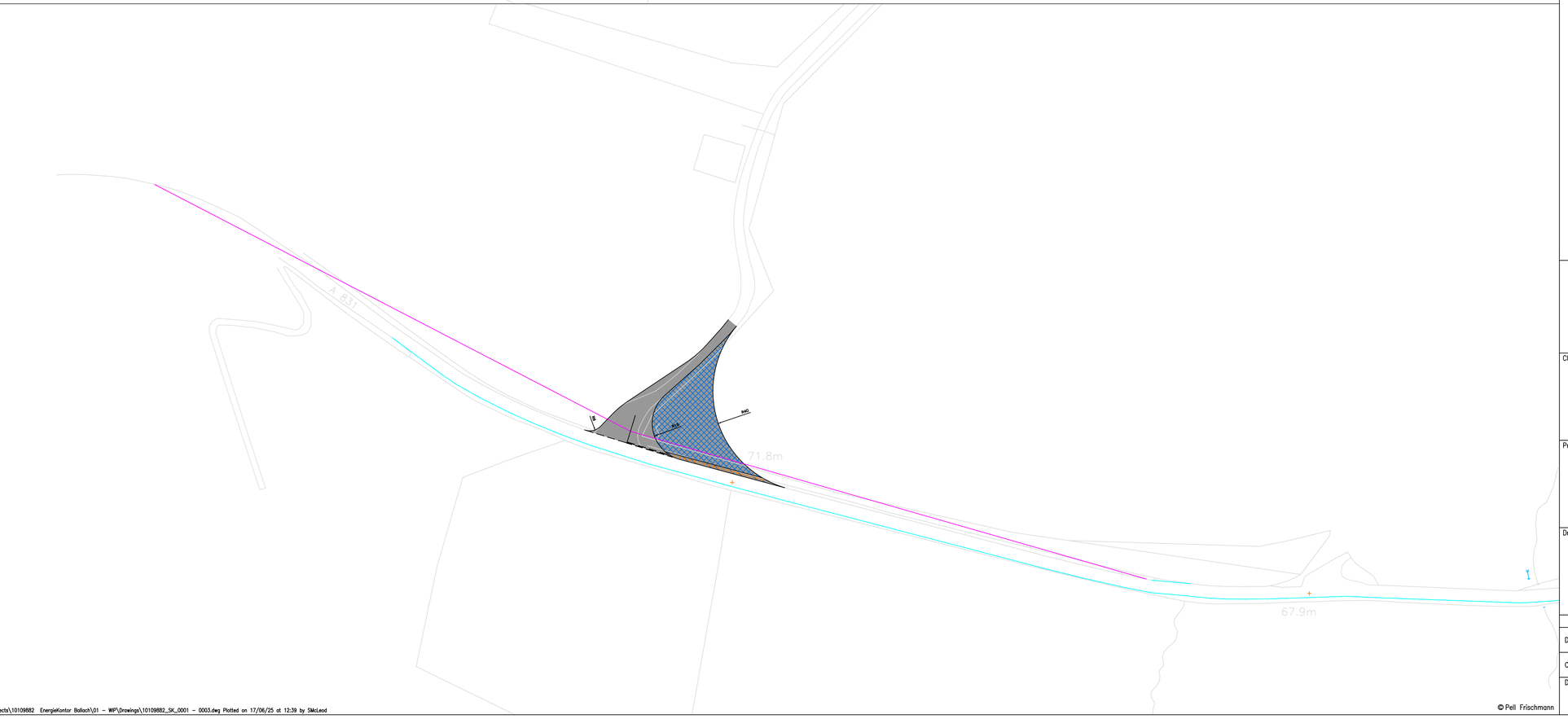
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Drawn	CN	17/06/2025	File No.	10109882_SK_0001
Checked	SCM	16/06/2025	Drawing Status	DRAFT

Drawing No. 10109882_SK_0001 | Revision A

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C:\OneDrive\Pell Frischmann Consultants\Edinburgh Office Team - General\Projects\10109882 EnergieKontor Ballach\01 - WIP\Drawings\10109882_SK_0001 - 0003.dwg Plotted on 17/06/25 at 12:39 by SMcLeod





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2. ALL WORKS TO BE EXECUTED IN ACCORDANCE WITH THE DMRB, THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, DESIGN MANUAL FOR ROADS AND BRIDGES, AND TRAFFIC SIGNS MANUAL.
3. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE. ALL LEVELS ARE IN METRES AND RELATE TO ORDNANCE DATUM.
4. DO NOT SCALE FROM ANY DRAWING. WORK TO FIGURED DIMENSIONS ONLY. ANY DISCREPANCIES IN DIMENSIONS ARE TO BE REFERRED TO THE DESIGNER BEFORE WORK IS PUT TO HAND.
5. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
6. ALL WORKS BY THE CONTRACTOR MUST BE CARRIED OUT IS SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
7. ALL WORKS ARE TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENT OF THE STATUTORY AUTHORITIES AND CONSTRUCTION DESIGN MANAGEMENT REGULATIONS.
8. CONTRACTOR TO VERIFY LOCATION OF ANY EXISTING UTILITIES. IF ANY UTILITIES ARE ENCOUNTERED RELEVANT APPROVALS FROM PROVIDERS WILL BE REQUIRED PRIOR TO CONSTRUCTION.
9. JUNCTION VISIBILITY SPLAYS TO BE CLEAR OF ALL OBSTRUCTIONS UP TO A HEIGHT OF 1.05m AS STATED IN THE HIGHLAND COUNCIL ROADS AND TRANSPORT GUIDELINES FOR NEW DEVELOPMENTS.

KEY:

4.5m x 160m VISIBILITY SPLAY

4.5m x 215m VISIBILITY SPLAY

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Client

ENERGIE KONTOR

Project

BALLACH WIND FARM

Drawing Title

PROPOSED SITE ACCESS
JUNCTION VISIBILITY SPLAYS

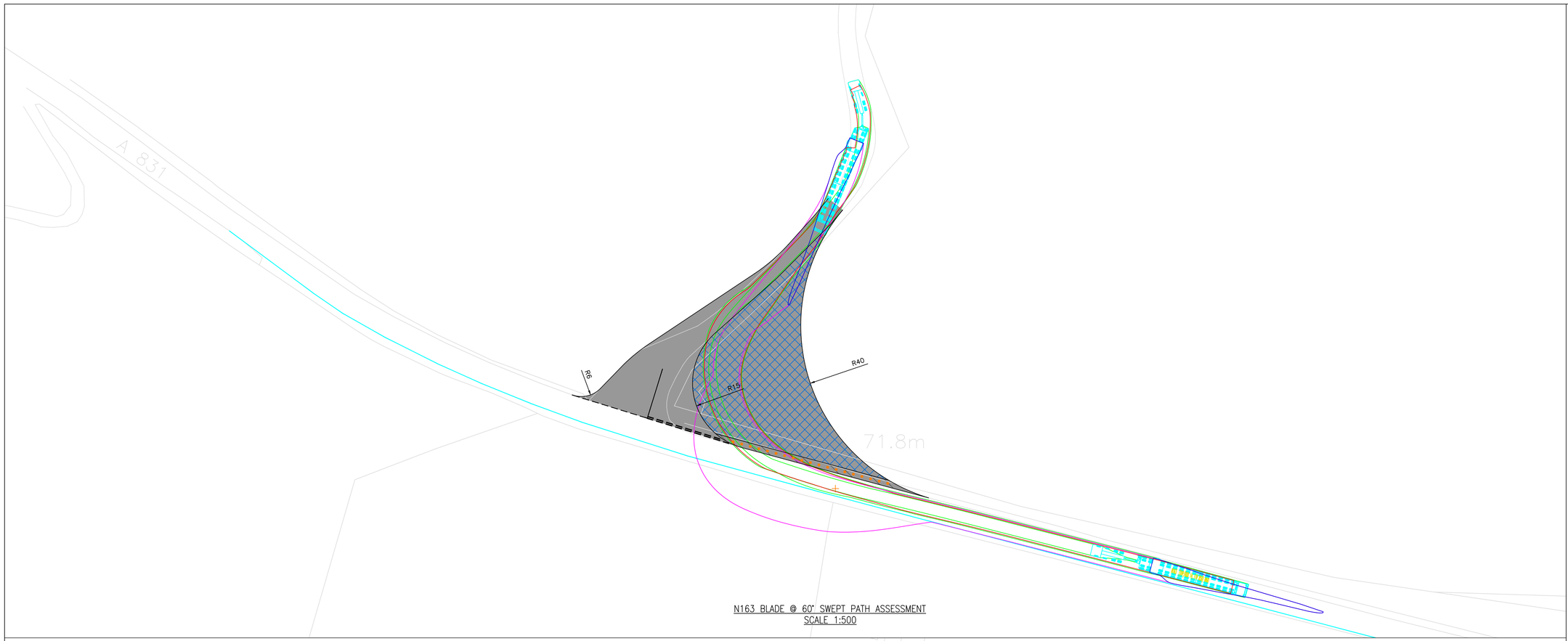
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Checked	SCM	16/06/2025	Drawing Status	DRAFT

Drawing No. 10109882_SK_0002

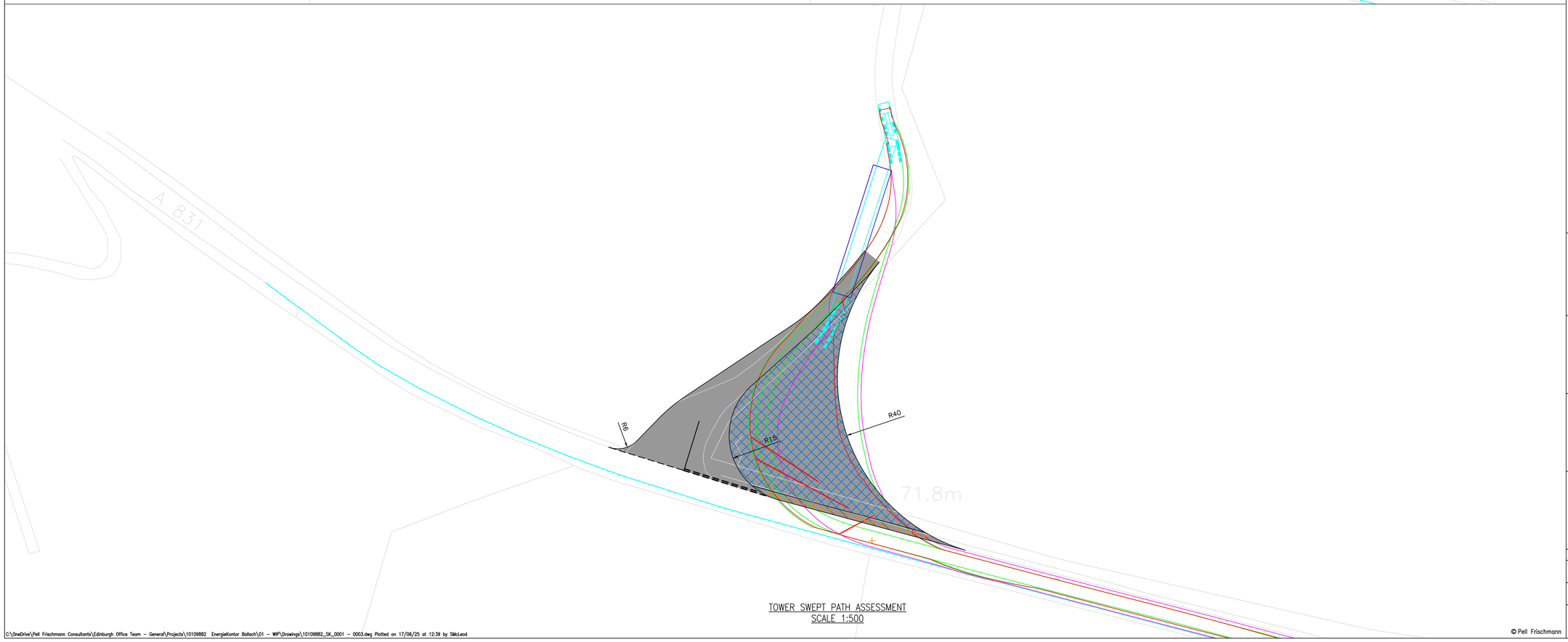
Revision A

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N163 BLADE @ 60° SWEPT PATH ASSESSMENT
SCALE 1:500



TOWER SWEPT PATH ASSESSMENT
SCALE 1:500

NOTE:

1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION FOR HIGHWAY WORKS AND THE TURBINE MANUFACTURERS STANDARDS AND ALL RELEVANT DRAWINGS WITHIN THE PROJECT DESIGN PACKAGE.
2. ALL WORKS TO BE EXECUTED IN ACCORDANCE WITH THE DMRB, THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, DESIGN MANUAL FOR ROADS AND BRIDGES, AND TRAFFIC SIGNS MANUAL.
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Client
ENERGIE KONTOR

Project
BALLACH WIND FARM

Drawing Title
PROPOSED SITE ACCESS
JUNCTION ABNORMAL LOAD
SWEPT PATH ASSESSMENT

	Name	Date	Scale	1:500
Drawn	CN	17/06/2025	File No.	10109882_SK_0003
Checked	SCM	16/06/2025	Drawing Status	DRAFT
Drawing No.	10109882_SK_0003		Revision	A

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Wind Power Aviation Consultants Ltd

Ballach Wind Farm Aviation Lighting and Mitigation Technical Appendix V1.1

Our Reference: WPAC 038/25
Your Reference: Ballach EIA

Authors: Commander John Taylor, RN (Ret)

Squadron Leader Mike Hale MBE MSc CFS RAF (Ret)

Light Modelling, GIS and Mapping – Sam Taylor BA (Hons) MSc

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Reference Documents

A. Civil Aviation Publication (CAP) 764 Civil Aviation Authority (CAA) Policy and Guidance on Wind Turbines Version 6, Feb 2016
B. CAP 764 Version 7 (Draft) issued for comment in June 2020
C. CAP 764 Version 7 (Draft) issued for comment in April 2024
D. Air Navigation Order (ANO) Article 222
E. CAA Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level dated 01/06/17
F. International Civil Aviation Organisation (ICAO) Annex 14 Vol 1 Chapter 6
G. MOD Obstruction Lighting Guidance Document 01 Jan 2020
H. Landscape Institute Guidance on Landscape and Visual Impact Assessment Version 3
I. NatureScot Guidance on Aviation Lighting Impact Assessment dated November 2024

Scope

1. This report is divided into two parts. Part 1 proposes a lighting design that is compliant with existing and draft (but soon to be ratified) regulations and guidance contained within References A to G as discussed with the Civil Aviation Authority (CAA) and the Ministry of Defence (MOD). It explains the rationale behind the lighting design taking into account the requirement to minimise the number of turbines illuminated with aviation obstruction lights whilst maintaining flight safety and provides a detailed assessment of the brilliance of the lighting when viewed from a number of viewpoints provided by the LVIA consultant after consultation with the relevant stakeholders including NatureScot and the Local Planning Authority. Part 2 of the report identifies and explains those mitigation measures that can be utilised to minimise the environmental effect of the lights including an assessment of the historical meteorological data from which to predict the luminous intensity requirements for the lights. The entire report can be considered to fulfil the requirements for an Aviation Lighting Landscape and Visual Impact Mitigation Plan and can be used to inform the Landscape and Visual Impact Assessment as recommended in the guidance laid down in the Landscape Institutes Guidelines for Visual Impact Assessment Version 3 (GLVIA3).

Part 1 Turbine Lighting Layout Design

Introduction

2. WPAC have designed a large number of CAA and MOD compliant lighting layouts for wind farms and are also in constant dialogue with the CAA regarding the proposed changes to CAP 764 in terms of aviation lighting requirements. Whilst Reference A is technically the current publication for policy and guidance on this issue, Reference B was released for comment and is already being used by the CAA as the current de facto policy. Reference C is also currently out for consultation with all aviation stakeholders but the proposed release date has passed and the CAA have yet to publish a new release date. Discussions with the CAA have clarified that the draft regulations at Reference B will not be changing in terms of the overarching policy but the wording may be slightly amended in the interests of clarity.

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Lighting Layout Starting Point and Assumptions

3. The Applicant has proposed a 20 turbine wind farm along the Beinn Nam Fitheach, Beinn Bheag Fhada and Cnoc Eille Mor ridge line to the South of the Gleann Goibhre. The centre of the site is 10km west south-west of Muir of Ord in Ross & Cromarty, Scotland.

4. From a civilian aviation perspective Ballach sits in unregulated airspace which is designated Class G (open airspace) by the CAA and away from civil and military airfields. In contrast, from a military perspective the proposed site is located in MOD Low Flying Area (LFA) 14. In addition the western leg of the site extends into Tactical Training Area (TTA) 14. This area doubles as the Highland Restricted Area (HRA-R610) activated by Notices to Air Missions (NOTAM). LFA 14 is the busiest of the UK LFAs. During the hours of darkness this area converts to Night Allocated Region (NAR) 1BE. Although primarily a fast jet training area the airspace is also used by NATO tactical aircraft and helicopters day and night.

5. Military fast jet aircraft operate down to 100ft (30m) and military transport aircraft down to 150ft (46m) above ground level in the TTA14/HRA-R610. Helicopters routinely operate down to 30ft (9m) and on occasion ground level. Military helicopters are cleared to fly through (operate within) wind turbine sites but fast jets must fly around these sites separated by their minimum separation distance (msd) which can be as small at 100ft (30m). Civilian aircraft will also operate in the area of the Ballach turbines by day and night and this will include helicopters from the Coastguard, Helicopter Emergency Medical Services (HEMS), Police and Air Ambulance.

Lighting Assessment Overview

6. From a CAA perspective Ballach is sited outside controlled airspace and away from airports and airfields. As a result it will be assessed against visible lighting in accordance with Class G 'en-route' airspace requirements as detailed in CAP 764 (latest draft). The following factors will be taken into account:

- To accommodate MOD requirements the site will be assessed for Night Vision Goggles (NVG) compatible lighting in accordance with MOD published obstruction lighting specifications.
- Where possible the recommended final lighting configuration will be optimised to reduce light impact on the local area.
- CAA obstruction lighting dispensations that are currently offered where flight safety can be maintained will be included.
- The Ballach proposed development is for 20 turbines: 12 at 229.5m and eight 199.5m to tip.

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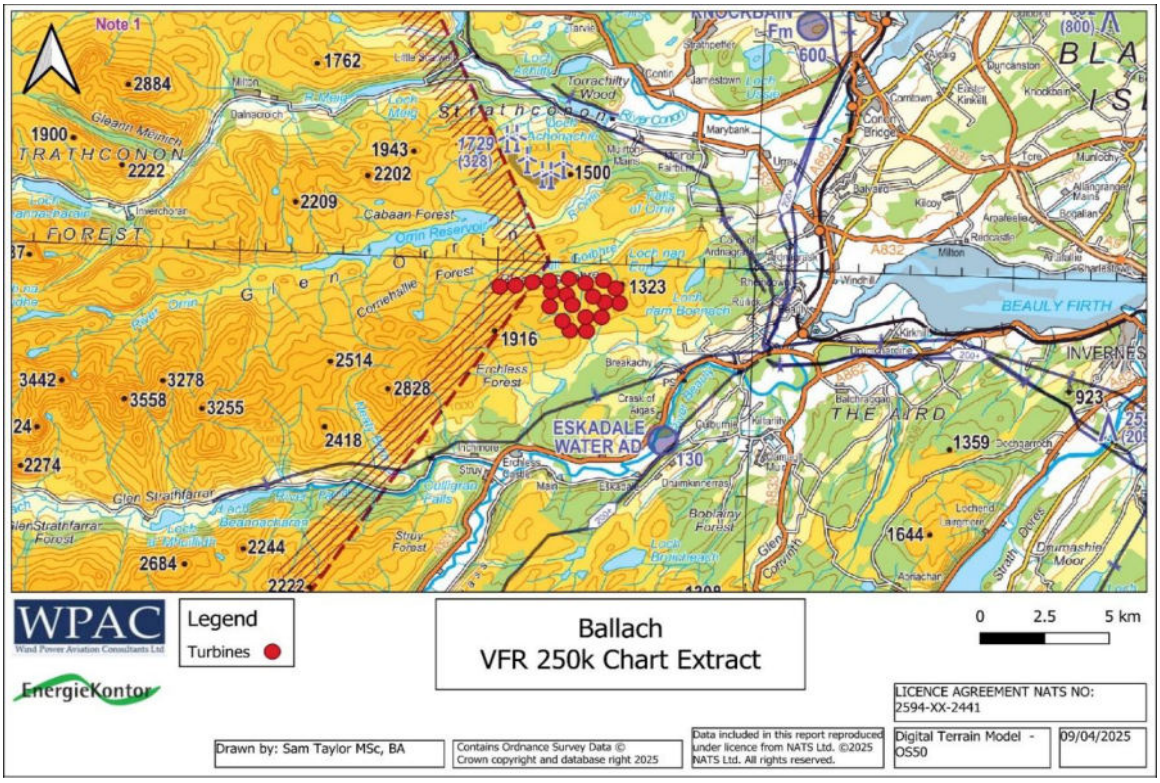


Figure 1 Ballach on an aviation chart

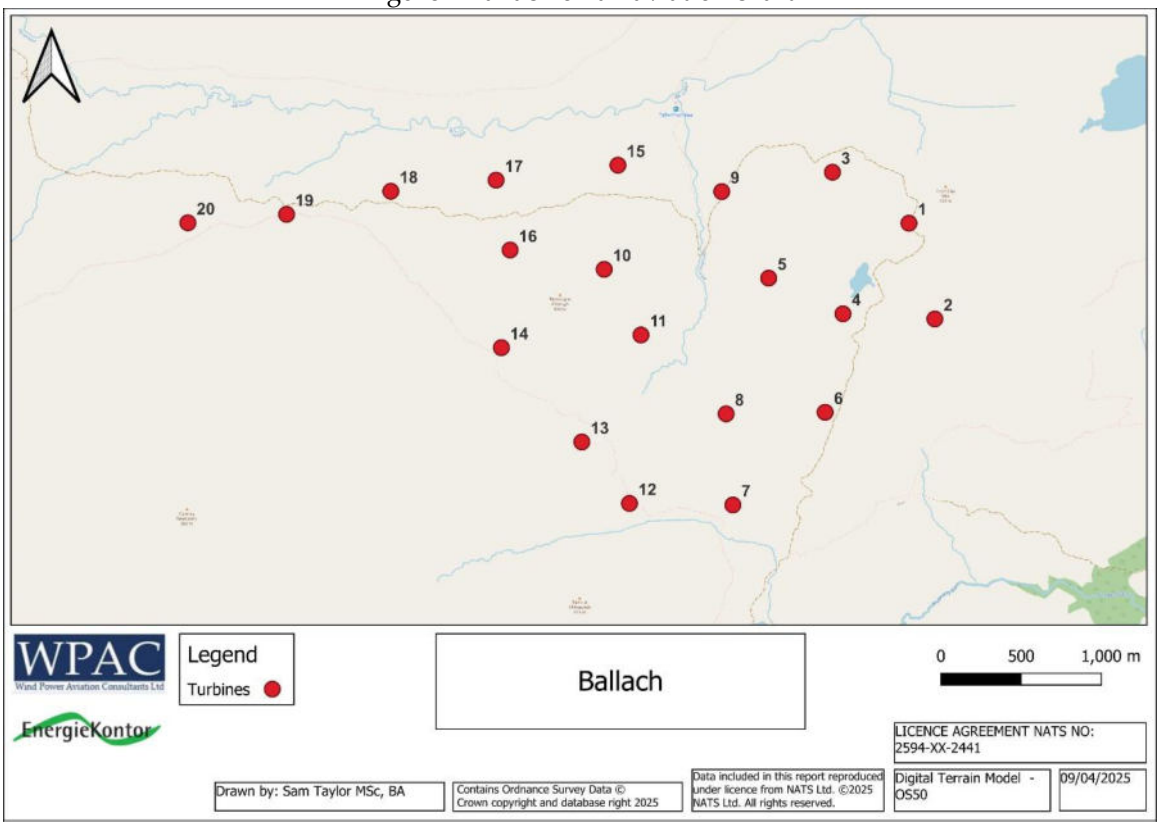


Figure 2 Ballach

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CAA-ANO Red 2000/200cd Lighting (In compliance with CAA CAP 764 - Draft)

7. In accordance with the CAP 764 (draft) conditions, the CAA requires:

- That all perimeter turbines be lit unless removing a light will leave a gap of less than 900m total between the remaining lit turbines.
- That any turbine within 200m of a 'string perimeter' be lit unless the distance between adjacent turbines is less than 900m total. Be: additional spacing dispensation is sometimes available for the above criteria.
- That any unlit turbine does not exceed a 10° up-slope from adjacent lit turbines.
- No turbine shall be more than 1800m (1nm) from a lit turbine.

8. Applying these criteria dictates that dictates that 13 turbines of the Ballach site would require ANO visible red lighting.

Turbines with 2000/200cd Lights: T1, T2, T3, T6, T7, T9, T12, T13, T15, T17, T18, T19 and T20

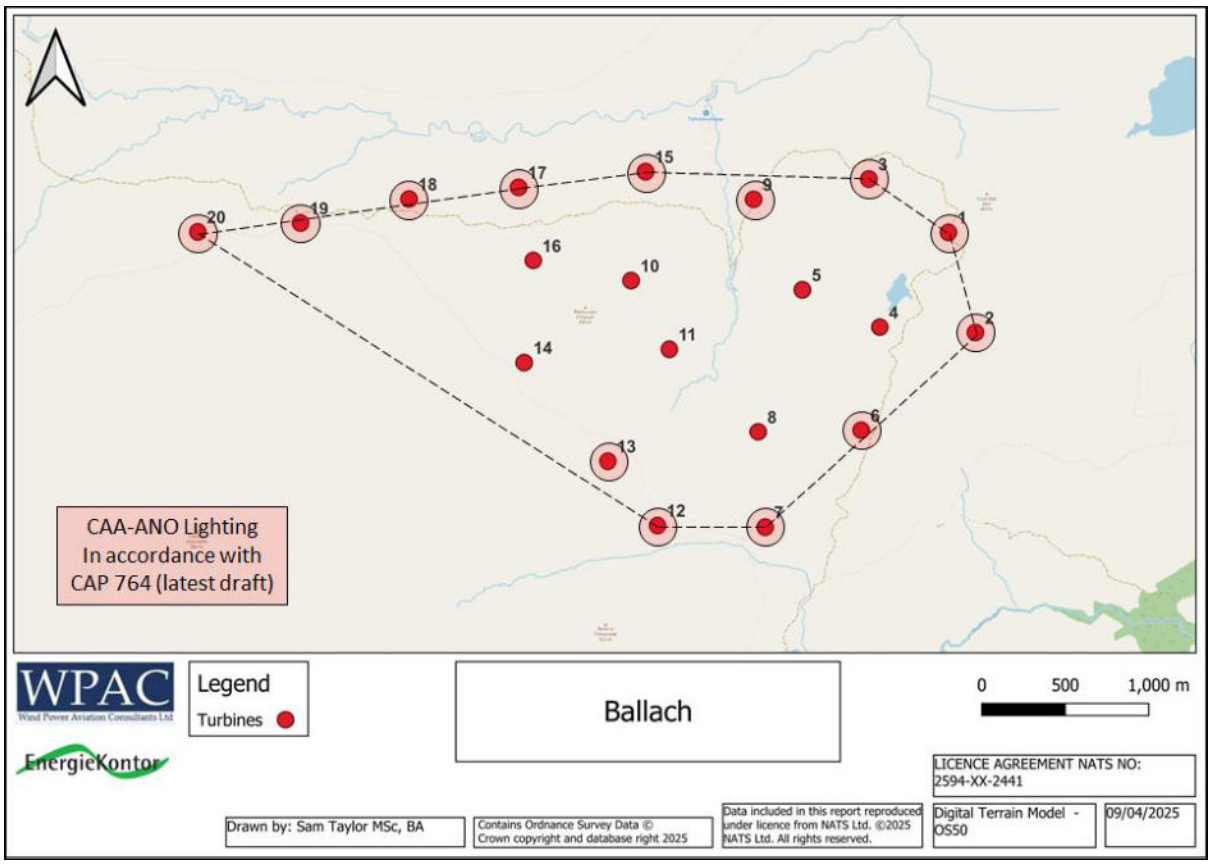


Figure 3 Lighting Layout without CAA Dispensations

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CAA-ANO Red 2000/200cd Reduced Lighting Proposal

9. The military have operated at low level at night for many decades now using night vision equipment. In more recent times, the last decade or so, more civilian operators have moved to night low level using suitable night vision equipment: night vision goggles (NVGs) etc. Such civilian operators include Coast Guard (CSAR), Police, Helicopter Emergency Medical Services (HEMS) and Air Ambulance.

10. Although, in the past, some night operators would fly at night at low level without night equipment (on carefully pre-planned exercises pre-flown by day) such events have been overtaken by the ever-widening use of night vision equipment. As a result, operators who now night fly without night vision equipment will fly at or above 'safety altitude' when not under the guidance of Air Traffic Control (ATC).

11. Aircraft operating at safety altitude or above and depending upon the protocol adopted or phase of flight, the safety altitude used will be 1000ft (300m), 1500ft (450m) or 2000ft (600m) above the local terrain/highest obstacle, this includes the turbine tip heights. Aircraft/helicopters flying as such, will only need enough visible lights to define the wind farm and its size/shape/perimeter.

12. Accordingly, aircraft flying above the Ballach turbines at safety altitude or above and/or under ATC will only require an outline of the Ballach site. Such a requirement could be met with **six** visible red lights on turbines **T2, T3, T7, T14, T17 and T20.**

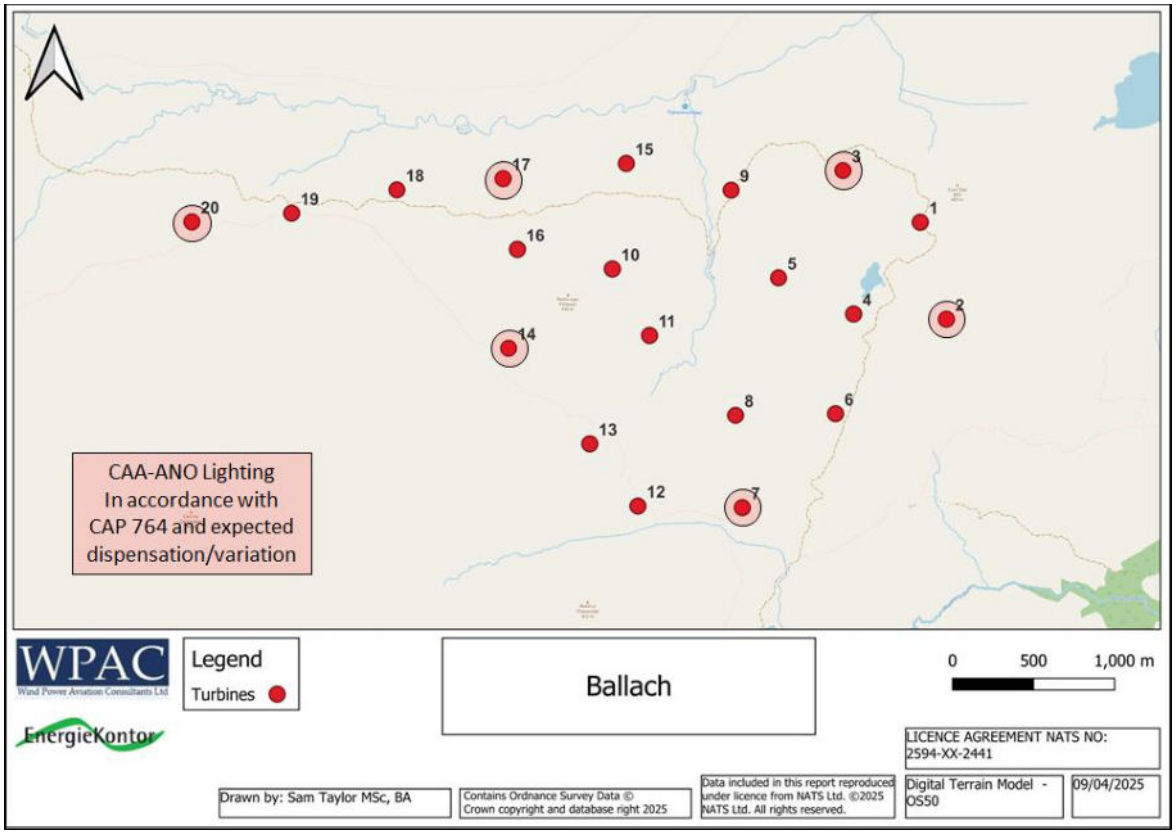


Figure 4 CAA-ANO Lighting Arrangement (including CAA dispensations).

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MOD Lighting Requirements

13. Early detection is important especially if the aircraft is manoeuvring hard and the air temperature profile causes the turbines to blend into the background. Suitable lighting is necessary for flight safety.

14. MOD IR lights have been developed to be invisible to the public at large but very detectable to aircrew night vision aids. As such the MOD IR lights can have a wide beam width and flash continuously without disturbing the visible environment.

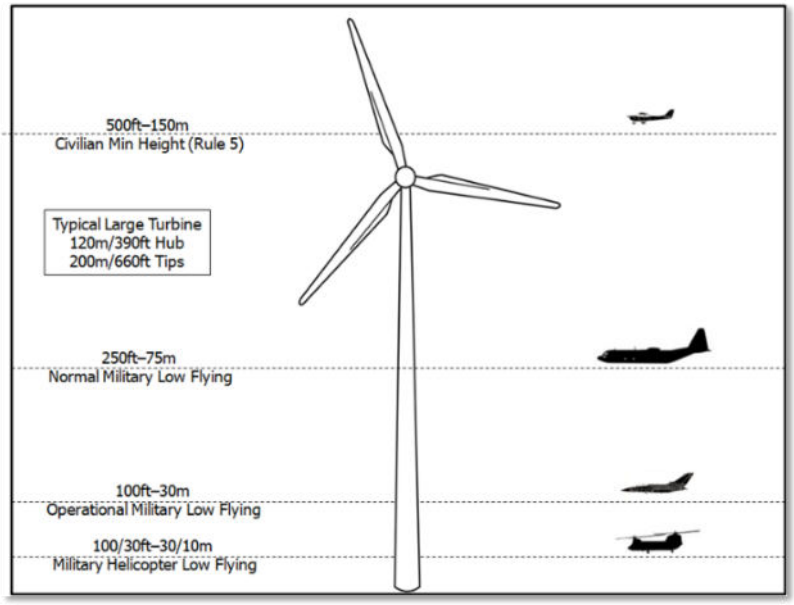


Figure 5 Wind turbine in context with MOD Low Flying

MOD Infrared Lighting Layout

15. The MOD requires:

- That all 'compound-perimeter' turbines (see Figure 6 blue dotted line) be lit unless removing a light will leave a gap of less than 500m between the remaining perimeter lit turbines. Note: At this site, the CAA string and MOD compound perimeters are notably different.
- That any dominant turbine, by location or height, be lit. Note: here all turbines are lit.
- Ballach does not meet the MOD small site criteria (red dotted circle). Accordingly, central (non-perimeter) turbines will require lighting.

16. Applying these criteria dictates that all 20 turbines of the Ballach site will require IR lighting.

Turbines with IR Lighting: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19 and T20.

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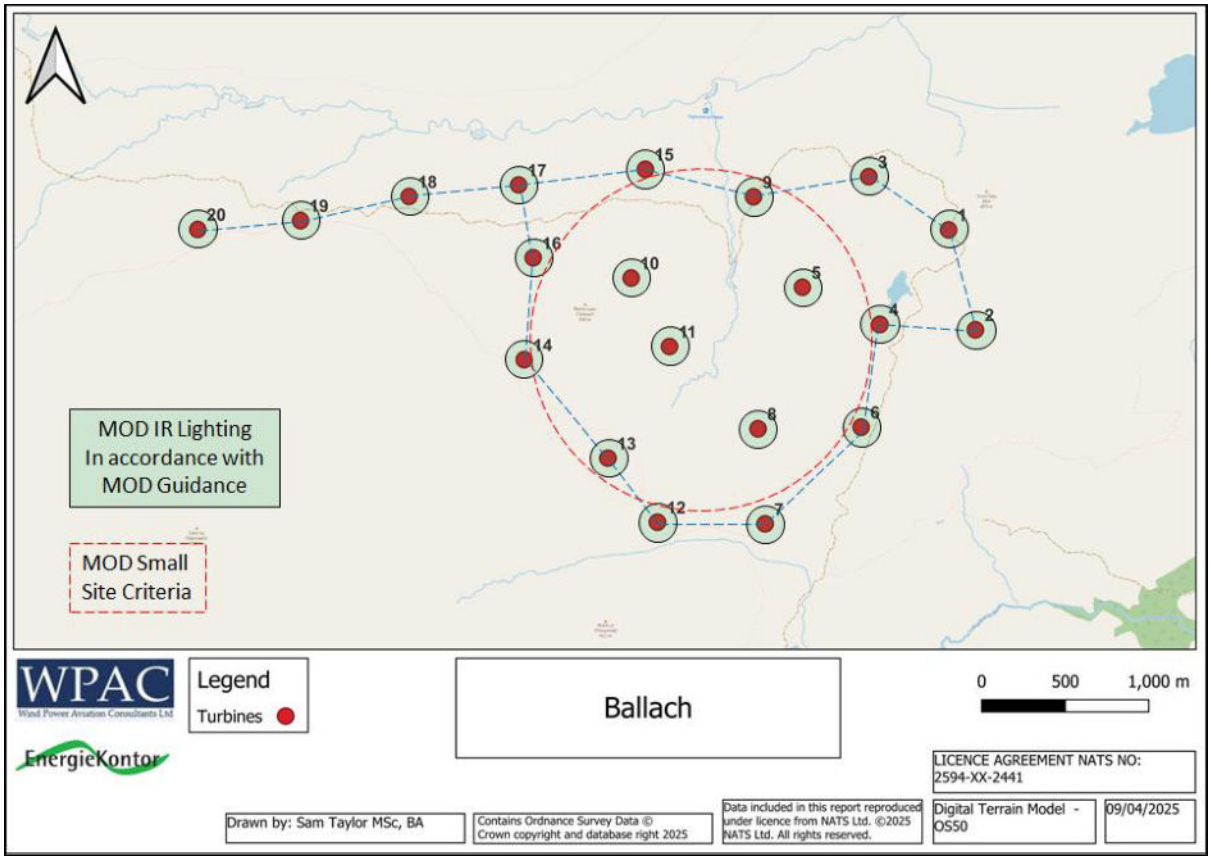


Figure 6 Proposed MOD Infrared Lighting Arrangement

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Combined CAA Visible Lighting and MOD Infrared Lighting

Ballach Turbine Lighting Table									
ID	Easting	Northing	CAA-ANO	MOD-IR	ID	Easting	Northing	CAA-ANO	MOD IR
1	244863	847520		600mW/sr	11	243181	846851		600mW/sr
2	245014	846919	2000/200cd	600mW/sr	12	243091	845800		600mW/sr
3	244392	847847	2000/200cd	600mW/sr	13	242801	846189		600mW/sr
4	244442	846961		600mW/sr	14	242310	846787	2000/200cd	600mW/sr
5	243983	847192		600mW/sr	15	243056	847914		600mW/sr
6	244320	846348		600mW/sr	16	242375	847396		600mW/sr
7	243735	845779	2000/200cd	600mW/sr	17	242295	847834	2000/200cd	600mW/sr
8	243703	846349		600mW/sr	18	241638	847776		600mW/sr
9	243700	847738		600mW/sr	19	240986	847643		600mW/sr
10	242959	847265		600mW/sr	20	240370	847601	2000/200cd	600mW/sr

Table 1 CAA and MOD Lighting Arrangement

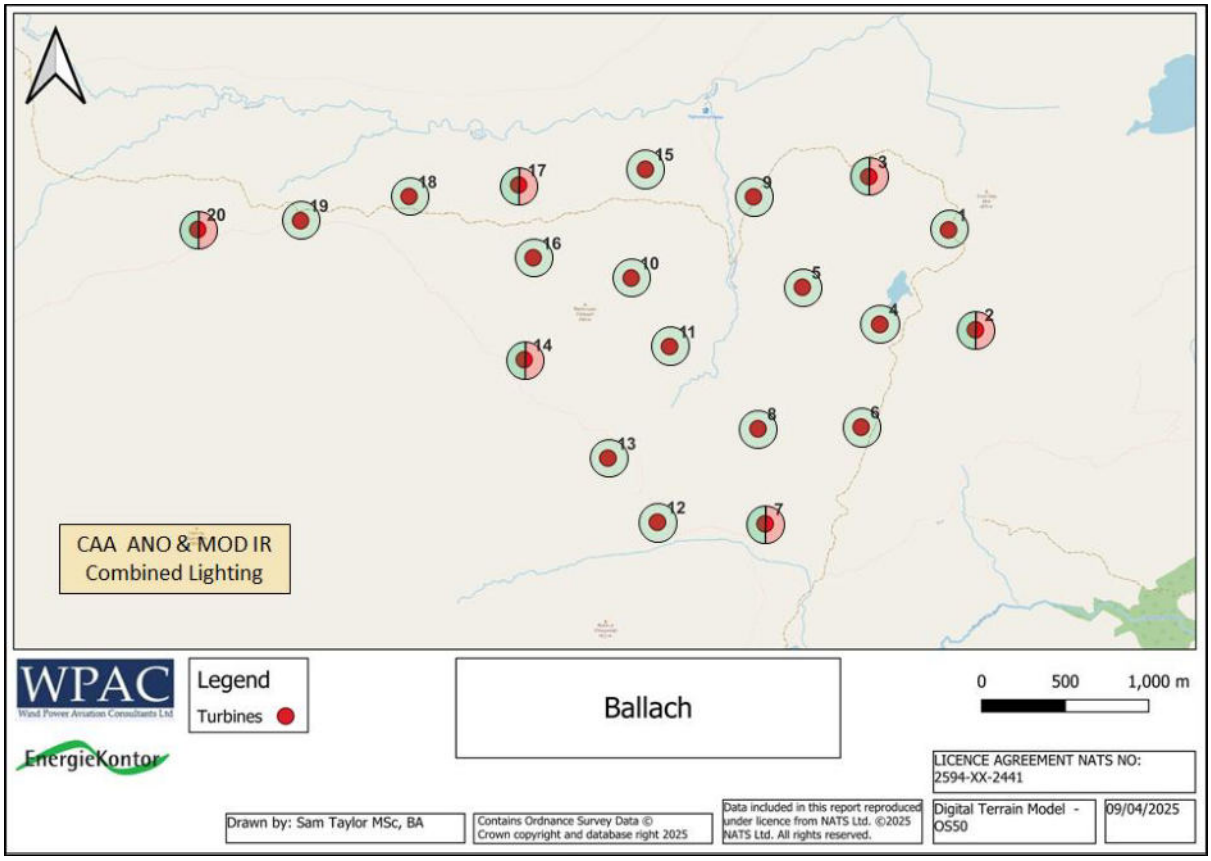


Figure 7 CAA-ANO Visible Red and MOD Infrared Lighting Arrangement

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ANO Light Specifications

17. The ANO 2000/200cd lights will conform to the ICAO specification as set out in Annex 14 Table 6-3. The lights will also be controlled such that when the visibility is greater than 5km in all directions from all turbine hubs, the lights will be reduced to 200cd (10% of normal power). This reduction in power will not apply to MOD IR Lights.

ICAO Annex 14 Table 6-3 (excerpt)

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical beam spread (c)		Vertical elevation angle (b)			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
2000	2000	1500	750	3°	750	2500	1125	75	N/A	N/A

a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity, as determined in accordance with the Aerodrome Design Manual (Doc 9157), Part 4.
b) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.
c) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the "intensity" column.

Table 2 ICAO Annex 14 Table 6-3 Medium Intensity Lighting Specifications.

18. **Low Intensity Mid Mast Lights** – Mid mast lighting was originally intended to give an attitude/range reference (horizon indication) to pilots flying at night in the days before NVGs. Hub and mid mast lights will give a vertical reference (from which a horizontal reference can be gauged) when fitted to a single vertical structure. In contrast, a single light will not be able to give a vertical or horizontal reference or indication of range and range-rate. However, a series of single hub lights, on a group of structures, will provide a good horizon reference together with range and range-rate clues. Accordingly, the requirement for mid-mast lights is much diminished if not made redundant in the case of multiple vertical structures such as wind farms.

19. All of the current commercially available 32cd (supposedly focused) lights are over-engineered (up to 70cd between -30deg and +40deg to fit a multitude of aviation and marine applications); they induce a disproportionately large environmental impact, often significantly more than the focused hub 2000/200cd lights. WPAC have proposed that the CAA guidance requirement for 32cd (Type B) mid mast lights be removed for Ballach. The CAA have agreed that intermediate lighting is not required as reflected in their lighting reduction concession approval letter attached at Appendix C to this report.

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Table 6-2. Light distribution for low-intensity obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10°	5 cd
Type B	32 cd (b)	N/A	10°	16 cd
Type C	40 cd (b)	400 cd	12° (d)	20 cd
Type D	200 cd (c)	400 cd	N/A (e)	N/A

Note.— This table does not include recommended horizontal beam spreads. 6.2.1.3 requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

Table 3 ICAO Annex 14 Table 6-2 Low Intensity Obstacle Lights.

IR Light Specifications

20. The IR lights will conform to the MOD specification as set out in MOD Lighting Guidance and shown below in Table 4.

MOD Specification IR.

IR wavelength – 750 to 900nm.
But ideally concentrated within 800 to 850nm for optimum detection by all military NVG types.

IR intensity – 600mW/sr minimum at peak flash but not above 1200mW/sr.
(Note: Typically a 300mW/sr steady burn LED IR light will generate 600mW/sr at peak flash)
This will generate a 7-8 nm NVG pick-up range - remaining above 5nm as the light ages.

Horizontal Pattern – unrestricted 360 deg.

Vertical Pattern – Minimum flash intensity of 600 mW/sr between +30 deg and -15 deg elevation.
– up to 50% reduction between +25 to +30 deg and -10 to -15 deg is acceptable.
– Maximum intensity of 1200 mW/sr for all angles of elevation.
– Vertical overspill is acceptable.

Flash Pattern – 60 flashes per min at 100-500 ms duration (ideally 250ms)

Synchronisation – all lights to be visually synchronised across a wind farm site

Table 4 MOD Specification for IR Obstacle Lights

Timings

21. The lights (IR and ANO) will be switched on between Evening Civil Twilight and Morning Civil Twilight in accordance with the UK Almanac; approximately 11 hours per day when averaged over the year.

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Assessment of Aviation Lighting and Potential Mitigation Measures Designed into the Lights

22. Having defined a layout of turbines to be fitted with visible lighting, an assessment has been undertaken to calculate the brilliance of the lights when seen from a number of viewpoints. The standard aviation lights to be fitted to the nacelle of the turbines are required to fulfil certain design criteria in terms of brilliance and coverage as per Table 2. They are designated 'medium intensity obstruction lights' and have a **minimum** luminous intensity of 2000 candela[1] at horizontal and slightly above. The LED lights are also required to be able to shine a beam that reduces in intensity above and below the horizontal. One manufacturer of such obstruction lights, CEL, have tested their light, the CEL-WT-MIC[2] in a calibration chamber and produced results showing precisely how much the beam reduces in brilliance at any specified elevation angle. The results are interpolated to every 0.1°. This light is a finely tuned upgrade to the previous version and has been developed specifically for onshore wind turbine lighting in order to minimise downward light intensity and is now available from the manufacturer.

23. Figure 8 demonstrates the reduction in luminous intensity below the horizontal and also above 1° in elevation. The various coloured lines are the candela measured from different angles in the horizontal in order to measure the performance all around the light.

[1] Candela is the SI Unit of luminous intensity and refers to the amount of light emitted in a particular direction.
[2] CEL-WT-MIC - rev1.pdf

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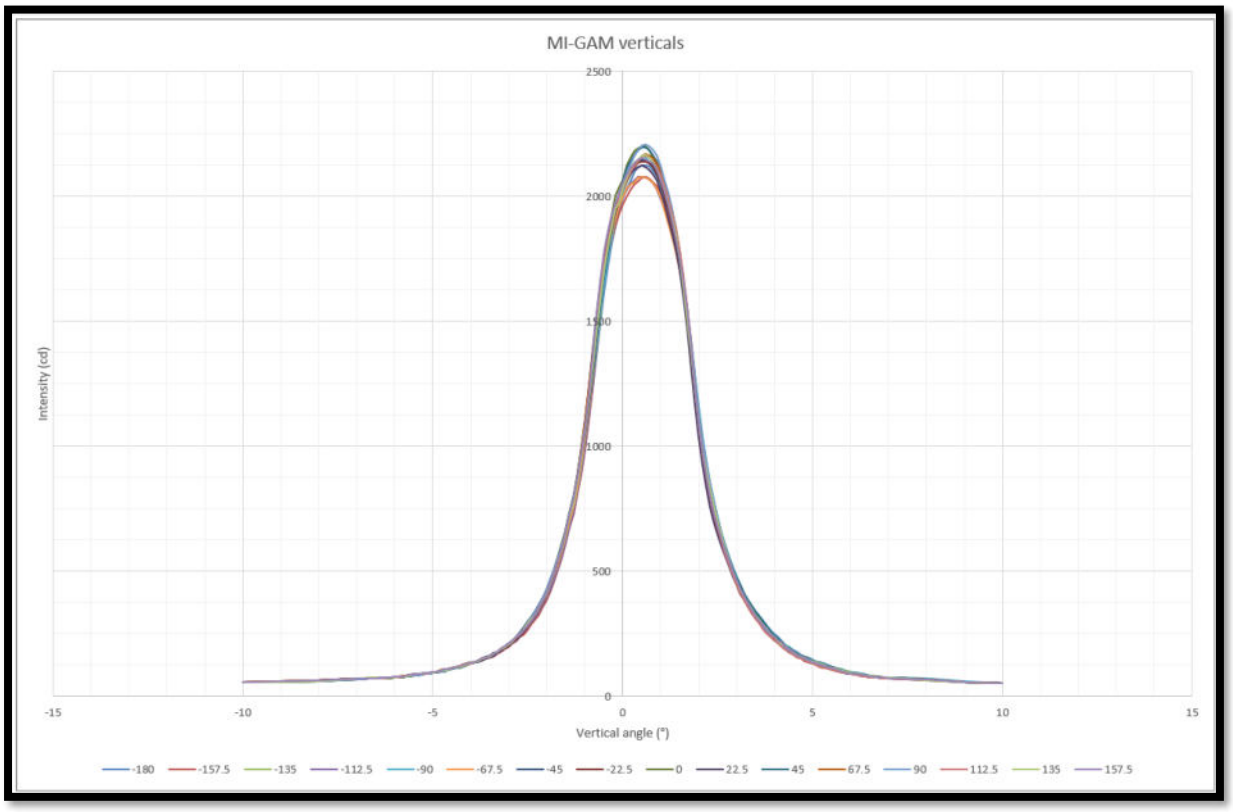


Figure 8 (MI GAM CEL-WT-MIC Light Measurement Results)

24. WPAC have utilised their propagation modelling system (Rview) to calculate the precise angle of elevation between the turbine light and a viewpoint assuming a height of eye of 1.5 metres and a turbine hub height of 118 and 148 metres as required. The system utilises a standard atmospheric model and an earth model that uses actual earth curvature between the turbine light and the viewpoint. Ordnance Survey OS50 DTM is used as the terrain model. The calculations have been undertaken for each designated lit turbine against all designated Ballach viewpoints. The locations of the viewpoints are shown in Figure 9 and Table 5.

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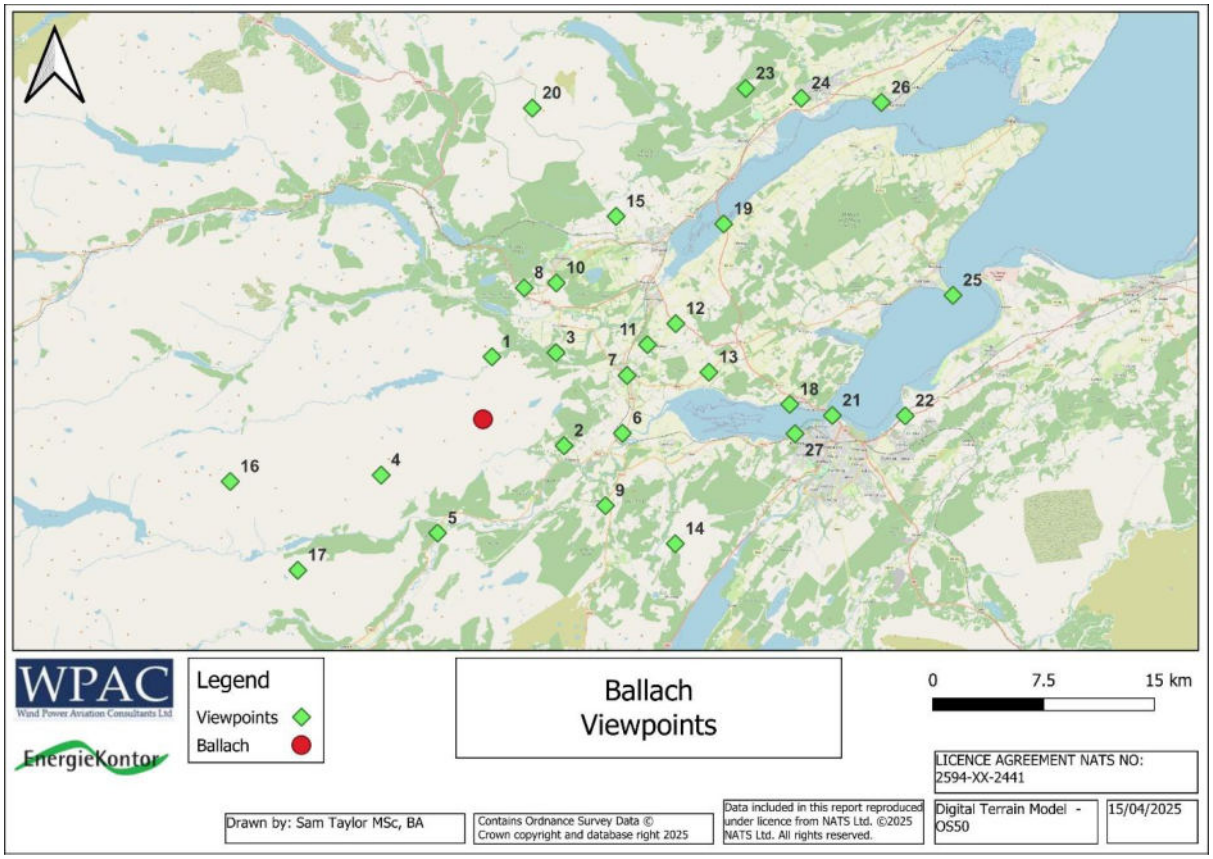


Figure 9 Viewpoint Locations

25. The next stage in the process is to take the candela figures radiated towards a viewpoint and taking into account the distance, calculate the lumens per square metre (also known as Lux) that will be experienced by the human eye at the viewpoint. The figure produced is in micro-lumens per square metre or lumen$^{(10\text{-}6)}$/m^2) or lux$^{(10\text{-}6)}$. These are perfect clear-air figures and therefore worst-case results from an LVIA perspective. Figures obtained by this method enable comparisons to be made with commonly understood light sources such as stars or planets. In practice the light intensity at the observation points will be further attenuated by scatter and absorption by airborne dust, droplets and aerosols in the atmosphere. This attenuation is typically in the order of 10 to 20% but can be as high as 75% at the more distant observation ranges.

26. The results for every lit turbine from all of the viewpoints are shown in the results tables in Appendix A to this report. Viewpoints where lights are obstructed by terrain are shaded in green, when the viewpoint is too close to a turbine to get an accurate assessment it is shaded red. **To take into account any limitations within the terrain model we have highlighted in purple any viewpoints where the line of sight is under 10 metres above ground level but above 1.5 metres and should therefore, still be screened by terrain but may be visible within the vicinity of the viewpoint**.

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Viewpoint Number	Viewpoint Name	Position
1	Core Path RC30.01 to Orrin Dam	NH 43569 51502
2	Torgormack / Drumindorsair	NH 48451 45470
3	Fairburn Estate	NH 47904 51779
4	Beinn a' Bha'ach Àrd	NH 36061 43473
5	Struy (A831)	NH 39878 39549
6	Beauly	NH 52401 46317
7	Muir of Ord (A832)	NH 52713 50238
8	Contin (A835)	NH 45754 56176
9	Kiltarlity	NH 51253 41407
10	Jamestown	NH 47922 56508
11	Balvaird / Newmore	NH 54096 52326
12	A835 / B9169	NH 56015 53748
13	A832 west of Tore	NH 58260 50456
14	Great Glen Way near Ladycairn	NH 55983 38822
15	Heights of Brae	NH 51971 61028
16	Sgùrr a' Choire Ghlais	NH 25838 43045
17	Meall a ’Mhadaibh	NH 30413 37020
18	Knockbain / Torgorm	NH 63734 48277
19	A9 Cromarty Firth	NH 59259 60510
20	Ben Wyvis	NH 46301 68366
21	A9 Kessock Bridge	NH 66618 47518
22	A96, Alturlie Junction	NH 71554 47495
23	Cnoc Fyrish	NH 60754 69696
24	B817, Alness	NH 64523 69039
25	Chanonry Point	NH 74788 55670
26	Invergordon	NH 69940 68752
27	A862 Clacnaharry	NH 64093 46284

Table 5 Viewpoints

Interpreting the Results

27. The results show that there is a significant decrease in the luminous intensity (candela) of the light emanating towards those viewpoints which are at lower angles of elevation in relation to the turbine hub. However, when considering the perception of the light from a viewpoint in general, the distance between the light and the viewpoint is likely to be the dominant factor and the resultant figure in micro-lux is the most relevant figure to consider. This report provides the results and anticipates that the Landscape and Visual Impact Assessment (LVIA) consultants will be able to put them into the correct context for visualisations in terms of background environmental lighting and atmospheric conditions. Table 6 shows the turbine with the greatest potential perceived luminous intensity expressed in micro-lumens per m^2 (Lux $^{(10-6)}$) at each viewpoint.

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Viewpoint	Turbine	Distance (KM)	Microlumens per m2 (lux10-6)	Microlumens at 10%	Obscured
1	3	3.75	8.31	0.83	
2	7	4.73	7.46	0.75	
3	3	5.27	3.87	0.39	
4	14	7.07	15.01	1.5	
5	7	7.33	3.46	0.35	
6	17	10.22	12.59	1.26	X
7	7	10.02	7.03	0.7	X
8	14	10	2.06	0.21	
9	7	8.7	3.24	0.32	
10	2	10.02	3.03	0.3	
11	17	12.63	4.02	0.4	
12	17	14.94	3.48	0.35	
13	3	14.11	2.45	0.24	
14	7	14.09	7.96	0.8	
15	7	17.33	3.93	0.39	
16	14	16.89	5.35	0.53	
17	14	15.39	9	0.9	
18	7	20.15	1.91	0.19	
19	17	21.18	1.73	0.17	
20	3	20.61	4.3	0.43	
21	7	22.95	1.63	0.16	
22	7	27.87	1.36	0.14	
23	3	27.3	2.6	0.26	
24	3	29.23	1.24	0.12	
25	7	32.59	1.11	0.11	
26	17	34.67	1.09	0.11	
27	7	20.36	1.87	0.19	

Table 6 Brightest Turbine Hub Light from each Viewpoint (measured in micro-lumens)

28. In order to place the values in microlumens per m^2 (lux^{10-6}) in context, Table 7 provides some examples of approximate values placed on a number of environmental comparators, however these are just an illustration to place the results in a real world environment. The actual perceived brightness will depend upon a number of factors including bulb manufacturer, bulb type, specific construction (single/multiple colour LEDs etc) atmospheric conditions, absorption spectrum, individual eye characteristics and capabilities.

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Comparison Object	Approximate Illuminance (micro-lumens per m²)
Car Halogen main beam approaching 1km	Up to 1,000,000 (can vary significantly between cars)
International Space Station (400km up)	1000 (depends upon relative position of sun)
Car Brake Light at 0.5km	400
Car Brake Light at 0.7km	200
Car Brake Light at 1.0km	100
Car Brake Light at 2.0km	25
Car Brake Light at 5.0km	4
Car Brake Light at 10km	1
Front Cycle Light at 0.5km	140 (Modern high power white LED)
Front Cycle Light at 0.7km	70
Front Cycle Light at 1.0km	35
Front Cycle Light at 2km	9
Front Cycle Light at 5km	2
White LED Street Light at 0.5km	500 (Viewed from the horizontal)
White LED Street Light at 0.7km	250
White LED Street Light at 1.0km	120
White LED Street Light at 2.0km	30
White LED Street Light at 5.0km	8
Sodium Street Light at 0.5km	300 (Viewed from the horizontal)
Sodium Street Light at 0.7km	150
Sodium Street Light at 1.0km	75
Sodium Street Light at 2.0km	20
Sodium Street Light at 5.0km	5
Brightest Star in the Sky (Sirius)	13
Airliner flying at 30,000ft)	Nav Lights 0.4 to 5; anti-collision lights 2 to 20
Typical bright star (e.g. Orion)	0.5 to 2.0
Faintest light visible from street lit area	0.4
Visible limit for fully dark-adapted eyes	0.02

Table 7 Comparisons of approximate micro-lumens values

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29. If there is a requirement to consider the brightest turbine in terms of emitted candela rather than micro-lumens, Table 8 provides data on which turbine emits the most candela towards each viewpoint but takes no account of the distance between light and viewpoint.

Viewpoint	Turbine	Distance (KM)	Candela	Candela at 10%	Obscured
1	20	5.04	195.6	19.56	
2	7	4.73	166.64	16.66	
3	3	5.27	107.6	10.76	
4	2	9.59	1112.94	111.29	
5	2	8.98	217.9	21.79	
6	17	10.22	1314.36	131.44	X
7	17	10.69	775.95	77.6	X
8	14	10	206.03	20.6	
9	7	8.7	244.83	24.48	
10	20	11.68	408.74	40.87	
11	17	12.63	641.55	64.16	
12	17	14.94	775.95	77.6	
13	14	16.37	535.25	53.52	
14	17	16.39	1697.46	169.75	
15	7	17.33	1181.14	118.11	
16	2	19.56	1642.62	164.26	
17	2	17.64	2141.94	214.19	
18	7	20.15	775.95	77.6	
19	17	21.18	775.95	77.6	
20	14	21.94	1954.86	195.49	
21	7	22.95	857.54	85.75	
22	7	27.87	1055.49	105.55	
23	17	28.61	1984.24	198.42	
24	7	31.2	1181.14	118.11	
25	7	32.59	1181.14	118.11	
26	17	34.67	1314.36	131.44	
27	7	20.36	775.95	77.6	

Table 8 Brightest Turbine Hub Light measured in Candela emitted towards a viewpoint

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Part 2 Mitigation

Intensity Reduction (ANO Lighting: 2000cd down to 200cd)

30. The lights (IR and visible red lights) will be switched on between Evening Civil Twilight and Morning Civil Twilight in accordance with the UK Almanac; approximately 11 hours per day averaged over the year.

31. The primary mitigation consideration in addition to the already described reduction in brilliance due to elevation angle, is taken from Reference D which states:

> *'If the horizontal meteorological visibility in all directions from every wind turbine generator in a group is more than 5 km, the intensity for the light positioned as close as practicable to the top of the fixed structure required to be fitted to any generator in the windfarm and displayed may be reduced to not less than 10% of the minimum peak intensity specified for a light of this type'.*

32. It is therefore possible to take advantage of the CAA SARG Policy Statement dated 01/06/2017 and incorporate the option to reduce the hub height lighting to not less than 10% of the minimum peak intensity specified for the installation in good weather. In essence, reducing the 2000cd obstruction lights to 200cd in meteorological visibilities greater than 5km. Note: This concession is not applicable to MOD specification IR lighting, which is covered separately.

33. It will be necessary to calculate how much time the lights would spend at 2000cd and at 200cd. To assess historical visibility in this Highlands region, the closest meteorological station to Ballach is at Inverness Airport. Note: there are no meteorological stations that publish meaningful historical data closer to Ballach. However, although the visibility at Inverness airport will not be identical to Ballach it will invariably be in the same air-mass for the majority of the time and will give similar observations over the longer period.

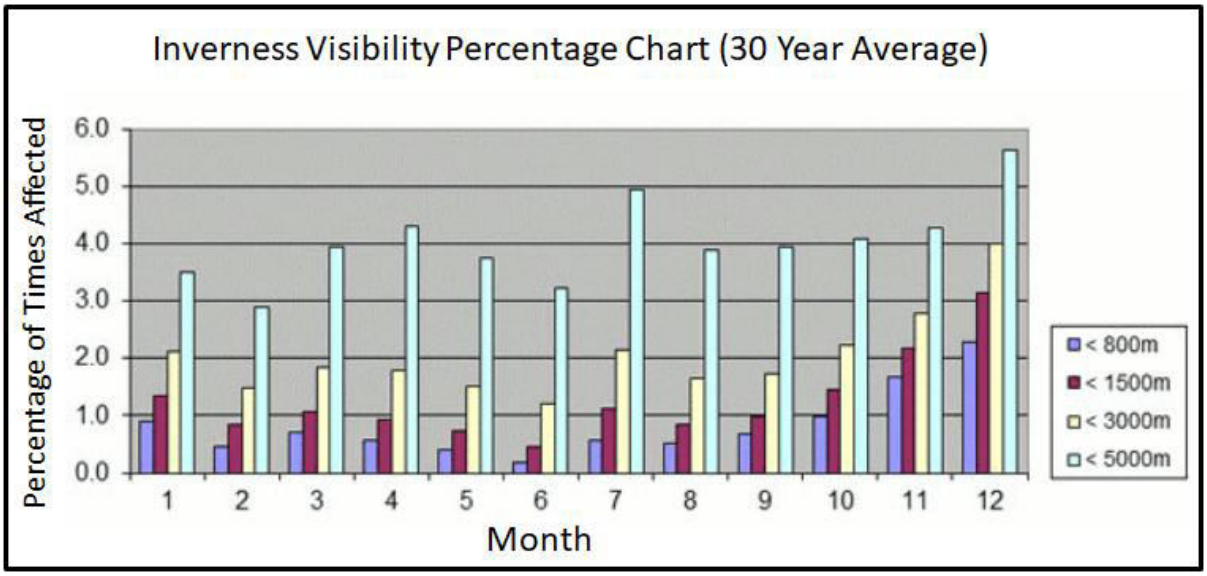


Table 9 Inverness Visibility

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34. The Met Office table shows that the visibility is below 5km (light blue bar) for an average of 6% of the time at Inverness. This suggests that the Ballach turbine lights will be at **2000cd for 6% of the time and 200cd for 94% of the time**.

35. In addition, visibility improves with height since the concentration of particles (dust, haze) and liquid droplets (water) reduces with height and the air also becomes thinner. It could be argued that the Ballach visibility, on a 300m – 430m hill, will be better than that at Inverness.

Obstruction Light Weather Obscuration.

36. On occasion, the visibility in the area of Ballach will reduce significantly due to the presence of cloud on the hills. If the Ballach turbines are in cloud, then the obstruction lights will not be seen. The turbines will carry the CAA/ANO lights on the turbine hub. The average height at the base of these turbines is around 1000-1400ft above mean sea level (amsl). The hub heights for the proposed turbines will be around 400 -500ft above ground level (agl) giving hub heights averaging around of 1400-1900ft amsl. For aeronautical reasons meteorological cloud bases are quoted in feet (ft).

37. It is now possible to compare the average **turbine hub/light** height of **1400-1900ft** amsl with the actual cloud bases recorded by the Met Office at Inverness Airport, again, over a 30-year period as shown in Tables 11 and 12.

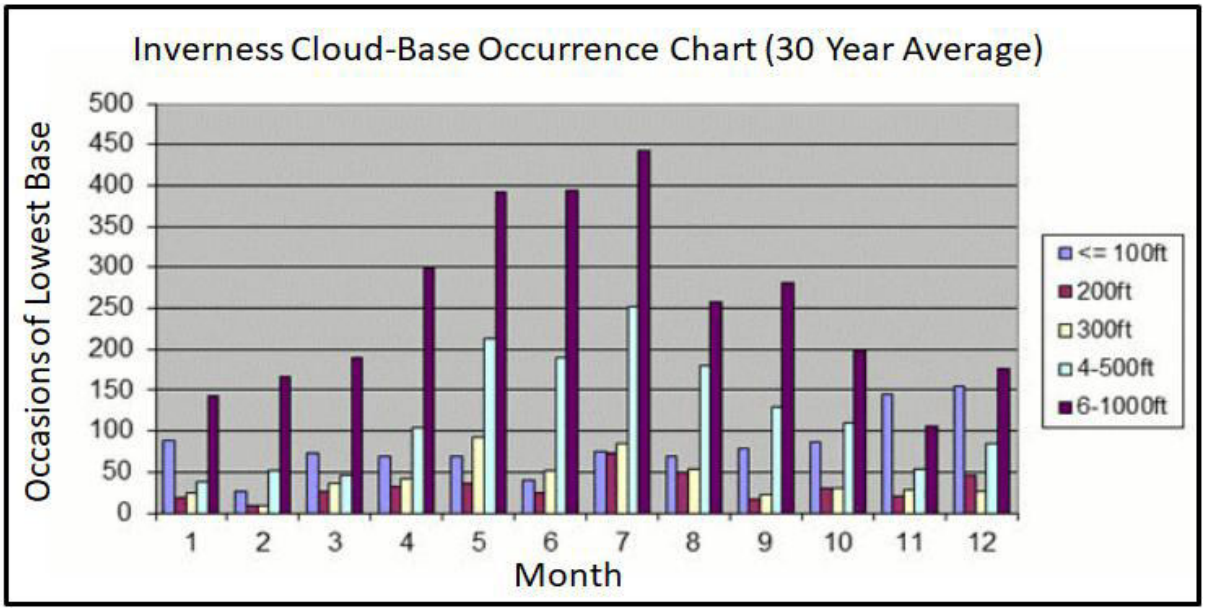


Table 10 Inverness Cloud Base

38. The burgundy columns (600-1000ft) indicate that the cloud base will range from approximately 600-1200ft below turbine hub heights on around 250 occasions a month. At this distance below the turbine hubs the lights will be completely obscured to the general public. The other columns (light blue in particular 400-500ft) indicate that on a further 250 times per month the lights will be completely obscured by cloud even to those observers on the immediate hills. Note 1: Met office statistics report cloud base in occurrences as opposed to total duration.

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39. Again, whilst Inverness is not Ballach, Met Office statistics and science show that cloud-bases reduce in the region of hills. It could be argued that at Ballach the cloud-base would on the whole, be lower than at Inverness thus providing even greater degree of light obscuration on more occasions per month.

Weather Obscuration Conclusion

40. It is most important not to try and combine the two different observations, visibility and cloud-base, into a single statement. Informal advice direct from Met Office and Airport forecasters indicates that the information for Ballach, so gathered, should be presented as follows:

> *Meteorological observations suggest that the turbine hubs will be obscured on more than eight hundred occasions a month by cloud. (Obstruction lights not visible to the public)*
>
> *When not obscured by cloud, the visibility in the area of the turbines can be expected to exceed 5km for up to 94% of the time. (Obstruction lights switched down to 200cd)*

Conclusion/Notes

41. The purpose of this Lighting Brief is to identify an obstruction lighting arrangement that will have the minimum effect upon the environment but at the same time is a safe design for night low level operators. This has been accomplished by using a combination of CAA ANO and MOD IR lights.

42. Applying the CAP 764 Draft criteria for visible red obstruction lighting results in a lighting solution that requires ten turbines to carry a visible red ANO light. By applying current CAA dispensations and then matching the lighting to the operators that will require night visible lighting, minimal but aviation safe layout was achieved. This results in a total of:

6 x ANO Red 2000/200cd lights and 20 x MOD IR 600mW/sr lights.

43. Furthermore, the site is in an area where it will benefit from 90% light-dimming in good-weather and obscuration of both turbines and the visible ANO lighting in poor weather. This lighting layout was sent to the CAA for approval. Their response approving the proposed lighting layout is attached at Appendix C..

The lights will be regularly obscured by cloud and when not obscured set at the lower 200cd for approximately 94% of the time.

44. The CAA currently state: *met visibility should be measured at suitable points around the wind farm*. In the case of the Ballach turbines: Visibility Meters on **T2, T7, T17, and T20** will meet this requirement.

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Technical Mitigation

45. One other form of potential mitigation commonly discussed is the installation of an Aircraft Detection Lighting System (ADLS). There are two possible methods of detecting an aircraft approaching a wind farm that will automatically turn on the aviation obstruction lights, firstly through the use of a suitable primary surveillance radar (PSR) or secondly, the use of aircraft installed Electronic Conspicuity (EC) equipment with a suitable receiver at the wind farm. There are some significant technical and regulatory issues to be overcome before any such system can be installed and operated in the UK.

46. In the case of PSR, this is already in use at wind farms in Europe; as an example the Terma Scanter 5002 radar is installed at a number of sites as shown in Figure 10. The main regulatory constraint is that although such systems are in use in Europe, in the UK, where airspace tends to be shared to a much greater extent between users, the CAA have yet to mandate the performance parameters that such a system must be capable of fulfilling. For example, the coverage requirement will need to be defined in terms of maximum range of detection and activation (which may vary depending upon the speed of the aircraft), base of cover (above ground level) and almost certainly a maximum height coverage to avoid unnecessary activations, which a PSR on its own cannot ascertain. An initial set of draft requirements was promulgated in 2018 but these were for discussion with aviation stakeholders and the wind industry and it cannot be assumed that these are going to be the final criteria. Even if the standards are defined, it may be that any single radar will not be capable of delivering the required coverage where, for example, a wind farm is located on a hill and aircraft may approach below the wind farm from any direction. It may then become necessary to install multiple radars in order to achieve the required coverage at low level. This in itself may lead to limitations due to mutual interference in what is already a crowded part of the electro-magnetic spectrum, (although the Terma radar does have some anti-interference capabilities) but the additional radars may affect other systems working in the same frequency band. There would also be additional planning issues to consider, such as the visual impact of additional aerials, and rotating arrays. Technical constraints also mean that it will be necessary to position the radars some distance outside the windfarm as shown in the example below in order to avoid turbines screening the radar and to provide the required height coverage.



Figure 10 Terma 5002 Radar at a Wind Farm in Germany

47. The one major advantage of PSR is that it will detect any aircraft, both those transponding and those that are not, known as non-co-operative targets. Depending upon how the regulatory process

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moves forwards, this may have a major effect on which systems to use for ADLS. In response to a recent planning inquiry paper the CAA responded stating in a letter dated 21 April 2021: *For the UK, there are some challenges to be resolved. The cost/benefit of the use of primary surveillance radar for the active detection of aircraft, spectrum availability, incentive pricing cost and geographical separation required before frequencies can be re-used potentially makes this a less than optimal solution.*

48. The alternate system is one based upon a reliance on aircraft carried Electronic Conspicuity (EC) transponders. Currently light aircraft flying clear of regulated airspace in the UK below 10,000ft are not required to carry a transponder (one example being Secondary Surveillance Radar or SSR). Most aircraft do, but not all. The CAA has been encouraging fitment by all aircraft and hope to have a regulatory system in place within the next few years requiring all flying machines to be fitted. Unfortunately this is not a simple process. This issue has been running for at least 20 years so far, however some limited progress is now being made. In the same response to a recent planning inquiry paper the CAA stated: '*At the same time, the lack of interoperability between the wide variety of electronic conspicuity devices currently available may require careful consideration of the specification of any passive system receivers and how they are deemed compliant to be deployed and operated.* ' The letter goes on to state: '*We concur that not every situation may require ADLS to be fitted and operated; Article 222 or 223 requirements of the Air Navigation Order will remain, and the CAA may agree a specific solution under Section 7 of Article 222 and Section 11 of Article 223. However, ADLS could potentially provide an acceptable means of compliance that could provide greater certainty for developers when developing planning proposals on CAA acceptance and assist with discussions with communities during planning consultation.*' What this letter is saying is that ADSL using EC is technically feasible but that until the regulatory actions concerning the mandatory carriage of a compatible EC system have been completed and signed into law, and the coverage requirements agreed, uncertainty remains unless a planning condition to require the retrospective installation of a system is considered appropriate. The length of time that this is likely to take is difficult to estimate, however, realistically it is likely to be within a two to five year timeframe as it is a small part of a much wider airspace modernisation programme currently under way. Additionally, the CAA also issued a Guidance Notice dated 26/10/21 entitled: *'Electronic continuity specifications: enabling interoperability between airspace users'*. This announced the establishment of a task force to jointly develop electronic conspicuity specifications to enable interoperability between airspace users. It goes on to state: '*The adoption of EC specifications will not be mandated UK wide. Users of other systems can continue to benefit from the functionality that those products offer'*. This does not mean that an EC triggered ADLS system will not be feasible, but the regulatory challenges mentioned above may take longer to resolve, a position reinforced by the Scottish Government recently in relation to the Narachan Wind Farm decision where Ministers stated the following: '*The Scottish Ministers have carefully considered the option of imposing a suspensive condition to secure the installation of an ADLS, prior to construction of the proposed Development, but do not find that the evidence provided to date on the matter affords sufficient assurance that either method would be capable of being installed on the proposed Development within the next 5 years. As such, taking account of the resulting uncertainty on timescales for the deployment of the proposed Development if it were to be consented, the Scottish Ministers consider it would not be appropriate in this case to impose the suspensive condition proposed by the Reporter to mitigate the effects of the proposed Development's lighting on the SQs of the North Arran NSA.*

49. What is clear is that when ADLS is finally mandated by the CAA, the carriage of compatible transponders is also mandated and all aircraft fitted with them, this is likely to be a realistic way of triggering an ADLS system. Such systems are passive at the wind farm and will not, therefore cause

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any interference. As shown in Figure 11 they require unobtrusive small aerials, approximately 1.2 metres long that are very reliable and relatively inexpensive to install and operate.



Figure 11 ADSB/SSR Passive Aerial

50. Bearing the above in mind, it might be prudent to ensure that lighting installed on the turbines is compatible with any future EC triggered ADSL system, so that when the regulatory process and aircraft equipage has been completed, it will be a relatively cheap and simple exercise to retro-fit such a system. Alternately, the ADSB/SSR aerials and system could be installed when the wind farm is constructed, ready for activation when required. Unfortunately, it is still not certain that the regulatory process and equipage issues will be completed within the lifetime of a planning consent.

51. An ADLS system may not be suitable for every location, depending upon the nature of aviation operations at night in the area around the wind farm and the activation criteria that are finally mandated by the CAA. If located close to the approach for a major airport for example, the lights might be required to be turning on and off continuously but this is very unlikely to be the case at Ballach. The EC activated ADLS system will be able to differentiate between civil traffic and SAR/HEMS/military traffic using NVD and not therefore activate when these types of aviation operations are taking place within the activation zone for the system. The infrared lights that these types of operations rely on will always be on at night, but of course are invisible to the naked eye and will have no effect on the visual impact of the development.

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Comment

52. In recent months various briefing documents have been in circulation suggesting that visible obstruction lights are not required in the current aviation environment. The CAA have briefed WPAC that they do not support this position and would consider prosecuting organisations that do not follow the existing guidance and regulations. However, change will come; this will be led by the CAA and be centred on the new draft CAP 764 (as adhered to in this report) and the future development of ADLS.

53. From the direct experience of WPAC staff who have over 40 years of day/night low flying over land and sea both with and without NVG/Ds, the inclusion of adequate visible red lighting is important to cater for both routine operations and the inevitable unplanned outcome. Pilots uncertain of their location together with emergency situations and system failures of critical night low flying equipment are circumstances that require a degree of visible obstruction lighting on large wind turbines.

54. In addition, future green energy aircraft (hydrogen/electric and battery powered) will fly considerably lower and slower than current aircraft and will be significantly limited in track variation by much shorter ranges. Good visible obstruction lighting will become more, not less important in this low direct flight environment.

55. Finally, an aircraft colliding with a wind turbine is thankfully an extremely rare event but one with enormous potential consequences. A standard risk assessment as part of an aviation safety case would conclude that even a very low probability of a significant dangerous event is still unacceptable and must be mitigated, in this case by the fitting of visible obstruction lights.

Conclusion

56. This report has assessed the requirements for both visible CAA approved aviation lighting and MOD approved Infrared lighting for the Ballachn wind farm. The resulting layout is set out in Figures 4 and 6 and makes use of both CAA/ANO Red lights and MOD IR lights. The proposed layouts have been sent to the CAA and MOD DIO for approval. The MOD will approve the IR lighting layout as there is no concession required and when the CAA have considered the proposal and responded, their concession letter will be included at Appendix C.

57. The report also provides the brilliance of lights that will be visible taking into account the elevation angle between the turbine hub obstruction light and the viewpoints and the distance between each turbine and each viewpoint. The report shows that for up to 94% of the time the lights will only be required to operate at 10% luminous intensity, which will significantly reduce obstruction light effects in the area. Further interpretation of these results can be undertaken by a Landscape and Visual Impact Assessment expert.

58. The report then identifies additional mitigation options that, should the regulatory process allow, enable the visible medium intensity turbine lights to be switched off for the vast majority of the time and activated only on those occasions when an aircraft activates the system.

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Authors

Cdr John Taylor RN (Ret) – after a career in the Royal Navy specialising in Air Traffic Control (ATC), Airspace Management and Air Defence which culminated in leading both the ATC and Fighter Control Specialisations, John worked for Lockheed Martin UK for three years as a Principal Consultant and Business Area Manager responsible for Air Traffic Management Consultancy, including the provision of advice to wind farm developers. In 2008 he founded WPAC Ltd and since then he and his team have provided aviation advice in relation to over 2000 wind farm and wind turbine sites, given evidence at a number of planning inquiries and enabled many sites to overcome aviation objections where it was feasible to do so. He and his team have also provided advice to a number of Local Planning Authorities, Renewable UK and the Aviation Fund Management Board, including organising workshops and the provision of guidance documents. John also advises planners and developers in relation to physical and technical safeguarding of non-wind farm developments in the vicinity of aviation facilities.

Sqn Ldr Mike Hale RAF (Rtd) has over 45 years, piloting, instructing and examining experience on numerous military fast jet aircraft through to a range of civilian and military general aviation training aircraft and gliders. He has held many posts including Flying Instructor, Training Officer, Flight Commander, Squadron Commander and Principal Tornado AD Force Examiner. He has amassed over 10,000 flying hours of experience when operating at many locations around the world. In parallel to his flying duties, Mike held the post of Officer Commanding the MOD Low Flying Operations Squadron (OC LFOS). In this post he was both Low Level Airspace Manager for the MOD & Wind-Farm Subject Matter Expert for the Defence Infrastructure Organization (DIO). During that period, he assessed over 14,000 wind-farm pre-applications and 2000 full applications against low flying, weapons range, specialist airspace, local community and aerodrome safeguarding criteria. Mike also instigated two Qinetiq ground based Infra Red obstruction lighting trials. These were followed by instigating and managing the MOD Infra Red/Low Intensity (Henlow) flight trials and the CAA/MOD/Trinity-House/RUK off-shore IR/Morse (North Hoyle) flight trials. In conjunction, Mike organised numerous and various supporting trials including night vision equipment compatibility and detailed lighting beam overspill analysis (where light is emitted outside the required specification envelope). In 2012, he was awarded an MBE for generating a proactive and mutually successful working relationship between the Wind Power Industry and the MOD Air Staff.



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Appendix A Lighting Results Tables

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	4.8	-3.08	195.6	19.56	8.47	0.85	X
3	3.75	-4.32	116.66	11.67	8.31	0.83	
7	5.72	-2.18	350.05	35	10.68	1.07	X
14	4.88	-3.85	135.51	13.55	5.69	0.57	
17	3.88	-2.54	283.8	28.38	18.82	1.88	X
20	5.04	-3.1	195.6	19.56	7.69	0.77	

Viewpoint 1 Core Path RC30.01 to Orrin Dam

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	3.73	-4.93	96.06	9.61	6.9	0.69	X
3	4.7	-3.56	154.28	15.43	6.97	0.7	X
7	4.73	-3.43	166.64	16.66	7.46	0.75	
14	6.28	-3.33	175.53	17.55	4.45	0.44	X
17	6.59	-1.41	706.42	70.64	16.25	1.62	X
20	8.36	-1.53	641.55	64.16	9.19	0.92	X

Viewpoint 2 Torgormack / Drumindorsair

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	5.65	-3.92	135.51	13.55	4.24	0.42	X
3	5.27	-4.63	107.6	10.76	3.87	0.39	
7	7.31	-1.42	706.42	70.64	13.23	1.32	X
14	7.5	-3.14	195.6	19.56	3.48	0.35	X
17	6.86	-1.77	487.76	48.78	10.37	1.04	X
20	8.62	-1.4	706.42	70.64	9.52	0.95	X

Viewpoint 3 Fairburn Estate

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	9.59	2.02	1112.94	111.29	12.09	1.21	
3	9.41	2.06	995.99	99.6	11.25	1.13	
7	8.01	2.79	542.05	54.2	8.44	0.84	
14	7.07	2.4	751.03	75.1	15.01	1.5	
17	7.61	3.03	464.29	46.43	8.02	0.8	
20	5.97	3.38	347.23	34.72	9.75	0.98	

Viewpoint 4 Beinn a' Bha'ach Àrd

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	8.98	-2.92	217.9	21.79	2.7	0.27	
3	9.45	-2.05	377.97	37.8	4.24	0.42	X
7	7.33	-3.17	185.73	18.57	3.46	0.35	
14	7.64	-3.17	185.73	18.57	3.19	0.32	X
17	8.63	0.85	2116.69	211.67	28.42	2.84	X
20	8.07	2.83	542.05	54.2	8.33	0.83	X

Viewpoint 5 Struy (A831)

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	7.41	-3.65	154.28	15.43	2.81	0.28	X
3	8.15	-2.53	283.8	28.38	4.27	0.43	X
7	8.68	-2.67	244.83	24.48	3.25	0.32	X
14	10.1	-2.38	304.3	30.43	2.98	0.3	X
17	10.22	-0.84	1314.36	131.44	12.59	1.26	X
20	12.1	-1.16	857.54	85.75	5.86	0.59	X

Viewpoint 6 Beauly

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	8.38	-3.06	195.6	19.56	2.78	0.28	X
3	8.66	-2.19	350.05	35	4.67	0.47	X
7	10.02	-1.41	706.42	70.64	7.03	0.7	X
14	10.96	-1.93	447.66	44.77	3.73	0.37	X
17	10.69	-1.33	775.95	77.6	6.79	0.68	X
20	12.62	-1.35	706.42	70.64	4.43	0.44	X

Viewpoint 7 Muir of Ord (A832)

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	9.29	-2.47	283.8	28.38	3.29	0.33	X
3	8.44	-1.94	447.66	44.77	6.28	0.63	X
7	10.59	-1.24	857.54	85.75	7.65	0.76	X
14	10	-2.99	206.03	20.6	2.06	0.21	
17	9.03	-2.01	408.74	40.87	5.01	0.5	X
20	10.12	-0.7	1450.77	145.08	14.15	1.42	X

Viewpoint 8 Contin (A835)

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	8.32	-3.2	185.73	18.57	2.68	0.27	
3	9.41	-2.84	232.11	23.21	2.62	0.26	
7	8.7	-2.74	244.83	24.48	3.24	0.32	
14	10.44	-2.81	232.11	23.21	2.13	0.21	
17	11.02	-1.78	487.76	48.78	4.01	0.4	X
20	12.52	-0.67	1450.77	145.08	9.25	0.93	X

Viewpoint 9 Kiltarlity

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	10.02	-2.38	304.3	30.43	3.03	0.3	
3	9.35	-2.02	408.74	40.87	4.67	0.47	X
7	11.52	-0.76	1314.36	131.44	9.91	0.99	X
14	11.22	-1.69	535.25	53.52	4.25	0.42	X
17	10.34	-1.93	447.66	44.77	4.19	0.42	M
20	11.68	-2	408.74	40.87	3	0.3	

Viewpoint 10 Jamestown

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	10.57	-2.16	350.05	35	3.13	0.31	
3	10.69	-2.13	377.97	37.8	3.31	0.33	
7	12.26	-1.24	857.54	85.75	5.71	0.57	X
14	13.02	-1.96	408.74	40.87	2.41	0.24	
17	12.63	-1.53	641.55	64.16	4.02	0.4	
20	14.52	-1.55	583.53	58.35	2.77	0.28	

Viewpoint 11 Balvaird / Newmore

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	12.95	-1.78	487.76	48.78	2.91	0.29	
3	13.04	-1.77	487.76	48.78	2.87	0.29	
7	14.64	-1.34	775.95	77.6	3.62	0.36	X
14	15.37	-1.68	535.25	53.52	2.27	0.23	
17	14.94	-1.32	775.95	77.6	3.48	0.35	
20	16.81	-1.36	706.42	70.64	2.5	0.25	

Viewpoint 12 A835 / B9169

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	13.71	-1.88	447.66	44.77	2.38	0.24	
3	14.11	-1.82	487.76	48.78	2.45	0.24	
7	15.26	-1.45	706.42	70.64	3.03	0.3	X
14	16.37	-1.74	535.25	53.52	2	0.2	
17	16.18	-1.24	857.54	85.75	3.28	0.33	X
20	18.12	-1.29	775.95	77.6	2.36	0.24	X

Viewpoint 13 A832 west of Tore

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	13.63	-0.83	1314.36	131.44	7.07	0.71	
3	14.69	-0.77	1314.36	131.44	6.09	0.61	
7	14.09	-0.6	1580.04	158	7.96	0.8	
14	15.82	-0.89	1181.14	118.11	4.72	0.47	
17	16.39	-0.48	1697.46	169.75	6.32	0.63	
20	17.91	-0.62	1580.04	158	4.92	0.49	

Viewpoint 14 Great Glen Way near Ladycairn

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	15.73	-1.15	857.54	85.75	3.47	0.35	
3	15.2	-1.19	857.54	85.75	3.71	0.37	
7	17.33	-0.89	1181.14	118.11	3.93	0.39	
14	17.21	-1.21	857.54	85.75	2.9	0.29	
17	16.36	-0.76	1314.36	131.44	4.91	0.49	X
20	17.74	-1	1055.49	105.55	3.35	0.34	

Viewpoint 15 Heights of Brae

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	19.56	1.6	1642.62	164.26	4.29	0.43	
3	19.16	1.65	1642.62	164.26	4.47	0.45	M
7	18.1	3.2	398.92	39.89	1.22	0.12	X
14	16.89	1.72	1525.86	152.59	5.35	0.53	
17	17.14	2.5	688.98	68.9	2.35	0.23	X
20	15.23	2.25	820.29	82.03	3.54	0.35	X

Viewpoint 16 Sgùrr a' Choire Ghlais

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	17.64	0.5	2141.94	214.19	6.88	0.69	
3	17.68	0.5	2141.94	214.19	6.85	0.69	
7	15.94	0.75	2133.71	213.37	8.39	0.84	
14	15.39	0.43	2132.36	213.24	9	0.9	
17	16.07	2.62	635.02	63.5	2.46	0.25	X
20	14.53	2.81	542.05	54.2	2.57	0.26	X

Viewpoint 17 Meall a 'Mhadaibh

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	18.77	-1.59	583.53	58.35	1.66	0.17	
3	19.35	-1.54	641.55	64.16	1.71	0.17	
7	20.15	-1.34	775.95	77.6	1.91	0.19	
14	21.48	-1.52	641.55	64.16	1.39	0.14	
17	21.44	-1.01	1055.49	105.55	2.3	0.23	X
20	23.37	-1.11	949.19	94.92	1.74	0.17	X

Viewpoint 18 Knockbain / Torgorm

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	19.69	-1.52	641.55	64.16	1.66	0.17	
3	19.53	-1.53	641.55	64.16	1.68	0.17	
7	21.4	-1.27	775.95	77.6	1.69	0.17	
14	21.81	-1.5	641.55	64.16	1.35	0.13	
17	21.18	-1.25	775.95	77.6	1.73	0.17	
20	22.88	-1.3	775.95	77.6	1.48	0.15	

Viewpoint 19 A9 Cromarty Firth

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	21.49	1.37	1827.21	182.72	3.96	0.4	
3	20.61	1.43	1827.21	182.72	4.3	0.43	
7	22.73	1.41	1827.21	182.72	3.54	0.35	
14	21.94	1.22	1954.86	195.49	4.06	0.41	
17	20.92	1.58	1642.62	164.26	3.75	0.38	
20	21.6	1.39	1827.21	182.72	3.92	0.39	

Viewpoint 20 Ben Wyvis

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	21.61	-1.41	706.42	70.64	1.51	0.15	
3	22.23	-1.38	706.42	70.64	1.43	0.14	
7	22.95	-1.21	857.54	85.75	1.63	0.16	
14	24.32	-1.38	706.42	70.64	1.19	0.12	
17	24.32	-0.91	1181.14	118.11	2	0.2	X
20	26.25	-1.17	857.54	85.75	1.24	0.12	

Viewpoint 21 A9 Kessock Bridge

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	26.55	-1.13	949.19	94.92	1.35	0.13	
3	27.16	-1.11	949.19	94.92	1.29	0.13	
7	27.87	-0.98	1055.49	105.55	1.36	0.14	
14	29.25	-1.13	949.19	94.92	1.11	0.11	
17	29.26	-0.9	1181.14	118.11	1.38	0.14	X
20	31.18	-0.97	1055.49	105.55	1.09	0.11	

Viewpoint 22 A96, Alturlie Junction

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	27.69	-0.21	1933.61	193.36	2.52	0.25	
3	27.3	-0.21	1933.61	193.36	2.6	0.26	
7	29.35	-0.11	1984.24	198.42	2.3	0.23	
14	29.41	-0.3	1867.36	186.74	2.16	0.22	
17	28.61	-0.09	1984.24	198.42	2.42	0.24	
20	30.06	-0.19	1933.61	193.36	2.14	0.21	

Viewpoint 23 Cnoc Fyrish

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	29.49	-1.04	1055.49	105.55	1.21	0.12	
3	29.23	-1.04	1055.49	105.55	1.24	0.12	
7	31.2	-0.9	1181.14	118.11	1.21	0.12	
14	31.44	-1.07	949.19	94.92	0.96	0.1	
17	30.72	-0.81	1314.36	131.44	1.39	0.14	X
20	32.3	-0.89	1181.14	118.11	1.13	0.11	X

Viewpoint 24 B817, Alness

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Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	31.03	-1.03	1055.49	105.55	1.1	0.11	
3	31.39	-1.02	1055.49	105.55	1.07	0.11	
7	32.59	-0.9	1181.14	118.11	1.11	0.11	
14	33.67	-1.04	1055.49	105.55	0.93	0.09	
17	33.42	-0.82	1314.36	131.44	1.18	0.12	X
20	35.35	-0.88	1181.14	118.11	0.95	0.09	X

Viewpoint 25 Chanonry Point

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	33.14	-0.97	1055.49	105.55	0.96	0.1	
3	33.01	-0.98	1055.49	105.55	0.97	0.1	
7	34.85	-0.82	1314.36	131.44	1.08	0.11	X
14	35.3	-1	1055.49	105.55	0.85	0.08	
17	34.67	-0.84	1314.36	131.44	1.09	0.11	
20	36.36	-0.89	1181.14	118.11	0.89	0.09	

Viewpoint 26 Invergordon

Turbine	Distance (KM)	Elevation Angle	Candela	Candela at 10%	Microlumens per square metre (lux10-6)	Microlumens per square metre (lux$^{10-6}$) at 10%	Obscured
2	19.09	-1.57	583.53	58.35	1.6	0.16	
3	19.76	-1.52	641.55	64.16	1.64	0.16	
7	20.36	-1.34	775.95	77.6	1.87	0.19	
14	21.79	-1.51	641.55	64.16	1.35	0.14	
17	21.85	-0.97	1055.49	105.55	2.21	0.22	X
20	23.76	-1.13	949.19	94.92	1.68	0.17	X

Viewpoint 27 A862 Clacnaharry

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Appendix B – Abbreviations and Definitions

ADSB……..……Automatic Dependent Surveillance Broadcast
AGL.....Above Ground Level (Height)
ANO.....Air Navigation Order
AMSL.....Above Mean Sea Level (Elevation)
ATC……..…Air Traffic Control
ASG.....Aviation Steering Group
CAA.....Civil Aviation Authority
CAP.....Civil Aviation Publication (Referrers to Specific Documents)
cd.....Candela, a measure of light intensity
DIO.....Defence Infrastructure Organisation
HNTA.....Helicopter Night Training Area
In Flight Visibility.....The distance a pilot can see ahead to fly & navigate the aircraft
IR.....Infrared
Kts.....Knots: a measure of airspeed (10 kts = 12mph = 19 kph)
LED.....Light Emitting Diode
MOD.....Ministry of Defence
mW/sr.....milliWatts per steradian: electromagnetic energy output related to solid angle
Nm.....Nautical Mile
NOTAM……Notice to Air Missions
NVD .....Night Vision Devices - Aircraft Mounted
NVG.....Night Vision Goggles - Operator Worn
Radar Altimeter.....An altimeter that uses radar to accurately measure height above ground
QFE .....Setting on Altimeter that gives Height above Airfield
RoAR.....Rules of the Air Regulations
Rule 5.....The Low Flying Rule – part of RoAR
Rule 28.....VFR Rules Outside Controlled Airspace – part of the RoAR
ReUK.....Renewables UK – The UK Wind Industry Body
SAR Box.....Night Training Area for Search and Rescue Helicopter Units
SSA.....Sector Safety Altitude
SSR…….Secondary Surveillance Radar
UKAB.....United Kingdom Air Prox Board – Investigates Aircraft Near Misses
VFR.....Visual Flight Rules (Flight without ATC on a see-and-be-seen basis)
VMC.....Visual Meteorological Conditions (Weather suitable for VFR flight)

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Appendix C CAA Response

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Strategy and Policy Group
Windfarm Policy

Civil Aviation Authority

Mike Hale
Aviation Consultant
Wind Power Aviation Consultants Ltd.
38 Hadrian Way
Chilworth
Southampton
SO16 7HX

22 April 2025
Ref Windfarms / Ballach

Dear Mike,

Proposed Obstacle Lighting Scheme for Ballach Wind Farm

Reference: Ballach Wind Farm Lighting report dated 9 April 2025

1. Thank you for the lighting brief at reference. The report discusses the proposed obstacle lighting plan for the Ballach Wind Farm, located approximately 10km west-south-west of Muir-of-Ord in Ross & Cromarty, Scotland.

2. The proposed Ballach Wind Farm consists of 20 turbines, with heights between 199.5m and 229.5m ground to tip. This brings all of the turbines within scope of the Air Navigation Order (ANO) Article 222 obstacle lighting requirements.

3. We have considered the report carefully and take note of the intent to address concerns relating to adverse visual impacts of aviation lighting on non-aviation receptors while ensuring that the lighting installed on the turbines meets air safety requirements.

4. We note the proposed lighting scheme identifies the perimeter outline and that some mitigation is proposed to be provided by the provision of infra-red lighting for those operators who carry Night Vision Device capability.

5. Under provisions given in the Air Navigation Order (ANO) Article 222 section 6, the CAA provides for the following variation:

- medium intensity steady red (2000 candela) lights on the nacelles of turbines T02, T03, T07, T14, T17 and T20;
- a second 2000 candela light on the nacelles of the above turbines to act as alternates in the event of a failure of the main light (note that both lights should not be lit at the same time);

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Telephone 0330 138 3166 andy.wells@caa.co.uk

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- the lights on these turbines to be capable of being dimmed to 10% of peak intensity when the lowest visibility as measured at suitable points around the wind farm by visibility measuring devices exceeds 5km;
- infra-red lights to MoD specification installed on the nacelles of turbines T01, T02, T03, T04, T05, T06, T07, T08, T09, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19 and T20 (note that dimming permission is applicable only to visible lights, not infra-red lighting).

6. Intermediate level 32 candela lights are not required to be fitted on the turbine towers.

7. If the proposed design of the wind farm changes (other than variations due to micrositing etc.) this is likely to require a revision to this aviation obstacle lighting variation.

Yours sincerely,

[redacted]

Andy Wells
Manager Aviation and Wind Turbine Policy

Continued (2 of 2 pages)

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Appendix D CEL-WT-MIC Specification



CEL AVIATION LIGHTING

DATASHEET

05 Dec 2024

Medium Intensity Red 2,000cd Light

230VAC - LED Aircraft Warning Light

CEL-WT-MIC - StandAlone / Modbus

Medium Intensity stand-alone 2,000cd red model is designed for Wind Turbine Installations. This intelligent light offers unique features such as incorporated fault monitoring, photocell, GPS synchronisation, adjustable luminosity and supports both stand-alone and Modbus operation as a part of a larger CEL aviation light system network.

Key features

- 2,000cd (effective) RED fixed or flashing modes
- Extremely reliable - long lifetime
- Supports both stand-alone and Modbus operations
- Suitable for Ofsh ore environment
- Incorporated GPS synchronisation
- Adjustable luminous output levels 10%, 30%, and 100%
- Incorporated photocell and fault monitoring
- WIFI interface
- Design lifetime more than 20 years
- 5yr warranty- the longest in the industry

Specifications met

- ICAO International Standards and Recommended Practices: Aerodromes Annex 14 Volume 1, 8th Edition, July 2018,
- Chapter 6: Medium-intensity, Type B/C Fixed Obstacle Light
- European Aviation Safety Agency - Chapter Q — Visual Aids for Denoting Obstacles CS-ADR-DSN.Q.848
- FAA Advisory Circular 150/5345-43F 09/12/06: L-864 and L-885
- CEL-WT-MIC - light measurement chart table - DEC2024

Optical characteristics

- 2,000cd (effective)
- Colour aviation RED
- NVG compliant infrared (850nm)
- Horizontal beam 360°
- Vertical beam 3°
- Maximum intensity at -1° is less than 1,110cd
- Maximum intensity at -10° is less than 56cd

Electrical characteristics

- Operating voltage 90-265VAC
- Constant power input at 95% by active PFC
- Flash rates: 20/30/40/60fpm
- Meets standards
  EMC (Emissions): EN 61000-6-4
  EMC (Immunity): EN 61000-6-2

EASA wifi

Electrical characteristics - continued

- Power consumption
  17W @Night (RED, 40fpm)
  20W @Night (RED+IR, 40fpm)
  25W @Night (RED, fixed)
  30W @Night (RED+IR, fixed)
- Recommended cables (Outdoor):
  Power (L-N-PE): 3x1,5mm²or 3x2,5mm²
  Data: CAT 7
  Alarm: CAT 7, 3x1,5mm or 3x2,5mm²
  Power + Data: 6x1,5mm²or 6x2,5mm²
- Input/Output terminals can be used to daisy chain power and data to additional lightheads

Mechanical characteristics

Painted marine grade aluminium body (C5MHigh)
Glass cover
Degree of protection IP66
Operating temperature range -40..+55°C
Mounting 240x240mm
Height 333mm, diameter 270mm
Weight 11kg

Additional Factory-Installed Options

Cold-climate version (CCV)
NVG compliant infrared (IR)

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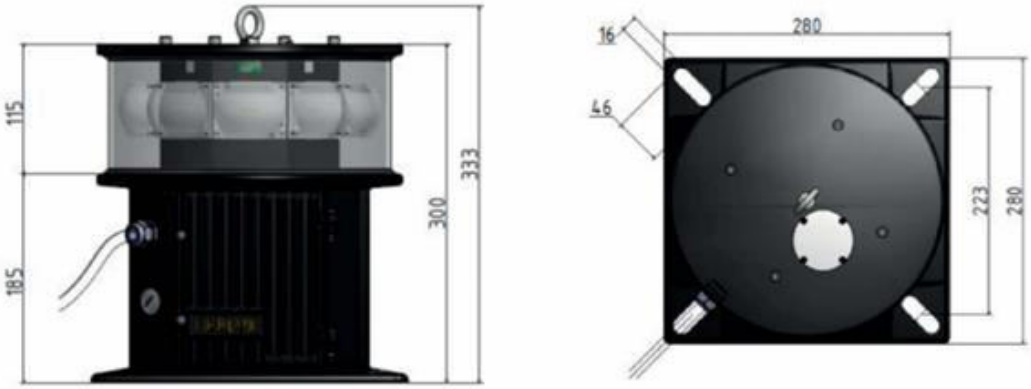
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Medium Intensity Red 2,000cd Light

230VAC - LED Aircraft Warning Light

CEL-WT-MIC - StandAlone / Modbus

CEL-WT-MIC
Light unit with mounting dimensions



CEL-WT Versions

CEL-WT-MIB	Medium-intensity Type B (flashing) obstruction light, 2,000cd Red, GPS sync, Photocell, Alarm, 100-240VAC Supports stand-alone and Modbus Network operation.
CEL-WT-MIC	Medium-intensity Type C (steady burn) obstruction light, 2,000cd Red, infrared, GPS sync, Photocell, Alarm, 100-240VAC. Supports stand-alone and Modbus Network operation.
CEL-WT-MIB-IR	Medium-intensity Type B (flashing) obstruction light, 2,000cd Red, Infrared 850nm, GPS sync, Photocell, Alarm, 100-240VAC. Supports stand-alone and Modbus Network operation.
CEL-WT-MIC-IR	Medium-intensity Type C (steady burn) obstruction light, 2,000cd Red, Infrared 850nm, GPS sync, Photocell, Alarm, 100-240VAC. Supports stand-alone and Modbus Network operation.

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cel AVIATION LIGHTING

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Ballach Wind Farm

Environmental Impact Assessment Report
Volume 1
Technical Appendix 14.2: Forestry

July 2025

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14 FORESTRY

Introduction

14.1 This technical appendix (TA) considers the potential effects of Ballach Wind Farm on Forestry.

14.2 This TA is also supported by the following figures as contained within Volume 2: Figures:

- Figure 14.2.1: Location
- Figure 14.2.2: Baseline Species
- Figure 14.2.3: Access Felling

14.3 The Appendix is supported by a further Technical Appendix (as set out within Volume 4: Technical Appendices), comprising:

- Technical Appendix 14.2.2 Forestry Photographic records.

14.4 Other relevant chapters include

- Chapter 3: Project Description;
- Chapter 8: Ecology;
- Chapter 6: Landscape and Visual; and
- Chapter 10: Geology, Hydrology and Hydrogeology.

14.5 The author of this Chapter, Neil McKay MICFor, is a chartered forester, a professional member of the Institute of Chartered Foresters since 1994. Neil McKay has more than 12 years of relevant experience in the preparation of Forestry Chapters as part of EIA Reports for a range of wind farms across Scotland.

Legislation, Policy and Guidance

Legislation

14.6 The scope of the assessment has been informed by consultation responses summarised in Table 14.1 and the following guidelines/policies:

- Forestry and Land Management (Scotland) Act 2018.
- Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal, Edinburgh.
- Forestry Commission (2023). The UK Forestry Standard: The Government's Approach to Sustainable Forestry, 5th Edition, Forestry Commission, Edinburgh.
- Forestry Commission (2023): The UK Forestry Standard Guidelines. Edinburgh.

- The Scottish Government (2019) Scotland's Forestry Strategy 2019-2029. Edinburgh.
- The Scottish Government (2011). Scottish Land Use Strategy. Edinburgh.
- The Scottish Government (2023) Scotland's Fourth National Planning Framework (NPF4). Edinburgh.
- The Scottish Government (2014b). Scottish Planning Policy. Edinburgh.

Policy

14.7 Chapter 5: Renewable Energy and Planning Policy of the EIA Report sets out the planning policy framework that is relevant to the EIA process and the proposed development. The policies set out include those from The Highland Council Local Development Plan (LDP) relevant aspects of NPF4 (National Planning Framework 4)(2023), Planning Advice Notes and other relevant guidance.

14.8 Key plans and policies include:

- The Scottish Government (2023) Scotland's Fourth National Planning Framework (NPF4)
- Forestry Commission Scotland (2009) The Scottish Government's Policy on Control of Woodland Removal, Edinburgh;

Guidance

14.9 The following guidance has been considered within the assessment Forestry Commission Scotland (2019) Scottish Government's policy on control of woodland removal: implementation guidance;

- Forestry Commission Scotland (2019): Scottish Government's policy on control of woodland removal: implementation guidance February 2019
- UK Forestry Standards (UKFS)5th Edition 2023
  - Forests and Biodiversity;
  - Forests and Climate Change;
  - Forests and Historic Environment;
  - Forests and Landscape;
  - Forests and People;
  - Forests and Soil; and
  - Forests and Water.
- The Highland Council, Highland Forest and Woodland Strategy (November 2018)
- The Highland Council, Trees, woodlands and development supplementary guidance (January 2013)
- SEPA (2017) SEPA Guidance Notes WST-G-027 Management of Forestry Waste; and
- SEPA (2014) LUPS-GU27 Use of Trees Cleared to Facilitate Development of Afforested Land.
- UKWAS (2012) The UK Woodland Assurance Standard, Third Edition, UKWAS, Edinburgh.

Consultation

14.10 As part of the Scoping exercise, a consultation exercise was undertaken to inform the design of the proposed development and to seek agreement on potential significant environmental effects that result from the proposed development as well as the scope of any assessment work required as part of this EIA.

14.11 The Scoping Opinion was received from ECU on 28 November 2024.

14.12 Consultation relevant to the forestry assessment was undertaken with The Highland Council (THC), NatureScot and Scottish Forestry (SF) who commented on aspects of methodology, sources of information, scope of assessment and cumulative development. A summary of these consultation responses is provided in Table 14.2.1.

Table 14.2.1: Consultation Responses

Consultee	Date Received	Consultation Response	Where and how is this addressed?
THC	28 November 2024	Within the access track corridor there are relatively small area of woodland which are listed in the Ancient Woodland Inventory as Long-established plantation origin (LEPO1860).	This is identified throughout this assessment as a loss of 0.14 ha broadleaved and 0.08 ha productive conifer. Construction Effects Section Figure 14.2.3
		Baseline survey of all the woodlands, trees and plants (including fungi, lichens and bryophytes) present on the site to determine the presence of any rare or threatened species. This could be a specific Forestry Chapter by a professional forester which identifies the location, area, type and condition of all productive and native woodland on and around the access route.	This technical appendix covers the trees and forest, identifying native woodlands and productive conifer woodlands. The other environmental interests would be covered in Chapter 8: Ecology.
		A breakdown of the impact of the proposals on woodland by type (productive, native or both) should be provided, as well as making clear the likely impact on woodland listed in the AWI under the various categories and also provide confirmation of the impact on native	The effects on woodlands have been broken down between native woodlands and productive conifer in Construction Effects Section. NWSS is also recognised and included within the assessment in the Baseline Section and Construction Effects Section.

Consultee	Date Received	Consultation Response	Where and how is this addressed?
		woodland listed in the NWSS.	
		The layout should be designed to minimise the impact on woodland as much as possible and in particular, the adverse impact on native broadleaf woodland and woodland listed on the AWI as ASNO should be minimised. The ES should include Tree constraints Plans and Tree Protection Plans to BS 5837:2012 to show how retained trees/ woodland would be safeguarded from construction activity as well as a tree/ woodland removal drawing which shows the extent of woodland that would need to be removed to accommodate new development.	The existing forest access track would be followed to the Proposed Development. This minimises the creation of new tracks. Upgrading of this existing track would require some edge felling of forest sub compartments which may require management felling to windfirm boundaries. The Access Junction improvements may require a small amount of felling within the broadleaved LEPO1860, the Abnormal Overrun is outwith the forest area but may effect individual trees. It is proposed that the Tree Constraints Plan and Tree Protection Plan are provided post consent prior to construction.
		A Landscape Plan and Landscape Maintenance Plan should be provided to show how trees to be removed are to be replaced with on-site planting and to show how the visual amenity of the local landscape is to be enriched.	A Landscape Plan is not required with off-site compensatory planting
		Where woodland is proposed to be removed, compliance with the Scottish Government's Control of Woodland Removal policy must be demonstrated. Where there are any proposals for woodland removal, compensatory planting of an area of new woodland, of a scale and type of woodland equivalent to that which is to be removed will be required	CoWRP is recognised and the compensatory planting Section addresses this matter.

Consultee	Date Received	Consultation Response	Where and how is this addressed?
NatureScot	28 November 2024	If felling is required to accommodate the Proposal, we recommend that the Applicant contacts Scottish Forestry to discuss the Control of Woodland Removal Policy and the implications this may have on the development.	As above.
SF	28 November 2024	National Planning Framework 4 - Policy 6 Forestry, Woodlands and trees identifies several themes that should be considered relevant to this application – b) Development proposals will not be supported where they will result in: i. Any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition; ii. Adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value, or identified for protection in the Forestry and Woodland Strategy; iii. Fragmenting or severing woodland habitats, unless appropriate mitigation measures are identified and implemented in line with the mitigation hierarchy; c) Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal.	As above.

Consultee	Date Received	Consultation Response	Where and how is this addressed?
		Where woodland is removed, compensatory planting will most likely be expected to be delivered. d) Development proposals on sites which include an area of existing woodland or land identified The development does not appear to impact on woodlands, the access is described as utilising existing tracks which are through woodland. If at a later stage there is an impact on trees or woodlands due to the proposed upgrading of access then the policies set out in the letter should be applied. Scottish Government's policy on control of woodland removal: implementation guidance February 2019 provides guidance on the level and detail of information Scottish Forestry will expect within the EIA Report, to help us reach an informed decision on the potential impact of the proposed development. Detailed information on any compensatory planting proposals should also be provided.	

Assessment Methodology and Significance

Scope of Assessment

Effects Assessed in Full

14.13 The following effects were considered to be potentially significant in relation to [Forestry at the scoping stage and have been assessed in full within this TA:

- The total forest cover within the Site; and

- The changes to the forest structure within the Site.

Effects Scoped Out

14.14 Secondary effects resulting from forestry activities, including effects on habitats and species, ornithology, hydrology and landscape and visual effects, are considered within their respective chapters of this EIA Report and are not included within this TA.

Cumulative Effects

14.15 On the basis that the overall forest resource will be maintained across the board in line with CoWRP and UKFS, then no cumulative effects are anticipated.

Study Area

14.16 The forestry study area is targeted at Erchless Forest, an established forest within the Site, is noted in Figure 14.2.1 Baseline Species.

Desk Based Study and Data Sources

14.17 The access to the Proposed Development is taken through Erchless Forest. The forestry study area is focused on the forest area within the Site.

14.18 The forest data sets and associated sources can be summarised as follows:

- National Forest Inventory (NFI) 2021;
- Ancient Woodland Inventory (AWI) (Scotland) 2024;
- Native Woodland Survey of Scotland (NWSS) 2024; and
  Erchless Forest Stock Map 2024 in .pdf format.

Field Survey

14.19 A field survey of the Forestry Study Area was undertaken on 17 January 2025. The field survey undertaken acts as ground truthing against the compartment maps supplied. Visual assessment of tree height and vigour was carried out. Example photographic records are provided as a Technical Appendix.

Assumptions and Limitations

14.20 The woodland information is provided by the forest owner and applicant is a .pdf stock map.

14.21 Other woodland information is based on open data including aerial imagery. It is noted that there are small mismatches between Ordnance Survey basemap, NFI, aerial imagery and the .pdf stock map.

Baseline Conditions

14.22 The mixed conifer and mixed broadleaved forest has a range of planting year from 1957 through to 2016 with ground recently felled and replanted or awaiting replanting.

14.23 SF Map Viewer evidence no current approved Forest Plan. Past thinning and clearfell Felling Permissions and Licences are shown.

14.24 The Ancient Woodland Inventory (AWI) for the whole forest includes an area of antiquity 1a, Ancient (of semi-natural origin) ASNO1750, antiquity 2b Long-Established (of plantation origin) LEPO1860 and antiquity 3 Other (on Roy map).

14.25 LEPO1860 is present within the access to the Site, as are areas of Native Woodland Survey of Scotland (NWSS) Native Pinewood with a smaller area of upland birchwood

14.26 It is noted that NatureScot *A guide to understanding the Scottish Ancient Woodland Inventory* describes:

- **Ancient Woodland (1a and 2a)**

  Interpreted as semi-natural woodland from maps of 1750 (1a) or 1860 (2a) and continuously wooded to the present day. If planted with non-native species during the 20th century they are referred to as Plantations on Ancient Woodland Sites (PAWS).

- **Long-established woodlands of plantation origin (LEPO) (1b and 2b)**

  Interpreted as plantation from maps of 1750 (1b) or 1860 (2b) and continuously wooded since. Many of these sites have developed semi-natural characteristics, especially the oldest ones, which may be as rich as Ancient Woodland.

- **Other woodlands on 'Roy' woodland sites (3)**

  Shown as unwooded on the 1st edition maps but as woodland on the Roy maps. Such sites have, at most, had only a short break in continuity of woodland cover and may still retain features of Ancient Woodland.

14.27 The NFI data is summarised below

Table 14.2.2: Erchless Forest NFI Classification.

NFI classification	Area Ha
Assumed Woodland	19.87
Broadleaved	44.04
Conifer	517.68
Felled	83.96
Interpreted Open Area	39.08
Mixed - predominantly Broadleaved	1.61
Shrub Land	3.22

Young Trees	29.10
Total	738.56

14.28

Identification and Evaluation of Key Effects

Construction Effects

14.29 The access for the Proposed Development requires the upgrading of the existing forest track including the Access Junction. The Site entrance also requires an Abnormal Load Overrun.

14.30 Felling to allow the access track upgrading would result in a woodland loss of 4.79 ha of conifer woodland and 0.33 ha of broadleaved woodland.

14.31 Felling the edges of mature compartments would open the remainder of the tree crop to windblow therefore felling to windfirm boundaries would require a further 11.60 ha of management or temporary felling of productive conifer, which would be replanted in situ. Of this area 8.53 ha is recorded as native pinewood within NWSS. The current species within this native pinewood area includes Sitka spruce and lodgepole pine planted in 1973, an area of Scots pine planted in 1973 with mixed conifer replanted in 2016. Smaller areas of Sitka spruce were replanted in 2013.

14.32 The area of permanent woodland loss within the AWI antiquity 2b is 0.14 ha broadleaved and 0.08 ha conifer.

14.33 The felling areas by woodland designations are summarised in Table 14.2.3

Table 14.2.3: Felling Areas Breakdown by Designation and Area

	Permanent Fell/Woodland Loss	**AWI -**	**NWSS**
Broadleaved	0.33	0.14 LEPO1860	0.19 Upland birchwood
Conifer	4.79	0.08 LEPO1860	Nil
Total	**5.12**		
	Temporary Fell/ Replant in Situ		
Conifer	11.60	Nil	8.53 Native pinewood
Total	11.60		

14.34 All marketable timber would be removed from Site supplying the wood processing industry as roundwood or biomass. Where forest crop is removed for construction the small trees (below biomass recovery) would be mulched and incorporated within the earthworks. The

total tonnage from both permanent and temporary felling is estimated at some 4,250 tonnes. See Photographic Records (TA1)4.2.2 for the variety of tree sizes.

Operational Effects

14.35 As part of the proposed development, the area of woodland lost would be replanted off-site in accordance with the implementation guidance to CoWRP. The new woodland would be to at least the area of woodland lost resultant from the proposed development. The new woodland would meet the requirements of UKFS.

14.36 The Applicant is committed to providing suitable compensatory planting at a location yet to be determined. The compensatory planting arrangements would be agreed with Scottish Forestry and THC prior to commencement of the construction stage.

Decommissioning Effects

14.37 There are no decommissioning effects to forestry

Compensatory Planting

14.38 The scoping opinion from The Highland Council and Scottish Forestry refers to Scottish Government's Control of Woodland Removal Policy and other relevant guidance. This recognises that, where woodland removal is required to enable the proposed development, it is expected to be with minimal woodland removal. The guidance advises that the proposed development falls into the category of woodland removal with a need for compensatory planting.

14.39 Compensatory planting is calculated in accordance with Annex 5 of the Scottish Government's Policy on Control of Woodland Removal: Implementation Guidance February 2019. Accordingly, compensatory planting arrangements shall be provided for at least 5.12 ha of woodland.

Cumulative Effects

14.40 Since plantation forests and woodlands are typically rotational, a cycle of felling and replanting would occur, as governed through the Forestry and Land Management (Scotland) Act 2018 and/ or the Scottish Government's Policy on Control of Woodland Removal. Therefore, there is no net loss of woodland and as such cumulative effects have not been considered in this assessment.

Summary

14.41 In upgrading the existing forest track to the standard required for the construction and operation of the Proposed Development there would be a permanent woodland loss of 5.12 ha.

14.42 This area includes felling of broadleaved trees at the access junction which is AWI antiquity 2b, LEPO1860.

14.43 Compensatory planting is proposed for at least 5.12 ha of conifer and broadleaved woodland.

References

- The Scottish Government (2019). Scotland's Forestry Strategy 2019-2029. Edinburgh
- The Scottish Government (2016) A Land Use Strategy for Scotland 2016-2021. Edinburgh
- The Scottish Government (2023) Fourth National Planning Framework (NPF4). Edinburgh
- The Scottish Government (2009) The Scottish Government's Policy on Control of Woodland Removal. Edinburgh
- Forest Research (2023) UK Forestry Standard (UKFS). Farnborough
- The Scottish Government (2018) Forestry and Land Management (Scotland) Act 2018
- SEPA (2014) Use of Trees Cleared to Facilitate Development on Afforested Land. Joint Guidance from SEPA, SNH and FCS
- NatureScot A guide to understanding the Scottish Ancient Woodland Inventory (AWI) Available at https://www.nature.scot/doc/guide-understanding-scottish-ancient-woodland-inventory-awi Accessed on 29/06/2025
- The Highland Council, Highland Forest and Woodland Strategy (November 2018)
- The Highland Council, Trees, woodlands and supplementary development guidance (January 2013).



Plate 1 Native woodland at Access Junction. Grid Ref: NH 411 410



Plate 2 Mature Productive Conifer on Access Track Grid Ref: NH 413 412



Plate 3 Productive Conifer and Native Broadleaved on Access Track. Grid Ref: NH 414 412



Plate 4 Younger Restocked Productive Conifer. Grid Ref: NH 419 420