

Technical Appendix 2.1: Outline Construction Environmental Management Plan (OCEMP) – Draft Template for Planning

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2.1.1 Introduction

- 2.1.1.1 This Outline Construction Environmental Management Plan (OCEMP) has been prepared in support of the Environment Impact Assessment (EIA) process for the Proposed Watchman Energy Park (hereafter referred to as the 'Proposed Development') and forms **Technical Appendix 2.1 (EIAR Volume 4)** of the Environmental Impact Assessment (EIA) Report (EIAR) submitted as part of the application for consent for the Proposed Development under Section 36 of the Electricity Act 1989.
- 2.1.1.2 A CEMP describes the environmental management and construction controls and methods to be employed during the construction of the Proposed Development to mitigate adverse environmental impacts. CEMPs are typically iterative and develop throughout the programme of construction works. The requirement to produce a CEMP will form part of the contract for the construction works for the Proposed Development, with its preparation the responsibility of the appointed construction contractor(s).
- 2.1.1.3 This outline CEMP sets out the minimum requirements, guidance and good practice measures from which the CEMP will be produced post-consent. Measures set out within this outline CEMP will be implemented in addition to those within **Chapter 13: Schedule of Environmental Commitments (EIAR Volume 2)**.
- 2.1.1.4 The CEMP will be updated with detailed information and finalised prior to commencement of construction, in consultation with the relevant authorities and taking account of the approved plans and planning conditions. The CEMP will be sought for approval with the relevant planning authorities prior to the commencement of construction works.
- 2.1.1.5 The contractor(s) appointed to construct the Proposed Development will prepare detailed method statements which will be incorporated into the CEMP. The management measures, method statements and referenced good practice guidance and legislation will form the basis of the detailed design to be prepared by the appointed contractor(s).
- 2.1.1.6 The CEMP will provide:
- a schedule of all construction stage mitigation measures required to address likely significant effects identified in the EIAR;
 - a schedule of all additional construction and decommissioning stage good practice management measures included as part of the proposed construction work, in line with industry good practice guidance;
 - a schedule of roles and responsibilities for delivering the requirements of the CEMP, including a statement of responsibility to 'stop the job/activity' if a potential breach of a mitigation or legislation occurs;
 - a method statement for monitoring, auditing, and templates for reporting and communication of environmental management performance on-site and with the Applicant, planning authority and other relevant parties;
 - construction stage environmental management measures, based on both compliance with relevant regulations and relevant good practice including but not limited to:

- Environmental Authorisation (Scotland) Regulations 2018 (EASR)¹;
 - Forestry Commission (2017). UK Forestry Standard: The Government's approach to sustainable forestry, 4th Edition. Forestry Commission, Edinburgh²;
 - NatureScot (2024) Good Practice During Wind Farm Construction, A joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland and Historic Environment Scotland, Marine Scotland Science³;
 - Netregs, Guidance for Pollution Prevention (GPP)⁴;
 - CIRIA Publications including CIRIA C768 (Guidance on the construction of SuDS), CIRIA C753 (The SuDS Manual)⁵; and
 - NatureScot (2015) Constructed Tracks in the Scottish Uplands, 2nd Edition⁶.
- a template for the production of detailed and task/ site specific plans for on-site components of the construction work.

- 2.1.1.7 It is anticipated that specific mitigation plans and additional management measures will be required to address cultural heritage, ecology (protected habitats and species), surface water management and pollution prevention, watercourse crossings, waste, access arrangements, soil and peat management, construction and decommissioning nuisance (noise, dust), and community liaison

2.1.2 Communication Protocol

Roles and Responsibilities

- 2.1.2.1 The CEMP will confirm the roles, responsibilities and communication routes for environmental management during construction works, including communication protocols for use during a potential environmental emergency or incident.
- 2.1.2.2 An appropriately qualified Ecological Clerk of Works (ECoW)/Site Environment Manager will be appointed with responsibility for monitoring compliance with the CEMP. They would be supported by an appropriately experienced and qualified engineering geologist/geotechnical engineer for the supervision of works in any areas identified as medium to high risk of peat instability.
- 2.1.2.3 An appropriately qualified Archaeological Clerk of Works (AcoW) would be appointed to supervise fencing off of archaeological remains and would be responsible for undertaking an archaeological watching brief on ground-breaking works across the Site as identified in the CEMP.

Recording and Reporting

- 2.1.2.4 The CEMP will set out the requirements for recording and reporting all aspects of environmental management, for example:
- minutes and attendance record of start-up meeting (on-site meeting prior to commencement of construction works);
 - an environmental risk register;
 - minutes of weekly meetings covering environmental (ecology, archaeology, hydrology) issues (meetings may be combined with regular construction progress meetings);

¹ Available at: <https://www.legislation.gov.uk/sdsi/2018/9780111039014/contents>

² Forestry Commission, 2017. The UK Forestry Standard. Online. Available at: <https://www.gov.uk/government/publications/the-uk-forestry-standard>

³ NatureScot, 2024. Guidance- Good Practice during Wind Farm Construction. Available at: <https://www.nature.scot/doc/good-practice-during-wind-farm-construction>

⁴ Available at: <https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/>

⁵ SUSDRAIN, URL: <https://www.susdrain.org/resources/ciria-guidance.html>

⁶ NatureScot, 2015. Constructed tracks in the Scottish Uplands. Available at: <https://www.nature.scot/doc/archive/constructed-tracks-scottish-uplands>

- a communication plan;
- records of toolbox talks;
- dust/noise monitoring records;
- site waste and materials records;
- water quality monitoring records (if required); and
- licensing and consents.

2.1.2.5 Consultation on the CEMP would be undertaken with South Lanarkshire Council (SLC) and relevant statutory consultees prior to adoption.

Environmental Audits

2.1.2.6 The CEMP will set out the programme of environmental audits, including audits of sub-contractors to be undertaken by the appointed contractor(s). Audits will be provided on a quarterly basis (as a minimum) with audit reports to follow within two weeks of the audit being undertaken.

2.1.2.7 The contractor(s) will develop a template for completing and reporting audits for the agreement of the employer prior to the commencement of site works.

Community Liaison

2.1.2.8 During the construction period, a community liaison plan may be developed by the appointed construction contractor(s). This would set out the approach for the dissemination of information (including regular updates to the project website) and the recording of public feedback and any potential complaints. SLC would be invited to contribute to the plan as appropriate.

2.1.3 Typical Construction Stage Environmental Management Measures and Plans

Contractor Requirements

2.1.3.1 A Principal Contractor will be appointed and they will ensure that all employees, sub-contractors, suppliers and other visitors to the Site are made aware of the content of the CEMP and its applicability to them. Accordingly, environmental specific induction training will be prepared and presented to all categories of personnel working on and visiting the Site.

2.1.3.2 As a minimum, the following information will be provided to all inductees:

- identification of specific environmental risks associated with the work to be undertaken on-site by the inductee;
- summary of the main environmental receptors, risks, aspects and requirements at the Site as identified in the CEMP; and
- Environmental Incident and Emergency Response Procedures (including specific Environmental Communication Plan requirements).

2.1.3.3 A conveniently sized copy of an Environmental Risk Map or equivalent will be provided to all inductees showing all the sensitive areas, exclusion zones and designated washout areas. The map will be updated and reissued as required. Any updates to the map will be communicated to all inductees through a toolbox talk given by specialist environmental personnel. Regular toolbox talks will be provided during construction to provide ongoing reinforcement and awareness of environmental issues.

Temporary Lighting

2.1.3.4 Temporary lighting will be required at the temporary construction compounds for security purposes and to ensure that a safe working environment is provided to construction staff. In addition, temporary lighting could be required to ensure safe working conditions at infrastructure locations during construction.

2.1.3.5 All temporary lighting installations will be downwards pointing passive infra-red (PIR) activated lighting and all lights will be switched off during daylight hours and outwith working hours.

Archaeological Management Plan

2.1.3.6 Specify requirement for mitigation and/or good practices measures agreed with the planning authority and in line with measures specified in the EIAR.

Felling Plan

2.1.3.7 A felling plan, specifying areas to be felled and how, would be developed in accordance with best practice measures and sustainable forest design.

Agricultural Management Plan

2.1.3.8 An agricultural management plan would be developed to outline how livestock would be managed on-site. The plan would detail how livestock would be managed through agricultural infrastructure e.g., fences and gates, how these would be maintained, and replaced, if required, during construction.

Ecological Management Plan

2.1.3.9 An Ecological Management Plan (EMP) would be developed and include all measures required to protect ecology at the Site and maintain compliance with relevant nature conservation and wildlife protection legislation.

Construction Bird Disturbance Management Plan (BDMP)

2.1.3.10 A construction Bird Disturbance Management Plan would be provided to specify the mitigation measures and working methods to protect against disturbance to birds.

Surface, Groundwater and Water Quality Monitoring Management Plan

2.1.3.11 The Site Boundary falls within the Daer Reservoir drinking water catchment where Scottish Water abstractions are located. The Daer Reservoir catchment supplies the Daer & Camps Water Resource Zone which Scottish Water confirm is in yield deficit with the reservoir a crucial resource for this zone.

2.1.3.12 A Surface, Groundwater and Water Quality Monitoring Plan will specify and provide design for drainage management measures, to incorporate sustainable drainage systems (SuDS) to attenuate the volume and rate of runoff and maintain water quality within the Daer Reservoir catchment and across the wider Site.

2.1.3.13 The plan will specify requirement for monitoring (including visual inspection and sampling) of all drainage measures (SuDS) employed during the construction phase to assess and manage the performance of the drainage system and ensure they are maintained appropriately and remain effective. The performance of the drainage measures will be monitored and recorded.

2.1.3.14 The plan will specify the monitoring of surface watercourses to be undertaken during the construction phase, including in relation to the Daer Reservoir. Further consultation in relation to water quality monitoring will be sought with Scottish Water prior to the commencement of construction works.

2.1.3.15 The contractor will obtain the appropriate EASR authorisation from SEPA prior to the commencement of construction. The Contractor will be responsible for implementing any requirements of the EASR

authorisation, along with PPG/GPPs and GBRs relevant to the protection of water quality.

American Signal Crayfish - Biosecurity Plan

- 2.1.3.16 Given the presence of American signal crayfish *Pacifastacus leniusculus* within watercourses located within the Site Boundary there is a need for the implementation of a biosecurity plan.
- 2.1.3.17 American signal crayfish are considered an Invasive Non-Native Species (INNS) which can have potentially harmful effects on native flora and fauna and therefore present a threat to the biodiversity of watercourses within the Site. While it can disperse naturally, poor site biodiversity may facilitate further transfer to other catchments.
- 2.1.3.18 With this considered, the following minimum mitigation measures will be implemented within the Site during the construction phase:
- the ECoW will be assigned the designated point of contact and responsibility for all issues in relation to INNS, including american signal crayfish;
 - separate plant would be used for operations in one catchment or another, or plant washed down if moved between these catchments;
 - a drive through wheel wash should be set up at key sites to prevent potential spread between catchments;
 - all vehicles leaving identified infested areas must be thoroughly pressure-washed in a designated wash-down area before being used for other work;
 - personnel working on or between watercourses will ensure their clothing and footwear are cleaned where appropriate to prevent spread;
 - an american signal crayfish toolbox talk would be provided to staff site and information posters displayed within the site office or welfare cabin to highlight risks associated with the species;
 - signage would be erected alongside watercourses as appropriate to highlight to staff the potential for crayfish;
 - records would be kept of any american signal crayfish identified within the Site, recorded within a biosecurity log; and
 - Material/water left after vehicles have been pressure-washed must be contained, collected and disposed of appropriately.

Dust Management Plan

- 2.1.3.19 Specify dust management controls and protocols for implementation (e.g., in the event of dry weather).

Waste Management Plan

- 2.1.3.20 Provide details of site waste management, identifying all waste streams and responsibilities of the contractor.

Ancillary Excavation Works and Material Storage

- 2.1.3.21 Provide details of ancillary excavation works and material storage, identifying responsibilities of the contractor.

Soil and Peat Management Plan

- 2.1.3.22 An updated Peat Management Plan (PMP), to be produced post consent using data acquired through the site investigation campaign. This will specify measures to maintain soil structure and function during temporary storage and reinstatement work.

Peat Instability Risk Assessment Management Plan

- 2.1.3.23 Provide a geotechnical risk register and management plan to manage risks associated with construction in close proximity to areas identified as having peat instability risk.

Noise Management Plan

- 2.1.3.24 Specify hours of work and an outline of proposed restrictions and noise control measures and notifications required during construction work.

Construction Traffic Management Plan

- 2.1.3.25 Specify traffic management plan measures agreed with the planning authority.

2.1.4 Construction Method Statements

Construction Programme

- 2.1.4.1 The estimated construction period of the Proposed Development is approximately 18 months.

Working Hours

- 2.1.4.2 The normal working hours would be as follows:

- Monday to Friday 0700 - 1900;
- Saturday 0700 - 1300; and
- No working on Sundays or public holidays without prior written approval from SLC.

- 2.1.4.3 No works which exceed the Category A thresholds in British Standard (BS) 5228 shall occur outside core hours except with prior approval from SLC, with the exception of turbine delivery, the completion of turbine erection and commissioning or emergency work. The requirement for out-of-hours work could arise, for example, from delivery and unloading of abnormal loads or health and safety requirements, or to allow optimal use of fair weather windows for the erection of turbine blades and the erection and dismantling of cranes.

Temporary Construction Compounds, Lighting, Staging Area and Site Fencing

- 2.1.4.4 Specify layout in temporary construction compounds.

Public Access Roads

- 2.1.4.5 Specify the improvements proposed along the Site access route and detail in the Traffic Management Plan (TMP) which will also set out any Agreements or Licences required with the relevant statutory authorities and the delivery of abnormal indivisible loads (AIL).

Site Entrance

- 2.1.4.6 Specify requirement for inspection of Site entrance roads and detail requirement/protocol for providing a road sweeper to remove mud or debris transferred onto the roads from Site activities, if required. Additionally, the Site entrance provides security to the Site.

Site Access Tracks

- 2.1.4.7 Specify construction details for Site tracks, including installation of track drainage, and the locations and use of cut and floating track design.
- 2.1.4.8 Specify areas requiring sub-grade drainage measures to maintain groundwater connectivity (based on detailed site investigation at pre-construction phase).

Watercourse Crossings

- 2.1.4.9 Specify design of watercourse crossings in accordance with the EASR authorisations (either General Binding Rules, Registration or Permit as appropriate).
- 2.1.4.10 Specifications will comply with:
- Flood Estimation Handbook⁷ (Statistical Analysis) and ReFH2 - used where appropriate used to determine the design flow;
 - CIRIA Culvert design and operation guide (C689)⁵;
 - Scottish Executive (2002) River Crossings and Migratory Fish: Design Guidance (where appropriate); and
 - Other SEPA guidance where appropriate.

Construction Methodology

- 2.1.4.11 Specify watercourse crossing construction methodology, including detailed measures to prevent pollution.

Crane Hardstanding

- 2.1.4.12 Specify construction design details for crane hardstanding and construction methods for their installation.

Turbine Foundations

- 2.1.4.13 Specify foundation design (based on site investigation) and construction methods proposed.

Turbine and Turbine Transformer Erection

- 2.1.4.14 Specify construction details for turbine and turbine transformer erection.

Site Electrical Works

- 2.1.4.15 Specify construction details for Site electrical works.

Cable Trench Design Philosophy

- 2.1.4.16 Specify route and design of on-site cables, including methods of installation, watercourse crossing and measures to ensure that cable trenches do not provide a preferential pathway for dewatering peat forming habitats.

Substation, Control Building and Battery Energy Storage System

- 2.1.4.17 Specify construction details for substation control building, battery energy storage system and its associated compound.

2.1.5 Decommissioning and Restoration Plan

- 2.1.5.1 The expected operational life of the Proposed Development is 40 years from the date of final commissioning. Towards the end of this period a decision will be made as to whether to refurbish, remove or replace the turbines. If refurbishment or replacement is chosen, then relevant planning applications would be made as appropriate.
- 2.1.5.2 The CEMP will be updated on completion of the construction work for handover to the Site operator(s). The CEMP will provide details of all relevant 'as-built' plans/drawings and technical details which will

inform the decommissioning process.

- 2.1.5.3 The CEMP will provide a schedule of bill of quantities to summarise the components and constituent materials which form the Proposed Development, and the likely options or methodology envisaged for the decommissioning process.
- 2.1.5.4 If a decision was taken to decommission the Proposed Development, this would require the removal of all the turbine components, transformers, battery energy storage systems (BESS), the substation and associated buildings. In the event of decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be prepared and submitted for approval to the relevant planning authorities including the local planning authority, NatureScot and SEPA, as appropriate, no less than 12 months prior to the final decommissioning of the Proposed Development. The detailed DEMP will be implemented within 18 months of final decommissioning of the Proposed Development, unless otherwise agreed with the relevant planning authorities.
- 2.1.5.5 The DEMP will include decommissioning and Site restoration proposals and will set out methods for the following:
- access track and hardstand areas: new site tracks and areas of hardstanding constructed as part of the Proposed Development would, subject to further appraisal of the best environmental option, be left in situ, partially removed or fully removed, in agreement with the landowner and/or SLC;
 - turbines: the decommissioning of the wind turbines will follow the reverse of the erection process involving similar lifting plant and equipment. Cranes would be used to split the turbines into sections which would then be transported from the Site. These components would be reused, recycled or, if appropriate, disposed of in accordance with the relevant waste management regulations at the time of decommissioning;
 - turbine foundations: the plinth and the top surface of the wind turbine foundations would be broken out to an agreed depth below the surface, with all cabling cut out at the same depth within the remaining concrete. Once the broken-out concrete was removed, the area would be reinstated with a final layer backfilled with soil to an agreed method statement;
 - energy storage units: energy storage units and associated equipment can be disassembled in reverse order to assembly with the aim of components being recycled;
 - cabling works: cabling would be safely disconnected but would generally remain in situ to avoid any effect to the local environment by the ground disturbance associated with their removal; and
 - substation compounds: would be decommissioned by disconnecting and dismantling all the surface plant. Solid structures such as the building and equipment plinths will be demolished and the foundation will be removed to an agreed depth below ground level. Ducting and cabling that is within the agreed depth to be cleared will be removed. The fence surrounding the compound will be removed and the area covered with topsoil and reseeded, as required.

⁷ UK Centre for Ecology and Hydrology: Flood Estimation Handbook. Available at: <https://www.ceh.ac.uk/our-science/projects/flood-estimation-handbook>

Technical Appendix 2.2: Borrow Pit Assessment

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2.2.1 Introduction

2.2.1.1 To reduce the volume of imported aggregate transported to the Site and any consequent environmental impacts, borrow pits are to be located within the Site Boundary (subject to further geotechnical evaluation). The borrow pits would be used to source aggregate required for track construction, turbine bases, crane pads, compounds and hardstanding areas.

2.2.1.2 This report provides details of the proposed on-site borrow pits for use during the construction phase of the Proposed Development. Two borrow pit search areas have been identified, within which two potential borrow pits would be located; the final dimensions of each borrow pit are proposed to be smaller than the individual search areas.

2.2.1.3 The Proposed Development is described in **Chapter 2: Description of Proposed Development (EIAR Volume 2)** and the borrow pit search areas, with indicative borrow pit excavation areas, are shown on **Figure 2.2.1 (Annex 1)** to this Technical Appendix. **Section 2.2.4** of this report provides specific information about the proposed borrow pit locations and restoration details.

2.2.1.4 This report makes cross reference to the following Chapters and Technical Appendices which form part of the Environmental Impact Assessment (EIA) Report (EIAR):

- **Chapter 2: Description of Proposed Development (EIAR Volume 2);**
- **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2);**
- **Technical Appendix 2.1: Outline Construction Environmental Management Plan (OCEMP) (EIAR Volume 4);**
- **Technical Appendix 6.7: Outline Biodiversity Enhancement Management Plan (EIAR Volume 4);**
- **Technical Appendix 8.3: Groundwater Dependent Terrestrial Ecosystems (EIAR Volume 4);**
- **Technical Appendix 8.4: Peat Depth Survey Results (EIAR Volume 4);** and
- **Technical Appendix 8.6: Peat Landslide Hazard Risk Assessment (EIAR Volume 4).**

Aims of this Report

2.2.1.5 This report provides geo-engineering information on the proposed borrow pit search areas (also referred to in this report as borrow pit locations) identified within the Site Boundary. The aim of this assessment is to provide:

- Preliminary indication of the suitability of the bedrock as construction material;
- Potential borrow pit locations;
- Indicative borrow pit dimensions;
- Indicative extraction volumes;
- Estimates of overburden volumes from borrow pit locations;
- Indication of potential extraction methods;

- Recommendations for geotechnical testing; and
- Preliminary borrow pit re-instatement and rehabilitation proposals.

2.2.1.6 This report outlines the methodology used by Ramboll for the borrow pit assessment along with the analysis undertaken; conclusions drawn and recommendations for borrow pit design at each location.

Limitations

2.2.1.7 It should be noted that all borrow pit information provided within this report is indicative only and is based on desk study and reconnaissance within the Site Boundary alone. No intrusive investigation (other than peat probing) has been carried out and consequently the suitability of the rock, suggested extraction methods and volumes are broad estimates and should be treated as such. A detailed ground investigation (such as boreholes and trial pits) would be required prior to detailed design to determine the suitability of the rock (extent and quality), potential for groundwater ingress, and to determine geotechnical parameters. Recommendations can then be made with regards to groundwater control, slope stability, extraction methods and finalised detailed design. The borrow pit locations have been identified to allow for any adjustments following the results of the ground investigation. The final dimensions of each borrow pit are likely to be significantly smaller than the individual search areas identified.

2.2.1.8 This report represents the findings and opinions of experienced geotechnical consultants based upon the information obtained from a variety of sources as detailed below. Ramboll believes the information obtained from third parties is reliable but does not guarantee its authenticity. The information has been accepted *de facto* but professional judgement has been used in its interpretation.

2.2.2 Methodology

2.2.2.1 This report comprises a desk-based study and notes compiled from a geo-engineering walkover survey.

2.2.2.2 The desk study consisted of a review of the available geological and hydrogeological data together with additional information relating to the Site including:

- 1:50,000 and 1:25,000 scale Ordnance Survey (OS) topographic mapping;
- OS Elevation Digital Terrain Mapping (DTM) data;
- Review of geological mapping within the Site Boundary, British Geological Survey (BGS)¹ 1:50,000 scale;
- Review of publicly available aerial photography and OS aerial imagery;
- Groundwater vulnerability map of Scotland²;
- BGS 1:625,000 scale hydrogeological map³; and
- Review of peat probe survey field data – refer to **Technical Appendix 8.4 (EIAR Volume 4)**.

2.2.2.3 Two walkover surveys have been undertaken within the Site Boundary to identify suitable borrow pit locations. The first survey was undertaken in June 2024. Following the initial survey observations, three potential borrow pit locations were identified. These locations were further investigated during the second walkover survey undertaken in April/May 2025.

¹ British Geological Society BGS Geo Index mapping Available: <https://mapapps2.bgs.ac.uk/geoindex/home.html> [accessed May 2025]

² Scottish Environment Protection Agency flood map. Available: <http://map.sepa.org.uk/floodmap/map.htm> [accessed May 2025]

³ British Geological Survey, 1:625,000 scale digital hydrogeological data. Available: <http://www.bgs.ac.uk/products/hydrogeology/maps.html> [accessed May 2025]

- 2.2.2.4 During the post survey design process, the initial three borrow pit locations were reduced to the two proposed locations that are discussed in detail within this report.
- 2.2.2.5 All survey work recorded detailed field notes and photographs of the potential borrow pit locations, including details of the geological and hydrogeological aspects of each identified location. A hand-held GPS was used to determine the grid reference.
- 2.2.2.6 The suitable borrow pit locations have been considered in more detail with preliminary layouts and volume estimates calculated of material which could be extracted. This is discussed in more detail in this report.

Borrow Pit Constraints

- 2.2.2.7 One of the principal factors affecting the location of a borrow pit is the thickness of overburden material, due to the increased effort required for its excavation and handling before the source of the aggregate is reached. Therefore, this assessment has sought to identify optimal borrow pit locations where there would be no, or only a very thin veneer of superficial deposits, especially peat (due to its high moisture content and broader environmental considerations).
- 2.2.2.8 In addition, this assessment has sought to avoid areas with a high groundwater table in order to reduce the potential for adverse effects on groundwater dependent terrestrial ecosystems (GWDTE). In doing so, the potential borrow pit locations also reduce the potential for erosion and additional processes required for handling and treatment of groundwater. At this stage groundwater mitigation measures are considered not to be required. However, groundwater levels within the proposed borrow pit locations would be confirmed as part of the findings from detailed ground investigation, and if required suitable mitigation measures would be proposed.
- 2.2.2.9 The borrow pit locations have also been selected to avoid existing watercourses due to the potential for runoff of sediment and fine-grained material.
- 2.2.2.10 Consideration is also given to the potential for visual effects and impacts on the setting of cultural heritage features; however it is considered that, with sensitive development and appropriate restoration, long term significant effects on the setting of cultural heritage assets associated with borrow pits can be avoided.
- 2.2.2.11 The locations of the potential borrow pits have been selected to be close to the existing access tracks where possible and in all cases close to proposed site infrastructure to allow early opening of borrow pits to support the construction effort and to minimise any additional new track requirements.

2.2.3 Desk Study and Site Information

- 2.2.3.1 The Site location and setting are described within **Chapter 2: Description of Proposed Development (EIAR Volume 2)**.

Topography

- 2.2.3.2 The topography of the Site is one of undulating rounded hills and is characteristic of the Southern Uplands. The landscape is moderately steep sculpted around four main hill peaks (Comb Law, Watchman's Brae, Roger Law and Ewe Gair). Ground elevation varies significantly from 380 metres Above Ordnance Datum (mAOD) in the east to 688 mAOD at the summit of Roger Law which is located in the west of the Site. Comb Law is located towards the north of the Site with its summit at 645 mAOD. Watchman's Brae is in the east of the Site with its summit at 594 mAOD. Ewe

Gair is located to the south of the Site Boundary with its summit at 559 mAOD. Topography elevations are shown on **Figure 8.6.1 of Technical Appendix 8.6 (EIAR Volume 4)**.

Superficial Geology

- 2.2.3.3 The 1:50,000 scale geological mapping available from the British Geological Survey (BGS)¹ shows superficial geology is absent across the majority of the Site. Localised areas of peat are mapped across the Site, with the largest area mapped in the southwest of the Site at the western toe of Roger Law. Quaternary aged, Devensian, Till – Diamicton deposits are shown to be present within valley formations and lower slopes of the hill formations. Alluvial deposits are shown to be present along watercourse formations. Refer to **Figure 8.3 (EIAR Volume 3a)** which accompanies **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.
- 2.2.3.4 Peat probing undertaken in 2024 and 2025 confirmed the presence of peat within the southwest part of the Site and within isolated pockets across northern and southern areas. The findings of the survey are presented within **Technical Appendix 8.4 (EIAR Volume 4)**.
- 2.2.3.5 The depth of superficial deposits was taken into account when selecting potential borrow pit locations, typically avoiding areas with >0.5 m peat or other superficial deposits. The peat depth surveys (**Technical Appendix 8.4, EIAR Volume 4**) identified a maximum depth of 0.3 m of peat at both borrow pit locations.

Bedrock Geology

- 2.2.3.6 The 1:50,000 scale geological mapping available from the British Geological Survey (BGS)¹ shows the majority of the Site is underlain by Silurian-aged Mindork Formation, metasandstone and metamudstone. The BGS Lexicon⁴ describes the formation as a thick bedded to massive, medium to coarse grained greywacke. Borrow Pit 01 (BP01) is located within the Mindork formation rocks.
- 2.2.3.7 Towards the south and west of the Site, by Roger Law and in the location of BP02, the bedrock is mapped as Silurian-aged Gala Unit 4 Wacke, of the Gala Group. Gala Unit 4 is described by the BGS Lexicon⁷ as graded beds that may include wacke sandstone, siltstone and mudstone in variable proportions, interpreted as turbidites. Conglomeratic beds are a feature of this unit. Siltstone interbeds yielded fauna of the cyphus to triangulatus Biozones. A Devonian-aged Ballenleuch Law Granite Intrusion is mapped oriented southwest-northeast west of Roger Law partially separating the aforementioned bedrock geologies. The BGS Lexicon⁷ notes Ballenleuch Law Granite intrudes wackes of the Gala Group (Silurian).
- 2.2.3.8 At the point where the Western Access enters the Site this is mapped as Ordovician-aged Shinnel Formation wacke, described as a wacke sandstone and siltstone turbidite succession⁷.
- 2.2.3.9 Refer to **Figure 8.4 (EIAR Volume 3a)** which accompanies **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

Structural Geology

- 2.2.3.10 BGS mapping¹ shows three fault lines, running approximately parallel in a southwest to northeast direction. A reverse/thrust fault borders the western edge of the Site Boundary (hanging wall towards west), a fault of unknown displacement is mapped towards Watchman's Brae, and a reverse/thrust fault is mapped bordering the Site Boundary to the east (hanging wall east). Each fault represents a boundary between the rock formations discussed above. The fault of unknown displacement is

⁴ British Geological Survey, BGS Lexicon of Named Rock Units. Available: <https://www.bgs.ac.uk/technologies/the-bgs-lexicon-of-named-rock-units/> [accessed October 2025]

intercepted by the granite intrusion, but mapping shows the fault to continue further south of the intrusion.

- 2.2.3.11 The BGS 1:625,000 scale hydrogeology mapping³ defines the rocks as follow:
- Mindork Formation & Gala Unit 4 (Gala Group) = low productivity aquifer (Highly indurated greywackes with limited groundwater in near surface weathered zone and secondary fractures).
 - Ballencleuch Law Granite Intrusion = Low productivity aquifer (small amounts of groundwater in near surface weathered zone and secondary fractures; rare springs).
 - Shinnel Formation = Low productivity aquifer (Highly indurated rocks with limited groundwater in near surface weathered zone and secondary fractures).

- 2.2.3.12 Refer to **Figure 8.5 (EIAR Volume 3a)** which accompanies **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

Surface Water Features

- 2.2.3.13 Daer Water and other streams pass through the Site and these are hydrologically connected to the Daer Reservoir. Meikle Burn is present towards the north of the Site Boundary and Potrail Water towards the west of the Site Boundary. A small area (<5% of the Site area) drains in a north westerly direction to Potrail Water. Refer to **Figure 8.1 (EIAR Volume 3a)**.
- 2.2.3.14 The borrow pit search areas have been selected to avoid borrow pit extraction within 50 m of existing watercourses or waterbodies and with standard mitigation (i.e., an upslope cut-off/diversion ditch to intercept surface water together with minor attenuation features or soakaways) the borrow pits are not considered likely to have any significant effect on surface water.

Groundwater Dependent Terrestrial Ecosystems (GWDTE)

- 2.2.3.15 The GWDTE assessment (**Technical Appendix 8.3, EIAR Volume 4**) confirmed that the majority of potential GWDTE habitats within the Site have a low likelihood of groundwater dependency, with one community assessed as having a moderate likelihood. Site review and inspection by the Hydrology team confirmed this to be maintained primarily by surface water and rainfall inputs rather than groundwater. Therefore, in line with SEPA Guidance, no significant effects on GWDTE are anticipated, and no further detailed risk assessment is required.
- 2.2.3.16 BP01 and BP02 are located in an area not considered to be a GWDTE, refer to **Figure 8.9 (EIAR Volume 3a)** which accompanies **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

Suitability of Bedrock as an Aggregate

- 2.2.3.17 The Site is predominantly underlain by metamorphic rock formations, predominately comprising metasandstone and metamudstone, described as being largely medium to coarse grained. The wacke bedrock present within the Site (in location of BP02) are sedimentary rocks of predominantly sandstone, siltstone and mudstone turbidite formations. The wacke and metamudstone formations possess the potential for generating increased fines during crushing and may limit its use as a structural fill material.
- 2.2.3.18 Sandstone is commonly used source of construction aggregate and, according to the BGS, the vast majority of sandstone quarried in the UK is used for crushed rock aggregate. Its suitability as aggregate largely depends on its strength, porosity and durability, which are in turn governed by characteristics such as mineralogical composition, grain size and sorting, cementation and weathering state.

- 2.2.3.19 A key factor in the suitability of the rock as aggregate is the mineral constitution and mode of occurrence, as often their quality is not uniform. The weathering state of the rock is also of high importance, as this weakens the aggregate and reduces durability. The depth of weathering is dependent on the distribution of joints and other rock discontinuities.

- 2.2.3.20 No rock formations were observed within the borrow pit search areas during the walkover surveys. Therefore, the rock type, discontinuity spacing and bedding orientation cannot be verified at this stage. An assumed rock type and weathering profile has been assumed for the purposes of this assessment based on the desk study information above.

- 2.2.3.21 The proposed borrow pit locations would need detailed ground investigations to verify rock type and quality, bedding orientation and weathering profile to minimise extraction of unsuitable or argillaceous material with a potential for high fines content after excavation/grading.

2.2.4 Borrow Pit Locations and Restoration Details

- 2.2.4.1 The proposed borrow pit search areas have been selected based on a preferential morphology for stone extraction (limited cover, rock close to surface and steep slopes). The locations have been sited to avoid areas with >0.5 m peat or other significant depths of superficial deposits. The locations also take into account visual, ecological, hydrological and cultural heritage constraints. The borrow pit search areas identified allow for any adjustments following the results of the ground investigation, with the borrow pits likely to be smaller in size relative to the search areas.

- 2.2.4.2 The borrow pit search areas are located with the aim of providing two areas of site-won rock within the Site, in an effort to reduce transportation of aggregate.

- 2.2.4.3 The preliminary estimation of potential material quantities which could be extracted from the proposed borrow pit locations are provided in **Table 2.2.1** and **Table 2.2.2**. The volumes given have been calculated from 3D modelling of the borrow pits assuming all extraction is undertaken from a single layer or 'bench', taking into account gradients of the ground surface and the indicative borrow pit footprint dimension and depth approximations. Please note that these figures do account for a 20% reduction due to wastage (associated with bands of unsuitable fine-grained bedrocks or highly weathered material) or bulking of excavated materials.

- 2.2.4.4 No account has been taken in the calculations for 'winning' rock during the construction phase (e.g., through track and turbine base excavations and widening of the existing track). The extent of material sourced in this manner would potentially minimise the extraction of rock required from the borrow pits.

- 2.2.4.5 Overburden/soils together with processing residue would be carefully stockpiled adjacent to the excavation void for use in the borrow pit restoration process. The stockpiles would be located and battered so as to limit instability and erosion. Silt fences and mats would be used to minimise sediment levels in runoff from the stockpiles.

- 2.2.4.6 It is anticipated that, upon completion, the borrow pits would be partially reinstated. This would involve the reworking of faces to stabilise them, partial infilling with site-won material and landscaping with soils excavated during construction of the Proposed Development. There would also be the potential for biodiversity enhancement in reinstatement of the borrow pits, particularly for BP02 as this lies within the Biodiversity Enhancement Area (within Habitat Management Unit A) of the outline Biodiversity Enhancement Management Plan (OBEMP). Further details are provided in **Technical Appendix 6.7 (EIAR Volume 4)** which accompanies **Chapter 6: Ecology (EIAR Volume 2)**.

- 2.2.4.7 Borrow pit restoration would utilise processing residues and overburden materials and would create slopes within the excavation at an approximate gradient of 2 (V) in 1 (H). The crest of the slopes would intersect the uppermost rock face at a position which partially obscures the lower part of the

faces. The toe of the restoration faces would be blended in to the borrow pit floor, which itself would be re-profiled to allow drainage and the re-introduction of appropriate cover. The upper part of the borrow pit faces would remain exposed and would be allowed to become weathered. It is envisaged that this face would acquire an appearance similar to that of other natural rock exposures in the locality.

Borrow Pit Details

2.2.4.8 An indicative borrow pit design has been prepared for each proposed borrow pit location (**Figure A**, **Figure B** and **Figure C** below). This includes the footprint area of the excavation and a typical cross section of the proposed borrow pit and is based on the following assumptions:

- Quarry face profile is approximately 70 degrees;
- Borrow pit floor is excavated to a nominal depth, but would in practice be inclined gently down slope into the excavation;
- Maximum height of any single face would be no more than 20 m; and
- Drainage would be managed using a peripheral cut off ditch.

Proposed Borrow Pit BP01

2.2.4.9 BP01 is located adjacent to the eastern access track junction northeast of Turbine 1, within the northern part of the Site on the northern slope of the Hem Hill formation, as shown on **Figure 2.2.1**. Maximum peat cover present is 0.3 m at this location based on the peat probe surveys undertaken (refer to **Technical Appendix 8.4, EIAR Volume 4**).

| Table 2.2.1: Proposed Borrow Pit BP01 (NGR 295704, 608398) | |
|---|--|
| Borrow Pit Search Area | 25,217 m ² |
| Borrow Pit Excavation Dimensions | Assumed dimensions: 132 m (L) * 92.5 m (W) |
| Height of Excavation | 20 m maximum |
| Area of Land Impacted | 12,210 m ² (Total Footprint incl. tie-in) 9,260 m ² (Total Footprint excl. tie-in) |
| Slope Angle from DTM mapping | The slope angle of the search area is approx. 11 degrees |
| Elevation of floor during construction | 403 to 423 m Above Ordnance Datum (mAOD) |
| Details of Extraction | No rock was observed within the Borrow Pit Search area. As such, rock type, rock quality and weathering profile are all assumed as: <ul style="list-style-type: none"> ▪ Hard digging to easy ripping (Sandstone). ▪ Orientation and spacing of discontinuities are unknown. As such a 70° angle of repose is assumed for the faces of the excavation. |
| Overburden Type and Depth | Superficial deposits during the peat probing survey recorded a maximum depth of 0.3 m of peat in this location, an overburden of less than 0.5 m is assumed. |
| Indicative volume of aggregate extraction | Approximate volume of 56,000 m ³ once 20% reduction applied. |
| Aggregate Composition | Assumed medium to coarse grained metasandstone and metamudstone with moderate to high weathering potential. |

BP01 TYPICAL SECTION
SCALE: H 1:500, V 1:500. DATUM: 400.000

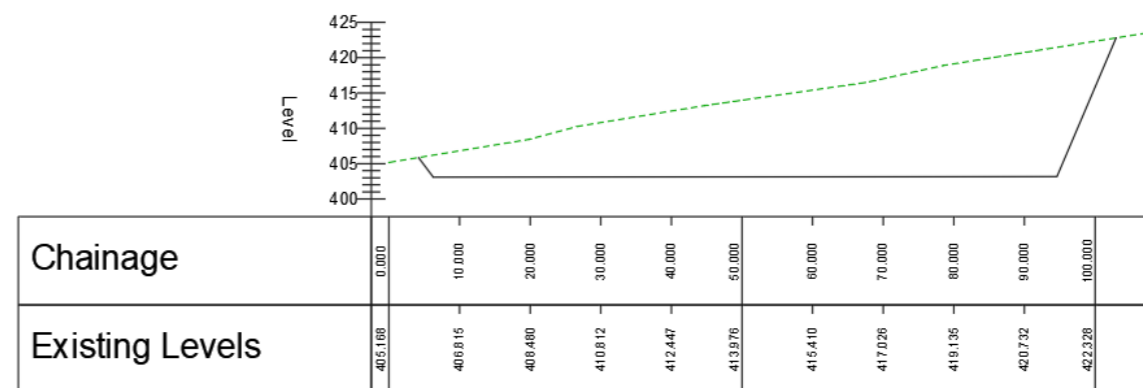


Figure A: Typical Borrow Pit Section of BP01

Proposed Borrow Pit BP02

2.2.4.10 BP02 is located adjacent to an access track southwest of Turbine 9, within the south of the Site, as shown on **Figure 2.2.1**. The slope angles across the footprint of the proposed borrow pit are highly variable and range from 3 to 11°. Maximum peat cover present is 0.3 m at this location based on the peat probe surveys undertaken (refer to **Technical Appendix 8.4, EIAR Volume 4**).

| Table 2.2.2: Proposed Borrow Pit BP02 (NGR 294392, 605641) | |
|---|--|
| Borrow Pit Search Area | 23,633 m ² |
| Borrow Pit Excavation Dimensions | Assumed dimensions: 205 m (L) * 72 m (W) |
| Height of Excavation | 17 m maximum |
| Area of Land Impacted | 14,750 m ² (Total Footprint incl. tie-in) 12,510 m ² (Total Footprint excl. tie-in) |
| Slope Angle from DTM mapping | The slope angle across the borrow pit area ranges between 3 to the western extents to 11 degrees for the eastern extents. |
| Elevation of floor during construction | 664 mAOD |
| Details of Extraction | No rock was observed within the Borrow Pit Search area. As such, rock type, rock quality and weathering profile are all assumed as: <ul style="list-style-type: none"> ▪ Hard digging to easy ripping (Sandstone). ▪ Orientation and spacing of discontinuities are unknown. As such a 70° angle of repose is assumed for the faces of the excavation. |
| Overburden Type and Depth | Superficial deposits during the peat probing survey recorded a maximum depth of 0.3 m of peat in this location, an overburden of less than 0.3 m is assumed. |
| Indicative volume of aggregate extraction | Approximate volume of 56,000 m ³ once 20% reduction factor applied. |

| Table 2.2.2: Proposed Borrow Pit BP02 (NGR 294392, 605641) | |
|---|--|
| Aggregate Composition | Assumed medium grained sandstone interbedded with bands of siltstone and mudstone. Unknown weathering or fracture spacing. No rock outcrops observed within this location. Due to the potential of fine grained silstones and mudstone rocks then these materials will be argillaceous and not suitable for structural fill due to high fines content and poor durability when crushed or compacted. |

BP02 EASTERN SECTION OF BORROW PIT
SCALE: H 1:500,V 1:500. DATUM: 660.000

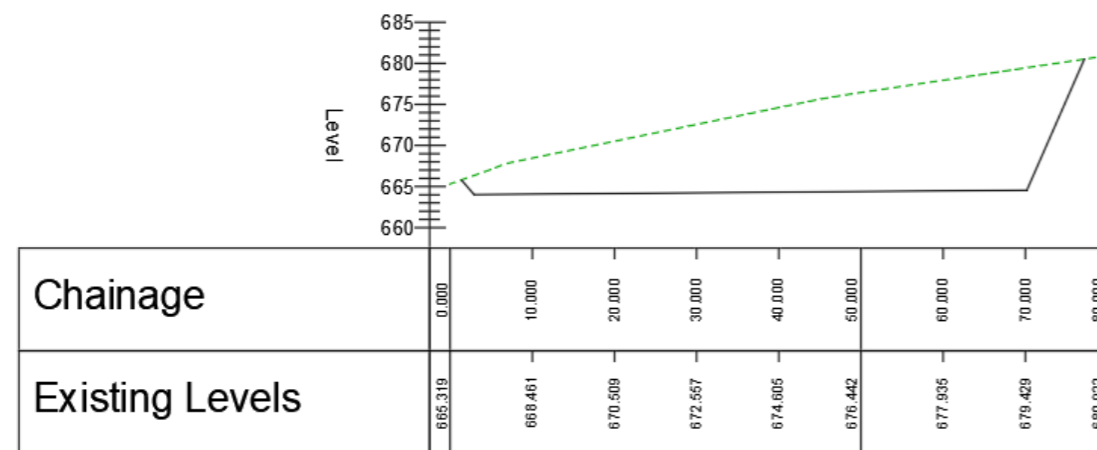


Figure B: Eastern Section of Borrow Pit BP02

BP02 WESTERN SECTION OF BORROW PIT
SCALE: H 1:500,V 1:500. DATUM: 660.000

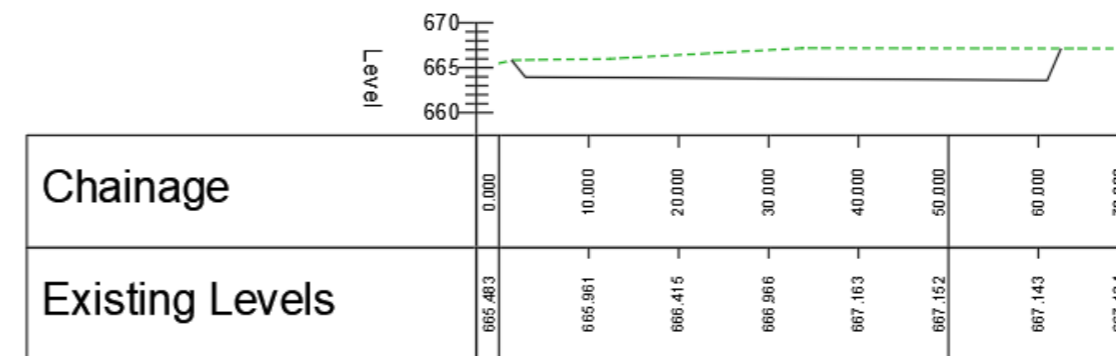


Figure C: Western Section of Borrow Pit BP02

Summary of Borrow Pit Locations (BP01 and BP02)

- 2.2.4.11 No exposures of bedrock were observed during the walkovers surveys and specifically at the proposed borrow pit search area locations. As such assumptions have been made based on the published BGS¹ data and Site setting (slope angles and ground cover). Won materials from the borrow pits would likely comprise of metasandstones and mudstones in the north (BP01) and sandstone, siltstone and mudstones in the south (BP02). A detailed assessment to determine the suitability of the rock would be required to confirm the exact extraction methods based on the intrusive site investigation data⁵.
- 2.2.4.12 Indicative aggregate volumes from the proposed borrow pits are assumed to be in the order of 112,000 m³ based on the dimensions and levels provided in **Table 2.2.1** and **Table 2.2.2**. However, this would depend on a number of factors including:
 - Results from the detailed design and intrusive investigation work prior to extraction including volume, quality and quantity of rock available for extraction at each location; and
 - Potential visual impacts at each location.
- 2.2.4.13 It is estimated that the volumes of material available from the two borrow pit locations would provide material for nearly 90% of all construction requirements for the Proposed Development. However, detailed analysis of the rock quality for reuse as structural fill would be required following ground investigation. Other site-won materials from the construction of the substation and BESS compounds would provide the remaining aggregate material required for construction of the Proposed Development (refer to **Chapter 2: Description of Proposed Development, EIAR Volume 2**).

⁵ A revision of the graphical method for assessing the excavatability of rock, Pettifer and Fooks, Quarterly Journal of Engineering Geology and Hydrogeology 1994; v. 27; p. 145-164.

2.2.5 Construction Requirements

Extraction Operations

- 2.2.5.1 The requirement to produce various grades of aggregate would necessitate the use of mobile plant and equipment. This operation would comprise of a few different elements which are summarised below.

Initial Stripping and Preparation

- 2.2.5.2 The initial access routes to the borrow pits would require preparation prior to the introduction of the main items of excavation plant, particularly, those located off the existing access tracks within the Site Boundary.
- 2.2.5.3 It is anticipated that BP01 would be accessed via the existing track network within the Site, with potential for a short section of track to be constructed from imported materials, unless locally sourced suitable materials can be located. For the existing tracks, initial preparation would consist of a series of passes using an excavator with blade to remove vegetation and any soft material, and also compacting the weathered material located immediately above the bedrock. The gradients of the prepared access way would be no steeper than 1(V) in 10(H). BP02 would be accessed from the track network for the Proposed Development.
- 2.2.5.4 In addition, the area of the proposed borrow pits would require to be stripped of the superficial material including any soil which lies above bedrock. This material would need to be carefully lifted and placed in storage mounds within an appropriate storage area.

Excavation of Materials

- 2.2.5.5 Hard digging to easy ripping is envisaged to be the methodology required for extraction of materials based on the assessment of observed rock strength from the walkover survey. Rock samples should be taken for strength testing by an approved geotechnical laboratory to derive point load and Unconfined Compressive Strength (UCS) values. The Contractor may wish to re-evaluate any alternatives to the requirement for digging on the basis of the available rock quality data (drilling and blasting may be required but it is considered unlikely).

Crushing and Screening

- 2.2.5.6 The primary component of this operation would consist of a mobile crushing and screening system. Modern mobile crushing plants are available in a number of different formats and are usually available complete with screening capability. The contractor would need to provide a plant setup that meets the project requirements in terms of the ability to process the raw material, the quantities of the material required and the quality and size gradings of the product.
- 2.2.5.7 It is also envisaged that a rubber tyred front end loader would also be required in order to serve the crushing and stockpiling operation, as well as to produce loadout facilities for the truck and shovel based roadmaking operation.

Drainage

- 2.2.5.8 A drainage and surface water management system would be provided in order to control surface water runoff. Due to the relatively small size of any proposed excavation together with the associated plant site, the system would comprise of a peripheral cut-off ditch together with minor attenuation features or soakaways.
- 2.2.5.9 Given the low to moderate permeability and generally thin veneer of the overlying peat and superficial deposits it is not anticipated that groundwater ingress would be significant. However, the flow capacity

of the bedrock would need to be determined to identify whether fracture flow is likely to be encountered and if standing water is likely to collect in the base of the excavation.

- 2.2.5.10 Water entering the borrow pits would need to be removed by either gravity drainage design or pumping depending on the overall morphology of the pit. The general topography in the areas identified is conducive to gravity drainage owing to the moderate to steep slopes. Discharge consent/relevant licence may be required from SEPA for this activity. Water removed from the excavations would be passed through an appropriate sediment settling system to remove suspended sediment prior to discharge. The constructed drainage system and water pumped from the excavations would not be discharged directly to any natural watercourse.
- 2.2.5.11 It is not anticipated that groundwater, that would require management, would be encountered by the opening of the borrow pits due to the high elevations and slope angles. However, the groundwater regime would need to be verified through further ground investigation.

Environmental Management

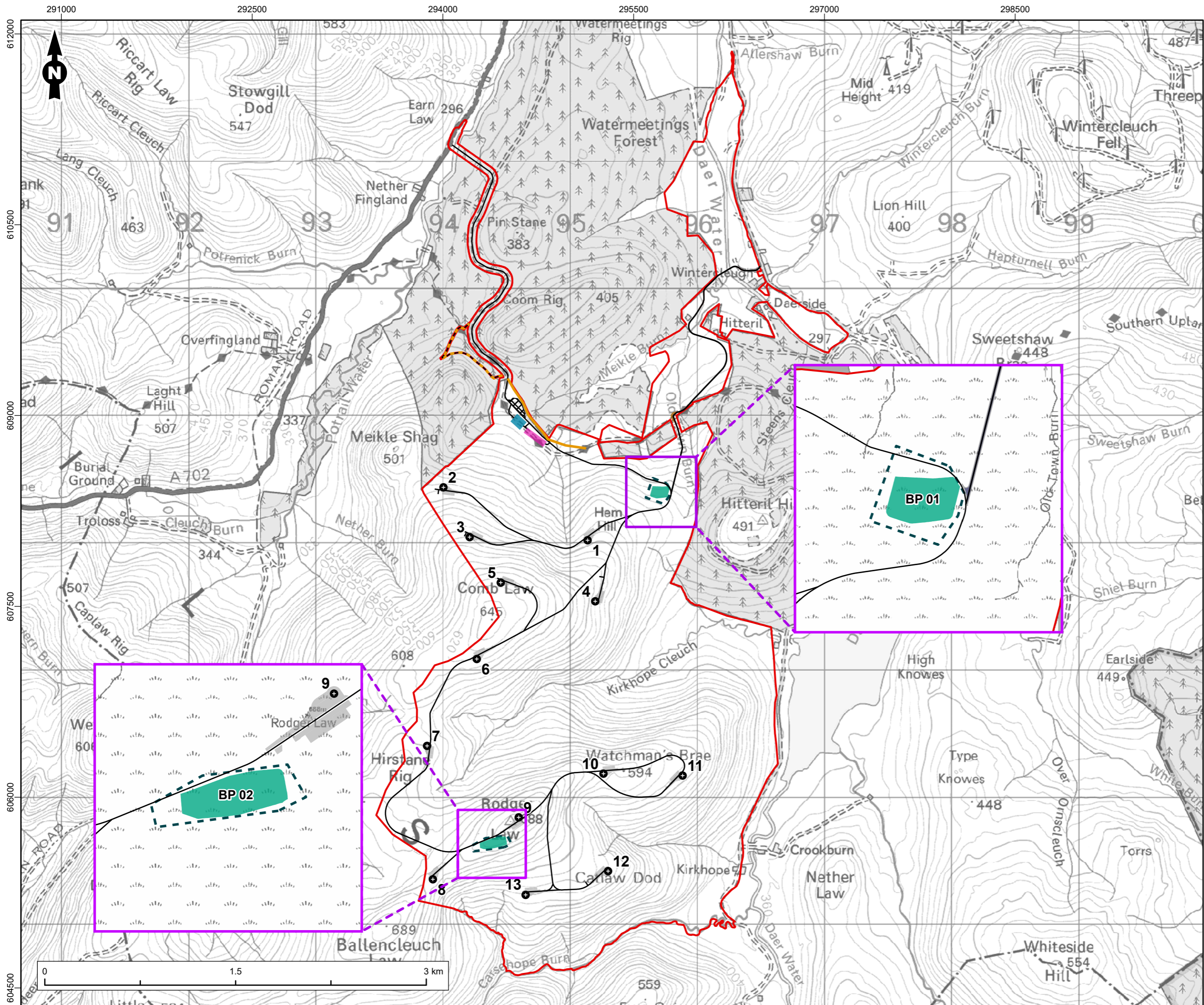
- 2.2.5.12 The Proposed Development would be designed, constructed, operated and decommissioned in line with relevant environmental legislation, guidance and good practice, to ensure that soils, and both groundwater and surface water are not contaminated.
- 2.2.5.13 During construction activities, a Construction Environmental Management Plan (CEMP) would be used to manage the potential impacts on the environment, and a specific plan covering borrow pits would be developed as part of the CEMP. An outline CEMP (OCEMP) (refer to **Technical Appendix 2.1 (EIAR Volume 4)**) would be submitted as part of the application for consent. A detailed version would be produced by the appointed construction contractor post-consent (in accordance with the outline version) and sought for approval with the relevant planning authorities prior to the commencement of construction works.
- 2.2.5.14 Assuming good practice techniques are adhered to at all times and the implementation of mitigation measures as discussed above, it is anticipated that residual impacts from borrow pit activities on surface water, groundwater and soils would not be significant.

2.2.6 Conclusions and Recommendations

- 2.2.6.1 Two viable borrow pit search areas (BP01 and BP02) have been identified through desktop data analysis and supporting field surveys within the Site Boundary. Within these areas the borrow pit excavation area is likely to be smaller than the full extent of the search area.
- 2.2.6.2 The surveys demonstrated that the areas of greatest potential in terms of bedrock excavation are located within the northern and southern areas of the Site within the Mindork and Gala Group Formations. No existing borrow pits were observed within the Site Boundary.
- 2.2.6.3 BP01 is located in the north of the Site and is likely to be predominantly coarse grained, but maybe occasionally interbedded with fine grained materials. BP02 is located in the south of the Site and is likely to contain finer grained material. The quality of finer grained materials would be verified through further ground investigation to minimise material unsuitable for construction. No detailed ground investigation has been undertaken within the Site Boundary to inform the assessment.
- 2.2.6.4 The proposed borrow pits locations are located on slopes with slope angles between 3° and 11°, which could be excavated within a single layer of excavation. The overburden depths are generally shallow, with BP01 <0.5 m and BP02 < or equal to 0.3 m. Both borrow pit locations are located in areas with limited peat cover, with the peat depth surveys identifying a maximum depth of 0.3 m of peat at both borrow pit locations.

- 2.2.6.5 The estimated amount of aggregate which could be won from the proposed borrow pits has been calculated as approximately 112,000 m³, allowing for a 20% reduction for unsuitable material or bulking of materials on excavation. This figure equates to approximately 90% of the estimated volume of aggregate required during the construction phase of the Proposed Development. To note, further site won aggregate would be available from the construction of the substation and BESS compounds which would mean that 100% of the aggregate required for construction of the Proposed Development could be won from a combination of the borrow pits and construction of on-site infrastructure. Refer to **Chapter 2: Description of Proposed Development (EIAR Volume 2)** for further details.
- 2.2.6.6 The primary use of aggregate arisings would be for the construction of tracks using unbound aggregate to the turbine suppliers' specifications and conforming to the Specification for Highways Works.
- 2.2.6.7 Detailed ground investigations, slope stability assessments and geotechnical testing would be required to inform the detailed design of the borrow pits to confirm the suitability of the material for use in construction of the Proposed Development. It is anticipated that impacts on groundwater, surface water and soils from extraction of aggregate would not be significant, assuming use of good practice construction techniques as outline in the CEMP which would include mitigation measures set out in this report.

Annex 1: Figures



Legend

- Site Boundary
- Turbine Locations
- Access Track
- Southern Upland Way Diversion (Permanent)
- Southern Upland Way Diversion (Temporary)
- Turbine Hardstanding
- Substation
- Construction Compound
- BESS
- Borrow Pit Excavation Area
- Borrow Pit Search Area

| | | |
|--------------------------------------|--------------|----------|
| Figure Title | | |
| Proposed Borrow Pit Locations | | |
| Project Name | | |
| Watchman Energy Park | | |
| Project No./Filey ID | | |
| 1620016964 / REH2024N01805 | | |
| Date | Figure No. | Revision |
| February 2026 | 2.2.1 | 1.0 |
| Prepared By | Scale | |
| RD | 1:28,000 @A3 | |
| Client | | |
| Watchman Energy Park Ltd | | |



Technical Appendix 2.3: Forestry and Woodland Assessment

Technical Appendix 2.3: Forestry and Woodland Assessment

2.3.1 Introduction

- 2.3.1.1 This Technical Appendix of the Environmental Impact Assessment (EIA) Report (EIAR) considers the potential effects of the Proposed Development on forestry activities and woodland areas within the Site.
- 2.3.1.2 It specifically focuses on the Western and Eastern Access routes into the main area of the Site, as any effects on forestry/woodland would be restricted to these areas. The majority of the Site, which includes the wind turbines and associated infrastructure, is outside of the forestry and woodland areas.
- 2.3.1.3 This Technical Appendix has been prepared by Neil McKay MICFor, Director of Neil McKay Forestry Consultant Limited, a professional member of the Institute of Chartered Foresters (ICF) since 1994 with more than 35 years' forestry practice in the public and private sectors throughout Scotland. Neil McKay has more than 10 years' experience producing forestry inputs for EIARs for renewable energy and energy transmission infrastructure developments across Scotland.
- 2.3.1.4 This Technical Appendix describes the existing forestry and woodland features that would be either directly or indirectly affected by the Proposed Development, with specific reference to woodland removal (felling) requirements. The changes to the forest structure are also described, as well as any forestry waste generated.
- 2.3.1.5 The nature of the Proposed Development and the interactions with woodland mean that likely significant effects on woodland as a material asset, or on forestry as a land use have not been identified. Nevertheless, there is requirement to demonstrate how the Proposed Development complies with policy relating to the conservation of woodland and control of woodland removal.
- 2.3.1.6 Whilst forestry is not regarded as a specific receptor for the purposes of the EIAR, the effects associated with felling have been considered in other specialist assessments where relevant. As such this Technical Appendix should be read in conjunction with the following EIAR chapters in relation to forestry:
- **Chapter 2: Description of Proposed Development (EIAR Volume 2);**
 - **Chapter 3: Design Evolution and Alternatives (EIAR Volume 2);**
 - **Chapter 4: Landscape and Visual Amenity (EIAR Volume 2);**
 - **Chapter 6: Ecology (EIAR Volume 2);**
 - **Chapter 7: Ornithology (EIAR Volume 2);**
 - **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2);** and

- **Chapter 9: Traffic and Transport (EIAR Volume 2).**

2.3.1.7 This Technical Appendix has been informed by the consultation responses summarised in **Table 2.3.1** (also detailed in **Technical Appendix 1.2, EIAR Volume 4**), information provided by the landowners' forestry agent and the guidelines/policies set out in **Section 2.3.2**.

2.3.2 Legislation, Policy and Guidance

2.3.2.1 This Technical Appendix has been informed by the following guidance/policies:

- Forestry Commission Scotland (2009) The Scottish Government's Policy on Control of Woodland Removal¹;
- Forestry Commission Scotland (2019) Scottish Government's Policy on Control of Woodland Removal: Implementation Guidance²;
- Forestry Commission (2023) The UK Forestry Standard: The Government's Approach to Sustainable Forestry³;
- Forestry and Land Management (Scotland) Act 2018⁴;
- Scottish Government (2019) Scotland's Forestry Strategy 2019-2029⁵;
- Scottish Government (2020) Scotland's Forestry Strategy Implementation Plan 2020-2022⁶;
- Scottish Government (2021) Scottish Land Use Strategy⁷;
- Scottish Government (2023) Scotland's Fourth National Planning Framework (NPF4)⁸; and
- South Lanarkshire Local Development Plan 2, Topic Paper #2 Biodiversity, Natural places, Soils, and Forestry, woodlands and trees (2025)⁹.

2.3.2.2 Recognisance has also been taken of the following best practice guidelines/guidance.

- Forestry Commission (2015) Deciding future management options for afforested deep peatland¹⁰;
- Forestry Commission (2023) The UK Forestry Standard Practice Guides¹¹;
- Scottish Environmental Protection Agency (SEPA) (2014) LUPS-GU27 Use of Trees Cleared to Facilitate Development of Afforested Land¹²;
- SEPA (2017) SEPA Guidance Notes WST-G-027 Management of Forestry Waste¹³; and

¹ Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal, Edinburgh. Available at https://www.forestry.gov.scot/sites/default/files/pub-documents/PDF_Policy_Felling_Trees_SG_Policy_on_Control_of_Woodland_Removal_022009.pdf

² Forestry Commission Scotland (2019) Scottish Government's policy on control of woodland removal: implementation guidance. Online. Available at: <https://www.forestry.gov.scot/publications/control-woodland-removal-policy>

³ Forestry Commission (2023). The UK Forestry Standard: The governments approach to sustainable forestry. Online. Available at: <https://www.gov.uk/government/publications/the-uk-forestry-standard>

⁴ Available at <https://www.legislation.gov.uk/asp/2018/8/enacted>

⁵ The Scottish Government (2019) Scotland's Forestry Strategy 2019-2029. Available at <https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/>

⁶ The Scottish Government (2020) Scotlands Forestry Strategy Implementation Plan 2020-2022. Available at: <https://www.forestry.gov.scot/publications/scotlands-forestry-strategy-implementation-plan-2020-2022>

⁷ The Scottish Government (2021) Scottish Land Use Strategy. Available at <https://www.gov.scot/publications/scotlands-third-land-use-strategy-2021-2026-getting-best-land/>

⁸ The Scottish Government (2023) Scotland's Fourth National Planning Framework (NPF4). Available at: <https://www.gov.scot/publications/national-planning-framework-4/>

⁹ South Lanarkshire Local Development Plan (2025). Topic Paper ~2 Biodiversity, Natural Places, Soils and Forestry, Woodlands and Trees. Available at

https://www.southlanarkshire.gov.uk/downloads/file/17514/topic_paper_2_biodiversity_natural_places_soils_and_forestry_woodlands_and_trees

¹⁰ Forestry Commission (2015) Deciding future management options for afforested deep peatland. Available at:

<https://www.forestryresearch.gov.uk/publications/deciding-future-management-options-for-afforested-deep-peatland/>

¹¹ Forestry Commission (2023) The UK Forestry Standard Guidelines. Available at <https://www.forestryresearch.gov.uk/?s=&type=publication&date-from=&date-to=&forestry-guidance%5B%5D=ukfs-practice-guide>

¹² SEPA (2014) LUPS-GU27 Use of Trees Cleared to Facilitate Development of Afforested Land. Available at: https://www.sepa.org.uk/media/143799/use_of_trees_cleared_to_facilitate_development_on_afforested_land_sepa_snh_fcs_guidance-april_2014.pdf

¹³ SEPA (2017) SEPA Guidance Notes WST-G-027 Management of Forestry Waste. Available at: https://www.sepa.org.uk/media/28957/forestry_waste_guidance_note.pdf

- United Kingdom Woodland Assurance Standard (UKWAS) (2017) The UK Woodland Assurance Standard, Fourth Edition, UKWAS.¹⁴ .

- The Scottish Government's Control of Woodland Removal Policy (CoWRP)¹ defines woodland removal as "the permanent removal of woodland for the conversion to another type of land use". This policy is supported by Scottish Government's policy on control of woodland removal: implementation guidance (2019)².

2.3.3 Consultation

2.3.3.1 Details of the consultation undertaken in relation to forestry and the responses from the consultees and applicant are detailed in **Table 2.3.1**.

| Table 2.3.1: Consultation | |
|---|---|
| Consultees and Scoping Response | Applicant Response |
| <p>SEPA - 17 December 2024</p> <p>If forestry is present on the site, we prefer a site layout which avoids 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.</p> <p>The submission must include a map with the boundaries of where felling will take place and a description of what is proposed for this timber in accordance with <i>Use of Trees Cleared to Facilitate Development on Afforested Land – Joint Guidance from SEPA, SNH and FCS</i>.</p> | <p>Forestry is present within the Site.</p> <p>Felling or removal of young trees would be restricted to the two access routes (Western and Eastern Access routes) into the main area of the Site where the turbines are located.</p> <p>Felling would be limited to small areas of young trees (see Table 2.3.3)</p> <p>Figures showing the location of required felling are included in this Technical Appendix.</p> <p>Details of proposed use of felled timber are included within this Technical Appendix.</p> |
| <p>Scottish Forestry - 11 December 2024</p> <p>I note that the proposals do not impact on forestry assets within and adjacent to the site and that the small blocks internal to the site boundary have been excluded from the site proposals. I also note that a desk search of the Ancient Woodland inventory has not identified any such sites.</p> <p>From the maps provided a number of watercourses are visible. It is possible that these retain remnants of old woodlands. I would recommend that where the site surveys identify such areas, they be recorded. It is possible that such areas, if they are indeed identified, could be enhanced by carefully considered tree planting to improve biodiversity and create habitat connectivity across what is an environmentally degraded landscape. I would urge the developers to consider this as part of any environmental improvement considerations.</p> <p>In response to the specific questions relevant to tree, woodland and forestry interests, I would confirm that the suite of field surveys in addition to a desk study proposed in relation to Ecology, are sufficient to inform a robust impact assessment in terms of any remnant woodland interest.</p> | <p>Note - Scoping response provided based on Scoping Layout which excluded the two access routes (Western and Eastern Access routes) to the main area of the Site where the wind turbines are located.</p> <p>Refer to Chapter 6 Ecology (EIAR Volume 2) and the Outline Biodiversity Enhancement and Management Plan (OBEMP) in Technical Appendix 6.7 (EIAR Volume 4) for details of the biodiversity enhancement proposals.</p> |

2.3.4.2 The assessment considers the potential impacts and effects of the Proposed Development on the following likely sensitive forestry receptors during the construction and operational phases:

- Coniferous plantation and broadleaved woodland;
- Ancient Woodland Inventory (AWI)¹⁵; and
- Native Woodland Survey Scotland (NWSS)¹⁶.

2.3.4.3 The likely environmental effects identified on the above receptors, are included in the following:

- Loss of woodland/feature to facilitate the construction of the Proposed Development; and
- Permanent loss of woodland associated with the completed development stage of the Proposed Development.

2.3.4.4 The assessment of the areas of required felling has considered forestry guidance¹⁷, the swept path analysis for delivery of wind turbine components and the outer extents of the access track (new and upgraded) including the required earthworks.

2.3.4.5 Where required, the assessment also considers the quantity in hectares (ha) for replanting in situ, if possible, post construction and/or for compensatory planting, preferably within the Site, for woodland loss resulting from the Proposed Development.

2.3.4.6 The assessment does not include the socio-economic effects and forest management resources due to the areas of woodland that would be lost being small in the broad forestry context such that significant effects would not be anticipated.

2.3.4.7 Professional judgement has been applied, taking a precautionary approach.

Forestry Study Area

2.3.4.8 The Forestry Study Area (**Annex A, Figure 2.3.1**) includes two distinct woodlands; Watermeetings Forest and a Native Woodland Creation Scheme near Hitteril.

2.3.4.9 Watermeetings Forest is an extensive (726.72 ha) productive conifer forest of which 17.13 ha of planted area and open ground is within the Site.

2.3.4.10 The Native Woodland Creation Scheme (near Hitteril) (34.88 ha) is a planted native woodland extending to 17.29 ha within the Site.

Desk Study

2.3.4.11 The forestry data sets and associated sources reference within this Technical Appendix include:

- Scottish Forestry Open Data¹⁸;

2.3.4 Assessment Methodology

2.3.4.1 The Technical Appendix assesses against the current forestry regulations and standards including:

- UK Forestry Standard (UKFS) The Government's Approach to Sustainable Forestry³.
- The Forestry and Land Management (Scotland) Act 2018 ('the Act')⁴. The Act provides the legal basis for the regulation of forestry in Scotland and includes the requirement to be in possession of a Felling Permission to fell trees.

¹⁴ UKWAS (2017) The UK Woodland Assurance Standard, Fourth Edition, UKWAS. Available at: https://ukwas.org.uk/wp-content/uploads/2018/05/UKWAS_Standard_FourthEdition_digital.pdf

¹⁵ Available at <https://www.data.gov.uk/dataset/c2f57ed9-5601-4864-af5f-a6e73e977f54/ancient-woodland-inventory-scotland1>

¹⁶ Available at <https://www.forestry.gov.scot/forests-environment/biodiversity/native-woodlands/native-woodland-survey-of-scotland-nwss>

¹⁷ Timber Transport Forum, the design and use of the structural pavement of unsealed roads. Available at <https://timbertransportforum.org.uk/wp-content/uploads/2024/01/The-design-and-use-of-the-structural-pavement-of-unsealed-roads-Revised-2020.pdf>

¹⁸ Available at <https://www.forestry.gov.scot/support-regulations/scottish-forestry-map-viewer>

- National Forest Inventory (NFI)¹⁹;
- Native Woodland Survey of Scotland (NWSS)¹⁶;
- Datasets for Ancient Woodland Inventory (Scotland) (AWI)¹⁵ and
- Forest sub compartment database (SCDB) for Watermeetings Forest provided by the forest manager showing the species, planting years, yield class and estimated felling years.

Site Visit

- 2.3.4.12 A forest walkover survey was carried out on 22 September 2025 to record the current woodland condition and how this related to the woodland designations within the Site.
- 2.3.4.13 The walkover included noting the tree species and woodland type against the forest compartment information, NFI conifer and broadleaved woodlands, and NWSS wet woodlands.
- 2.3.4.14 The walkover also noted the age and height of the commercial crops and native woodland creation areas for the purpose of assessing windblow. There is no risk of windblow for an estimated further 20 years of growth.
- 2.3.4.15 A note of the existing forest track corridors was taken with a view to minimising any felling requirements.

Limitations to Assessment

- 2.3.4.16 Some minor spatial differences have been noted between the digital data from NFI, the Ordnance Survey basemap (2024) and the web based aerial imagery.
- 2.3.4.17 The information provided by the forest manager is detailed for the Watermeetings Forest and is in preference to other Open Data for this forest.
- 2.3.4.18 For other woodlands Open Data NFI and NWSS and Scottish Forestry Open Data on woodland creation is used.

2.3.5 Baseline Conditions

- 2.3.5.1 There are no woodlands listed in the AWI¹⁵ within the Forestry Study Area.

Watermeetings Forest

- 2.3.5.2 The Watermeetings SCDB covers an area of 726.72 ha, with 17.13 ha of planted area and open ground within the Site. The extent of the forest is shown on **Figure 2.3.1 (Annex A)** and includes a western and eastern block of woodland.
- 2.3.5.3 The productive conifer forest described within the Watermeetings SCDB, was initially planted in the 1960s. Restructuring, felling and replanting, started in 1994 and continues to the present day with a further coupe to be felled in 2025. The SCDB includes long term retentions which extend into the third rotation and natural reserves where there is no intention to fell or clear woodland.
- 2.3.5.4 The main productive conifer species is Sitka spruce (*Picea sitchensis*) with Scots pine (*Pinus sylvestris*), Norway spruce (*Picea abies*), lodgepole pine (*Pinus contorta*) and larch species (*Larix spp.*). A variety of broadleaf species have been introduced in these areas and include birch (*Betula spp.*), alder (*Alnus spp.*), willow (*Salix spp.*) and rowan (*Sorbus aucuparia*).

- 2.3.5.5 The forest includes areas listed in NWSS16 as wet woodland, mainly associated with Potrail Water and Benuff Burn in the western block, with upland birchwood tending to be concentrated in the eastern block.

Native Woodland Creation Scheme near Hitteril

- 2.3.5.6 Native woodlands near Hitteril were planted under the Scottish Forestry Grant Scheme (SFGS) Nunnerie Farm (reference 3200546) as part of a 34.88 ha native woodland creation scheme which extends beyond the Site. 17.29 ha of this woodland creation scheme is located in the Site.
- 2.3.5.7 The woodlands contain established native broadleaved trees, mainly birch, which are currently approximately 2 to 3 m in height with approximately 3 m spacing between trees. The area is listed in NWSS16 as wet woodland. This woodland is under separate ownership and management from the Watermeetings Forest.

Summary

- 2.3.5.8 The Forestry Study Area is show on **Figure 2.3.1** and summarised in **Table 2.3.2**.

| Table 2.3.2 | | |
|---|--|------------------|
| Forest/Woodland | Species | Area (ha) |
| Watermeetings productive conifer forest | Mixed broadleaved | 3.93 |
| | Sitka spruce (<i>Picea sitchensis</i>) | 9.40 |
| | Norway spruce (<i>Picea abies</i>) | 0.68 |
| | Forest open ground | 3.12 |
| <i>Total</i> | | 17.13 |
| Native Woodland Creation Scheme near Hitteril | Native broadleaved | 17.29 |
| <i>Total</i> | | 17.29 |
| Overall Total | | 34.42 |

Future Baseline

- 2.3.5.9 The future baseline would be as the Watermeetings SCDB, when revised, and this is currently based on felling and replanting on a generalised 30-to-40-year rotation. A future Long Term Forestry Plan (LTFP) would define future felling phases as a continuation of the restructuring process of a sustainable productive conifer forest.
- 2.3.5.10 Native woodland creation near Hitteril would continue to be maintained as a native woodland with no proposals to fell and little expected intervention.

2.3.6 Standard/Best Practice Mitigation

- 2.3.6.1 Standard/best practice mitigation includes:
 - All forestry works, felling and replanting, to be carried out in accordance with the relative UKFS supporting guidelines (mitigation ref: FO01); and
 - Inclusion and implementation of the forestry operations as detailed in the Construction Environmental Management Plan (CEMP) (mitigation ref: FO02) - outline CEMP provided in **Technical Appendix 2.1 (EIAR Volume 4)**.

¹⁹ Available at <https://www.forestry.gov.scot/support-regulations/land-information-search>

2.3.7 Potential Impacts

2.3.7.1 Felling or impacts on forestry activities would be restricted to the two access routes (Western and Eastern) into the main area of the Site. Most of the Site, which includes the wind turbines and associated infrastructure, is outside of the forestry and woodland areas.

2.3.7.2 The Western Access route mainly follows existing forestry tracks (to be upgraded). However, a section of new access track is required from the A702 to the point at which this would join the existing forest track (to be upgraded) through Watermeetings Forest.

2.3.7.3 The Eastern Access route mainly consists of a new access track with some shorter sections which follow existing forest tracks (to be upgraded).

Construction Phase

2.3.7.4 Felling that would result from the two access routes is shown on:

- **Annex A, Figure 2.3.2a and 2.3.2b: Forestry Felling - Western Access;** and
- **Annex A, Figure 2.3.2c: Forestry Felling - Eastern Access.**

Western Access Track

2.3.7.5 Felling would be required for the new section of access track which is approximately 400 m in length from the A702 to the point at which the new access track would join the existing forestry access track (**Figure 2.3.2a** and **Annex B, Plate 1. Photographic Records**).

2.3.7.6 Felling would also be required on a 100 m section of the upgraded access track to allow for oversail of the track during the delivery of the wind turbines to Site (**Figure 2.3.2b**).

2.3.7.7 From a forestry perspective, the upgrading of existing forest tracks (**Annex B, Plate 2. Photographic Records**) within Watermeetings Forest would require pruning of side branches (**Annex B, Plate 3. Photographic Records**) and removal of natural regeneration encroaching the track sides.

Eastern Access Track

2.3.7.8 Removal of an area of the woodland as part of the native woodland creation scheme would be required for the creation of a new section of the Eastern Access track, approximately 280 m in length (**Annex B, Plate 4. Photographic Records**).

2.3.7.9 Removal of a small area of the woodland as part of the native woodland creation scheme would be required for the upgrade of an existing track on the Eastern Access which is approximately 85 m in length.

Summary of Potential Impacts

2.3.7.10 The total areas to be felled are shown in **Table 2.3.3**

| Table 2.3.3 Felling Required for the Proposed Development | | | |
|--|-----------------------------------|----------------------|-------------------------|
| Felling Area | Species | Planting Year | Felled Area (ha) |
| Watermeetings Forest – New Access Track | Open Ground | NA | 0.03 |
| | Norway spruce | 2018 | 0.24 |
| | Sitka spruce | 2018 | 0.24 |
| | Mixed broadleaved and open ground | 2018 | 0.39 |
| Watermeetings Forest – Track upgrade - Oversail | Mixed broadleaved and open ground | 1999 | 0.07 |

| Table 2.3.3 Felling Required for the Proposed Development | | | |
|---|----------------|----------------------|-------------------------|
| Felling Area | Species | Planting Year | Felled Area (ha) |
| Watermeetings Forest Felling - Sub total | | | 0.97 |
| Watermeetings Forest Felling (% of total area) | | | 0.13% |
| Native Woodland Creation (near Hitteril) – Eastern Access Route | Mainly birch | 2007 | 0.62 |
| Native Woodland Creation (near Hitteril) Felling - Sub Total | | | 0.62 |
| Native Woodland Creation (near Hitteril) Felling (% of Total Area) | | | 1.80% |
| Total Felling Required | | | 1.59 ha |

2.3.7.11 The Watermeetings Forest Open Ground (0.03 ha) listed in **Table 2.3.3** is mapped forest ride. In this situation this includes trees and is considered a loss to the forest environment and is included in the calculation of woodland loss. The mapping for the native woodland creation scheme does not identify open ground and all is treated as woodland.

2.3.7.12 The woodland lost to the Proposed Development equates to 0.13% of the Watermeetings Forest area and 1.80% of the Native Woodland Creation (near Hitteril). These areas are not considered to be significant to the overall structure of these woodlands.

2.3.7.13 No felling of mature tree crops is required within either Watermeetings or the woodland creation scheme, therefore no management felling is required to mitigate the potential windblow which may have resulted from felling into a mature tree crop.

2.3.7.14 CoWRP implementation guidance² states that "the removal of large areas of woodland will not be supported and all felling proposals must be compliant with the UKFS". UKFS guidance is such that felling is appropriate to the forest design and the forest landscape. As such, the small-scale area of felling required for the Proposed Development does not contradict any UKFS guidance.

2.3.7.15 NWSS form part of the woodlands to be felled as a result of the Proposed Development.

2.3.7.16 The Western Access includes 0.36 ha of forest classed as wet woodland (**Annex A, Figure 2.3.2a and b**). The Eastern Route (**Annex A, Figure 2.3.2c**) requires 0.36 ha of woodland classed as wet woodland to be felled. Out of the total 1.59 ha woodland felling, 0.72 ha are planted areas classed as NWSS wet woodland.

2.3.7.17 The tree sizes for the Watermeetings conifers (**Annex B: Plate 1**) planted in 2018 will not reach a marketable size till approximately 2038 onwards while the trees planted in 1999 are few in number and will not form a marketable parcel. The native broadleaved trees planted in 2007 near Hitteril (**Annex B: Plate 4**) will not provide limited marketable produce until the 2050s. As such materials as a result of felling these sites would be chipped or otherwise disposed of on-site.

2.3.7.18 The volume of chips would be minimal and not considered as forestry waste under the SEPA Guidance Notes WST-G-027 Management of Forestry Waste¹³. Should any off-site uses develop prior to construction the opportunities would be pursued. If off-site use of the material is an option available at the time of construction a Forestry Waste Plan would be prepared for this material.

Operational Phase

2.3.7.19 No further felling would be required during the Operational Phase.

Decommissioning Phase

2.3.7.20 No further felling would be required during the Decommissioning Phase.

2.3.8 Specific Mitigation

- 2.3.8.1 The area of woodland lost (1.59 ha, including 0.03 ha open ground) would be the subject of compensatory planting (mitigation ref: FO03), preferably within the Site, in compliance with CoWPR¹ and the associated implementation guidance to CoWRP². With the minimal tree removal for the construction of new access tracks replanting in situ is unlikely.
- 2.3.8.2 The compensatory planting would be at least the same area of the woodland lost (1.59 ha) and would deliver the equivalent woodland-related net public benefits of the woodland removed. The newly planted woodland would meet the requirements of UKFS³. Compensatory planting is likely to complement the areas of native broadleaved woodland planting proposed through the OBEMP (refer to **Appendix 6.7 (EIAR Volume 4)**).
- 2.3.8.3 The compensatory planting arrangements and a detailed Planting Plan would be agreed with Scottish Forestry prior to the commencement of the construction stage.
- 2.3.8.4 Should any off-site uses for the chippings as a result of felling be develop prior to construction, the opportunities would be pursued. If off-site use of the material is a viable would be prepared for this material. Any material removed from Site would be undertaken by a competent forestry contractor who would follow best practice guidance at the time.

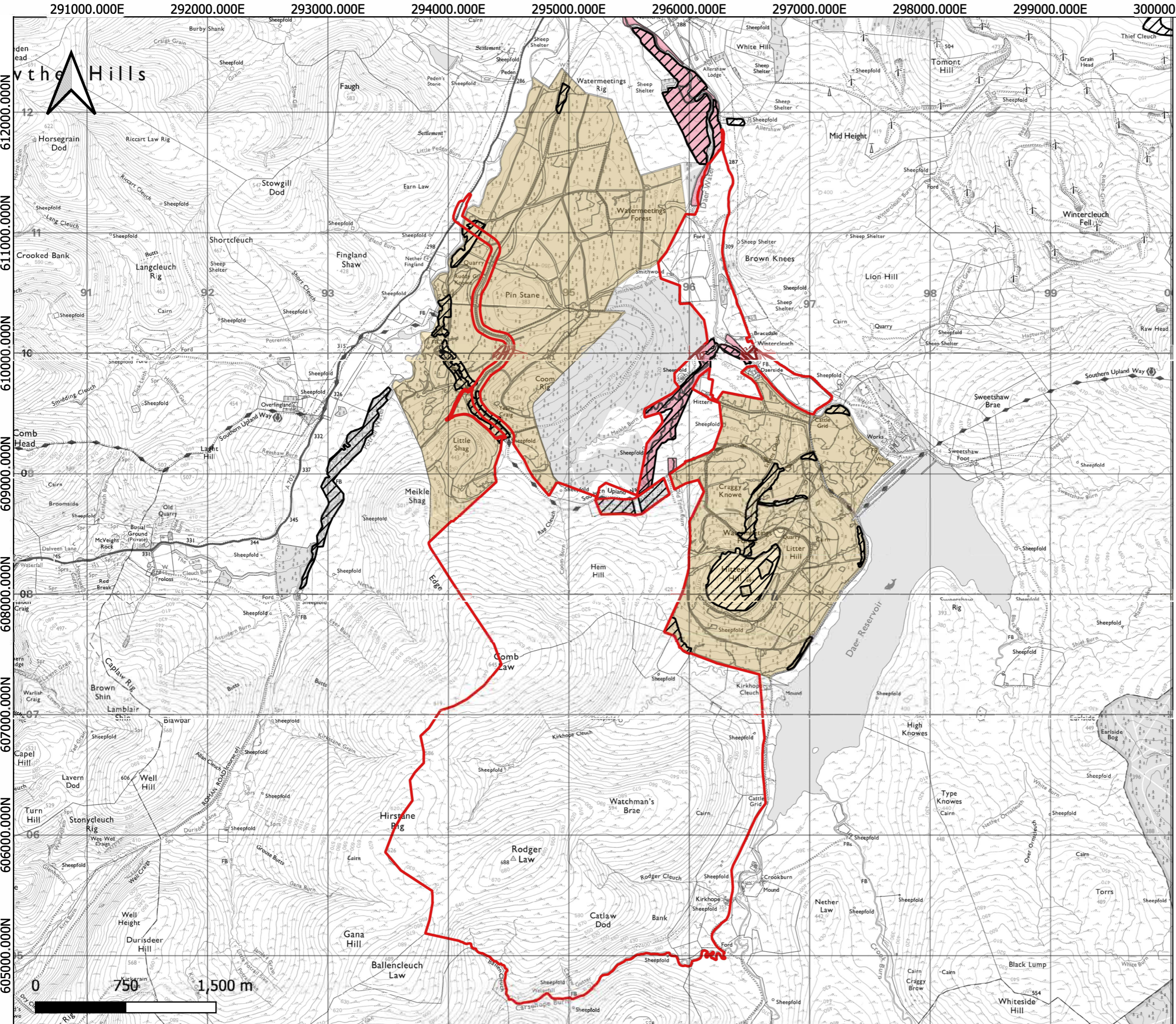
2.3.9 Residual Effects

- 2.3.9.1 The small loss of woodland, with compensatory planting provided, results in a conclusion that there would be no significant impacts on forestry from the Proposed Development.

2.3.10 Summary

- 2.3.10.1 The areas of forest and woodland within the Site that would be affected by the Proposed Development consist of two separate ownerships and management arrangements: Watermeetings Forest and Nunnerie Farm Native Woodland Creation Scheme near Hitteril.
- 2.3.10.2 Permanent felling of 1.59 ha would be required for the construction and operation of the Proposed Development; 0.97 ha of felling (including 0.03 ha open ground) would be required in relation to the construction of the Western Access within the Watermeetings Forest and 0.62 ha of felling would be required in relation to the Eastern Access within the woodland creation at Hitteril.
- 2.3.10.3 The Applicant is committed to providing at least 1.59 ha of appropriate compensatory planting. This is likely to be provided within the Site and complement the native broadleaved woodland planting proposed within the OBEMP (refer to **Appendix 6.7, EIAR Volume 4**). The compensatory planting would meet the requirements of UKFS guidance, and a detailed Planting Plan would be provided for approval by Scottish Forestry.
- 2.3.10.4 This mitigation, and the relatively small area of felling required, means there are no residual significant effects anticipated in relation to forestry.

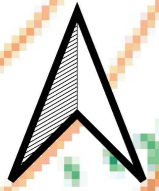
ANNEX A: FIGURES



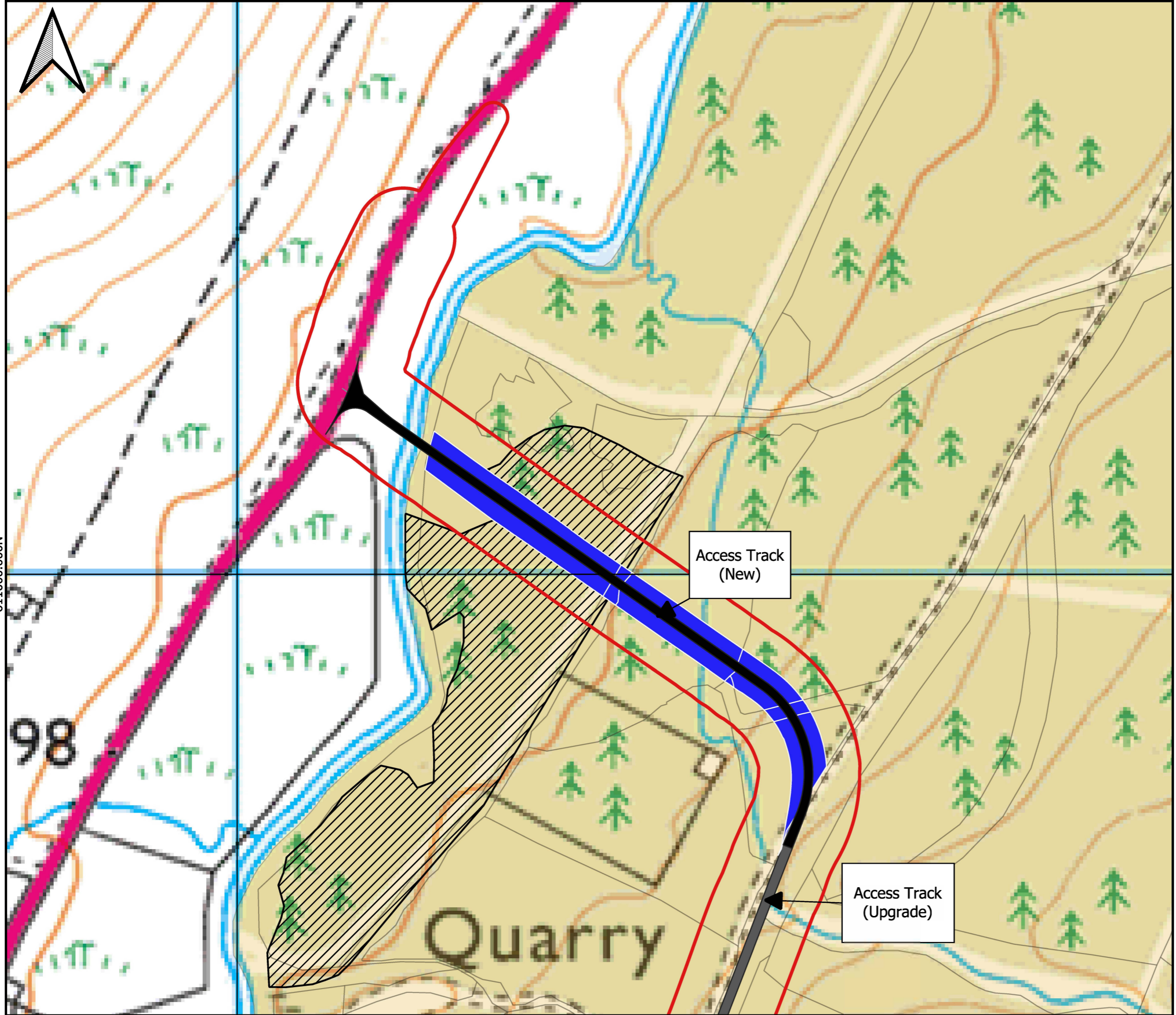
- ### Legend
- Site Boundary
 - Watermeetings Forest
 - Scottish Forestry Grant Scheme Native Woodland Creation
 - Native Woodland Survey of Scotland

| | | |
|---------------------------------|-------------|----------|
| Figure Title | | |
| Forestry Study Area | | |
| Project Name | | |
| Watchman Energy Park | | |
| Project No | | |
| 1620016964 | | |
| Date | Figure No | Revision |
| December 2025 | 2.3.1 | 1.0 |
| Prepared by | Scale | |
| NMcK | 1:30,000@A3 | |
| Client | | |
| Watchman Energy Park Ltd | | |
| | | |

294000.000E



611000.000N



Legend

- Site Boundary
- Watermeetings Forest
- Native Woodland Survey of Scotland
- Felling Area

Figure Title
Forestry Felling - Western Access

Project Name
Watchman Energy Park

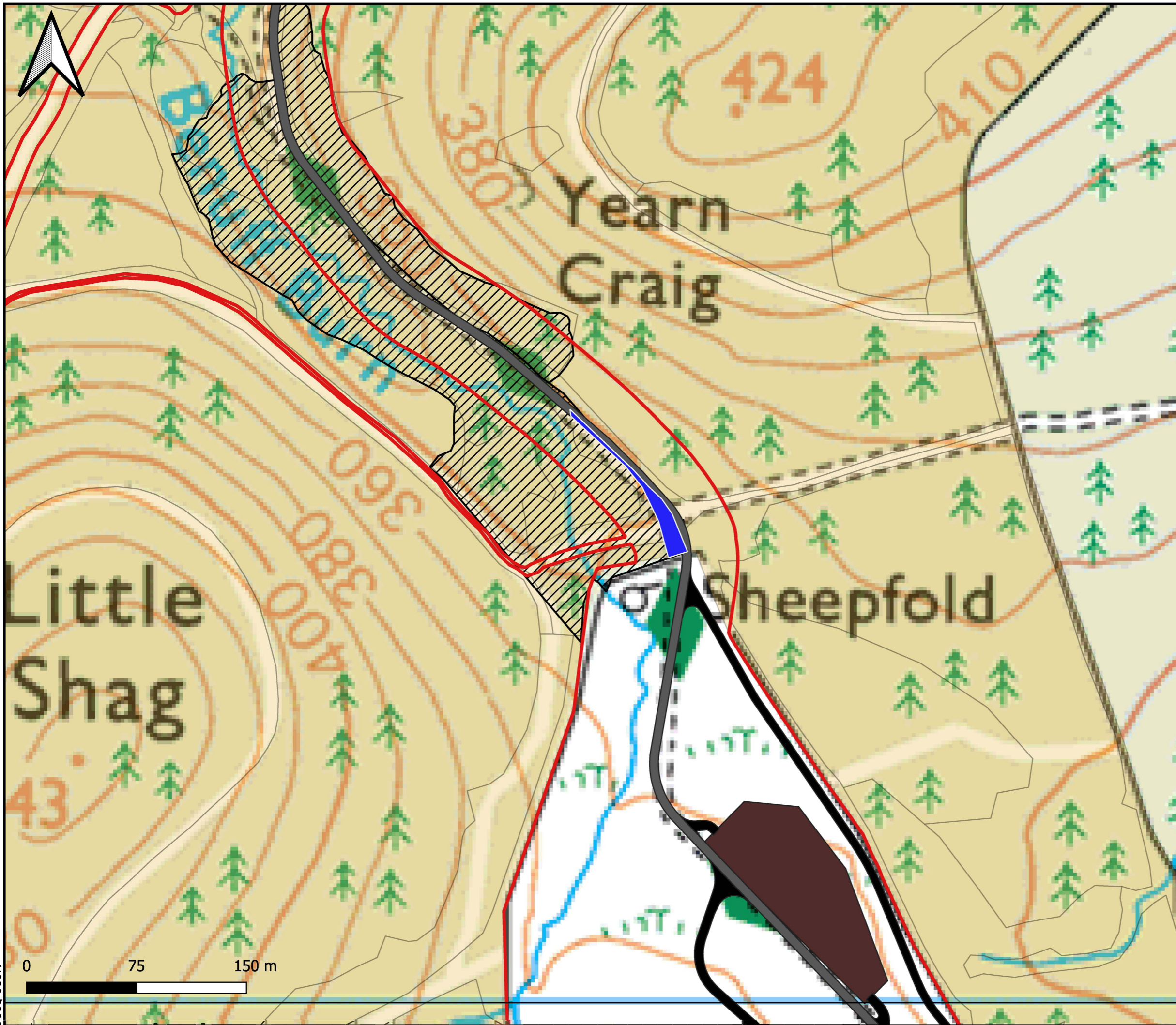
Project No
 1620016964

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| Date | Figure No | Revision |
| January 2026 | 2.3.2a | 1.1 |

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| NMcK | 1:2,500@A3 |

Client
Watchman Energy Park Ltd





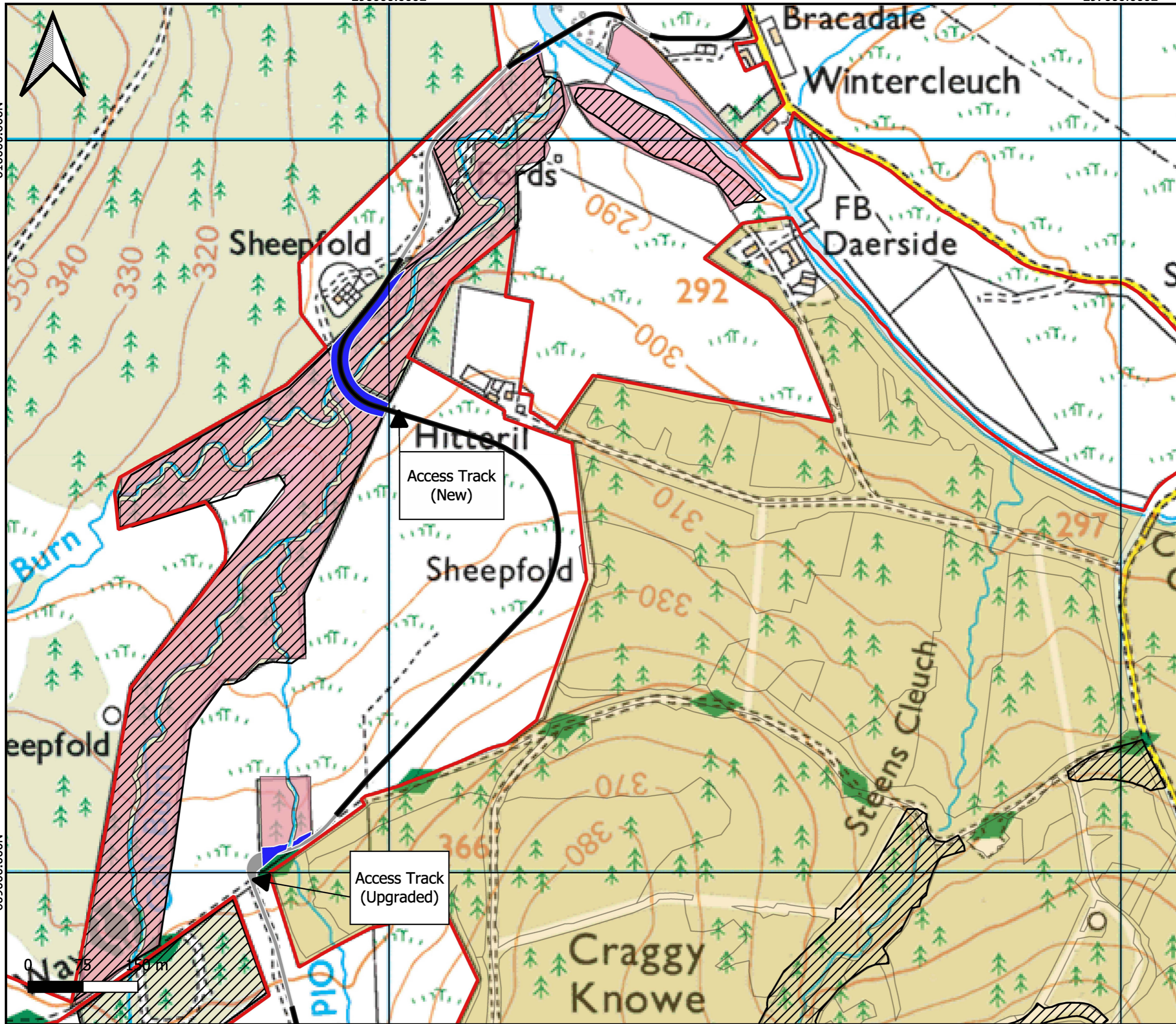
Legend

- Site Boundary
- Watermeetings Forest
- Native Woodland Survey of Scotland
- Felling Area
- Access Track (New)
- Access Track (upgraded)
- Construction Compound

| | | |
|-----------------------------------|--------------------------|-------------------------|
| <small>Figure Title</small> | | |
| Forestry Felling - Western Access | | |
| <small>Project Name</small> | | |
| Watchman Energy Park | | |
| <small>Project No</small> | | |
| 1620016964 | | |
| <small>Date</small> | <small>Figure No</small> | <small>Revision</small> |
| January 2026 | 2.3.2b | 1.1 |
| <small>Prepared by</small> | <small>Scale</small> | |
| NMcK | 1:2,500@A3 | |
| <small>Client</small> | | |
| Watchman Energy Park Ltd | | |



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Legend

- Site Boundary
- Watermeetings Forest
- Native Woodland Survey of Scotland
- Scottish Forestry Grant Scheme Native Woodland Creation
- Felling Area

Figure Title
Forestry Felling - Eastern Access

Project Name
Watchman Energy Park

Project No
 1620016964

| | | |
|--------------|-----------|----------|
| Date | Figure No | Revision |
| January 2026 | 2.3.2C | 1.1 |

| | |
|-------------|------------|
| Prepared by | Scale |
| NMcK | 1:2,500@A3 |

Client
Watchman Energy Park Ltd



ANNEX B: PHOTOGRAPHIC RECORDS



Plate 1. Watermeetings Forest, Proposed new access from A702.



Plate 3. Watermeetings Forest, existing forest track requiring pruning back.



Plate 2. Watermeetings Forest, broad open ground of existing forest tracks.



Plate 4. Woodland Creation near Hitteril.

Technical Appendix 2.4: Carbon Balance Assessment

Technical Appendix 2.4: Carbon Balance Assessment

2.4.1 Introduction

- 2.4.1.1 This Carbon Balance assessment has been prepared to assess carbon emissions associated with the Proposed Development. This Technical Appendix should be read in conjunction with **Chapter 2: Description of Proposed Development (EIAR Volume 2)** and **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.
- 2.4.1.2 It is widely recognised that wind farms and other renewable energy developments can significantly reduce carbon emissions over their operational lifetime, when compared to the emissions that would be associated with either the equivalent energy generation from conventional fossil fuel-based power generation or from a 'grid-mix' of power production.
- 2.4.1.3 It is also recognised that the construction of the infrastructure and subsequent operation and decommissioning of the Proposed Development would include activities that either directly or indirectly result in carbon dioxide (CO₂) emissions. Emissions of CO₂ associated with the construction of the Proposed Development requiring consideration includes the potential loss of CO₂ from carbon stored within the peat deposits within the Site.
- 2.4.1.4 This Carbon Balance Assessment provides an evaluation of the net measure of carbon emissions associated with the Proposed Development, whether produced or otherwise reduced. The assessment has been conducted using an offline version of the Scottish Government's windfarm carbon calculator¹, which is derived from the government's online tool. At the time of this assessment (January 2026), the online version is undergoing redevelopment. The tool quantifies CO₂ emissions associated with the Proposed Development lifecycle and benchmarks them against the emissions that would be produced by alternative electricity generation sources.
- 2.4.1.5 This Technical Appendix is supported by the following:
- **Annex 1: Carbon Calculator Results and Charts.**
- 2.4.1.6 The carbon calculator tool uses the methodology and approach developed by Nayak *et al.*².

2.4.2 Input Parameters

- 2.4.2.1 Information to inform the carbon calculator has been derived from either specific design parameters for the Proposed Development itself or has been based on industry standard information, as outlined in the Scottish Government's Carbon Calculator Technical Guidance³.

Characteristics of the Proposed Development

- 2.4.2.2 The Proposed Development would comprise an onshore wind farm with up to 13 turbines and a total estimated installed capacity of 91 MW. The net capacity factor for the Proposed Development is estimated to be approximately 51.86%, which has been estimated based on wind data analysis.
- 2.4.2.3 The Proposed Development would have an operational life of 40 years from the date of final commissioning (the operational phase).
- 2.4.2.4 The CO₂ emissions generated during the life of the Proposed Development, including those created during manufacture and removal, are calculated using default values within the carbon calculator.

- 2.4.2.5 The Proposed Development also includes a Battery Energy Storage System (BESS) with an approximate capacity of 50 MW which is not included in the calculations.

Peatland and Environmental Characteristics of the Site

- 2.4.2.6 The Site covers an area of approximately 1,089 hectares (ha) and is located approximately 10 km south of Crawford, 7 km south of Elvanfoot and 12 km to the west of Moffat (**Figure 1.1 and 1.2, EIAR Volume 3a**). It is situated between the valley of the Daer Water to the north, Daer Reservoir and commercial forestry to the east, open moorland of the Southern Uplands to the south, and further open moorland and commercial forestry with the A702 road beyond to the west. The Site is within the administrative boundary of South Lanarkshire Council (SLC).
- 2.4.2.7 The main development area of the Site where the turbines are to be located predominantly comprises upland moorland. The undulating landscape is typical of the wider location and includes a series of rounded hills characteristic of the Southern Uplands including Comb Hill, Watchman's Brae, and Rodger Law.
- 2.4.2.8 A number of watercourses run through the Site (**Figure 8.1, EIAR Volume 3a**). The south of the Site is within the catchment of Daer Water, upstream of Daer Reservoir which is located a short distance east of the Site. The central area of the Site drains to Kirkhope Cleuch which in turn flows to Daer Reservoir with the west of the central catchment draining directly to Daer Reservoir. The north of the Site (approximately 15% of the total Site area) drains via Meikle and Calf Burn to Daer Water downstream of the reservoir. A very small area (<5% of the total Site area) drains in a north westerly direction to Potrail Water.
- 2.4.2.9 According to the British Geological Survey's (BGS) 1:50,000 geological mapping⁴, approximately 5% of the Site is underlain by superficial deposits of diamicton and alluvial deposits near watercourses. Small areas are shown to be underlain by superficial deposits of peat (>5% of the Site area). Superficial geology is not recorded by the BGS on remaining areas of the Site indicating the absence of superficial deposits in these areas, where shallow soils may directly overlay the bedrock geology (**Figure 8.3, EIAR Volume 3a**). The majority of the Site is underlain by bedrock geology of the Mindork Formation (Metasandstone and Metamudstone), with a small area of Ballencleuch Law Granite (Granite) in the southwest of the Site and Gala Unit 4 (Wacke) in the southeast (**Figure 8.4, EIAR Volume 3a**).
- 2.4.2.10 A combined total of 2,706 peat depth probes were taken during the peat surveys (883 peat depth probes during the Stage 1 survey and 1,823 peat probes during the Stage 2 surveys) (**Figure 8.10, EIAR Volume 3a**). Findings of the peat survey and the assessment of potential impacts on underlying peat resources are provided in **Technical Appendix 8.4 (EIAR Volume 4)**.
- 2.4.2.11 The findings of the peat depth survey found that the majority of the Site is either absent of peat or, where peat is present, it is relatively shallow. Approximately 85% of samples were located on land with peat depth less than or equal to 0.5 m. Further, approximately 95% of the peat depth probes recorded peat depths less than or equal to 1 m depth. Approximately 5% of the Site includes peat deeper than 1 m which is dispersed in pockets throughout the Site. The mean peat depth recorded across the Site was 0.27 m, with the deepest areas recorded up to 3 m in the southwest of the Site (refer to **Figure 8.10, EIAR Volume 3a**).

¹ Scottish Government, 2022, Carbon Calculator Tool for Onshore Wind Farms. Available at: [Carbon calculator for wind farms on Scottish peatlands: factsheet - gov.scot](https://www.gov.scot/resources/consultations-petitions-and-statements/factsheets/factsheet-carbon-calculator-for-onshore-wind-farms/)

² Nayak D.R., Miller D., Nolan A., Smith P., Smith J.U. (2011). Calculating Carbon Savings from Windfarms on Scottish Peat Lands: A New Approach

³ Scottish Government, 2018, Carbon Calculator: Technical Guidance. Available at [Carbon calculator: technical guidance - gov.scot](https://www.gov.scot/resources/consultations-petitions-and-statements/factsheets/factsheet-carbon-calculator-technical-guidance/)

⁴ Available at: <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

- 2.4.2.12 Infrastructure of the Proposed Development has been located away from these deeper peat deposits where practicable, taking into account other environmental and technical constraints, or microsituated to reduce potential adverse effects. The peat mitigation hierarchy, as detailed in **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**, has been used, whereby consideration has been given to avoiding development on peatland in the first instance. Where this was not possible, as a result of other environmental and technical constraints, commitment is made to implement measures to reduce the likely significant effects on peat, including restoration.
- 2.4.2.13 For the calculation of carbon balance, only peat depths from areas designated for the Proposed Development's permanent infrastructure were included. Minimum and maximum expected peat depths were calculated as one standard deviation below and above the mean peat depth. It should be noted that the assessment of peat/soil depth assumes peat exists to the full depth of the probed depth value, with potential for an over estimation dependant on the underlying organic material/clay present.
- 2.4.2.14 Peatland Condition Assessment (PCA) (**Technical Appendix 6.2b, EIAR Volume 4**) surveys undertaken for the Proposed Development have shown the peatland within the Study Area to comprise a patchwork of modified and degraded bog along with areas of actively eroding peatland (**Figure 6.5, EIAR Volume 3**). The PCA data identifies potential for peatland restoration opportunities within the Site. These findings have informed proposals included in the Outline Biodiversity Enhancement and Management Plan (OBEMP) (**Technical Appendix 6.7, EIAR Volume 4**).
- 2.4.2.15 The mean annual temperature was derived based on the mean annual air temperature for Abington over a five-year period between 2020 – 2024⁵. The mean annual air temperature for Abington was found to be 6.9°C, with minimum and maximum values of -4°C and 18°C respectively. However, 0°C and 15°C have been used as the minimum and maximum values in the carbon calculator as these are the maximum and minimum values allowed.
- 2.4.2.16 An average and maximum carbon content of dry peat (% by weight) value of 65% has been used as this is the default value in the carbon calculator. A minimum value of 19% has also been used as per tool limitations.
- 2.4.2.17 Generic hydrological parameters³ have been used for average groundwater table depth for the Site. A value of 0.3 m has been used as the expected value. A 'maximum' value of 0.5 m has been used to represent areas of intact peat (the higher the water table the longer the payback period), and a 'minimum' value of 0.1 m has been used to represent areas of eroded peat.
- 2.4.2.18 The extent of drawdown on drainage features due to excavations onsite is variable and can extend between 2 m and 50 m horizontally around the feature. Site-specific values are not available, so the standard values from 'Windfarm Carbon Calculator Web Tool, User Guidance'³ have been used. Therefore, the expected value is 10 m, minimum is 5 m and maximum 50 m.
- 2.4.2.19 The peat is expected to have a low dry bulk density because it is fibrous and intermediate rather than amorphous (see **Technical Appendix 8.4, EIAR Volume 4**). Therefore, in the absence of Site specific dry bulk density values, an average dry soil bulk density (g/cm³) of 0.2 g/cm³ was included in the calculator, with minimum and maximum values of 0.1 g/cm³ and 0.3 g/cm³ respectively.
- 2.4.2.20 For vegetation restoration, it has been assumed that five years is a reasonable time period for regeneration of most bog plants based on the Site elevation, location and current conditions, with minimum and maximum values of 2 and 10 years. The carbon accumulation rate for peatland has been derived based on the carbon calculator guidance³, 0.25 tC ha⁻¹ yr⁻¹, with the accumulation rates of 0.12 tC ha⁻¹ yr⁻¹ and 0.31 tC ha⁻¹ yr⁻¹ adopted as the minimum and maximum values respectively.

Counterfactual Emission Factors

- 2.4.2.21 The most recent counterfactual emission factors for three methods of energy generation have been used in the carbon calculator. These are 0.207 tCO₂ MWh⁻¹ CO₂ emissions for grid mix, 0.945 tCO₂ MWh⁻¹ for coal, and 0.424 tCO₂ MWh⁻¹ for fossil fuel mix⁶.

Proposed Development

- 2.4.2.22 In line with standard carbon calculator practice³, the BESS has not been included as part of the calculation. The Scottish Government's carbon calculator scope captures onshore wind infrastructure and peat/land disturbance only and includes no energy storage module.
- 2.4.2.23 The net capacity factor of the wind turbine generators is estimated to be approximately 51.86%, which has been estimated based on wind data analysis.
- 2.4.2.24 For the purposes of this assessment, the turbine foundations were assumed to remain unchanged regardless of their location within the Site. The calculation was based on a central excavation of approximately 25 m diameter and an approximate depth of 3.5 m subject to prevailing ground conditions. Based on the peat probing survey results, the mean peat depth at the turbine footprint is estimated to be 0.11 m. The minimum and maximum expected peat depths are 0.05 m and 0.16 m respectively.
- 2.4.2.25 The proposed turbine permanent area of the hardstandings and laydowns total 26,208 m², with the same excavation footprint. Based on the peat probing survey results, the mean peat depth at the turbine hardstandings is calculated as 0.14 m. For the purposes of the carbon calculator, minimum and maximum depths recorded around hardstandings of 0.00 m and 0.36 m respectively are used.
- 2.4.2.26 A total of 17.37 km of access tracks would be required as part of the Proposed Development, 13.97 km of which would be new excavated access tracks (of a total footprint of 104,471 m²). The proposed width of the excavated access track is 6 m with 0.5 m wide shoulders on each side. The minimum and maximum expected peat depths along the access tracks are 0.03 m and 0.37 m respectively with the mean of 0.20 m used.
- 2.4.2.27 Approximately 0.67 km of floating track is also proposed as part of the Proposed Development, traversing an area underlain by deeper peat. The minimum and maximum expected peat depths are 0.00 and 1.67 m respectively, with a mean of 0.64 m.
- 2.4.2.28 A total of approximately 1.59 ha of forestry is to be felled as a result of the Proposed Development. The Applicant is committed to providing at least 1.59 ha of compensatory planting and has identified areas within the Site (see **Technical Appendix 2.3, EIAR Volume 4**), which will complement the native broadleaved woodland planting proposed within the Outline Biodiversity Enhancement Management Plan (OBEMP) (see **Technical Appendix 6.7, EIAR Volume 4**).
- 2.4.2.29 A Substation Compound (of a total footprint of approximately 8,000 m²) has been considered in the carbon balance assessment. The mean, minimum, and maximum peat depths at this location are 0.35 m, 0.29 m and 0.64 m respectively.
- 2.4.2.30 The BESS Compound (of a total footprint of approximately 9,500 m²) has been included in the carbon balance assessment. The mean, minimum, and maximum peat depths at this location are 0.42 m, 0.21 m, and 0.63 m respectively.
- 2.4.2.31 The potential peat excavation volume associated with the two borrow pit locations has also been considered (approximately 26,960 m² footprint). The mean peat depth across both borrow pits is 0.05 m. The minimum, and maximum expected peat depths are 0.00 m, and 0.12 m respectively.

⁵ [Abington Weather Averages - South Lanarkshire, GB](#)

⁶ [Digest of UK Energy Statistics \(DUKES\) 2025 - GOV.UK](#)

- 2.4.2.32 Temporary infrastructure such as construction compounds, and cable trenches are not expected to result in a permanent displacement of peat.
- 2.4.2.33 Peat excavation volumes have been estimated based on the interpolated peat depth survey information and outlined in the Outline Peat Management Plan (**Technical Appendix 8.5, EIAR Volume 4**).
- 2.4.2.34 The Peat Landslide Hazard Risk Assessment (PLHRA) is detailed in **Technical Appendix 8.6 (EIAR Volume 4)**. It is assumed that measures have been taken to limit damage so carbon losses due to peat landslide fixed as 'negligible' in the online carbon calculator.

Opportunities for Carbon Sequestration

- 2.4.2.35 Any local improvements to carbon sequestration, such as areas of peatland habitat restoration, would result in a reduction in the net carbon emissions from the Proposed Development. Given the absence/shallow depth, and potentially modified condition of the peat at the Site as a result of artificial drainage, there are opportunities, as part of the Proposed Development, to restore and enhance the peat condition. These are summarised as part of the Outline Biodiversity Enhancement Management Plan (OBEMP) (**Technical Appendix 6.7, EIAR Volume 4**) and Outline Peat Management Plan (OPMP) (**Technical Appendix 8.5, EIAR Volume 4**).
- 2.4.2.36 Drainage implemented during the construction phase of the Proposed Development would be removed prior to operation, and has been assumed to be temporary in duration. For the purposes of the carbon calculator the expected value for completion of backfilling, removal of any surface drains, and restoration of the hydrology is 0.25 years, and the minimum and maximum are assumed to be 0.1 year and 3 years respectively.
- 2.4.2.37 It has been assumed that at the end of its operation (40 years), the Proposed Development would be decommissioned. In this case, it has been assumed that access tracks constructed would remain in situ, drainage channels and gullies in peat would be blocked, and turbine infrastructure removed.

2.4.3 Results

- 2.4.3.1 The estimated total carbon losses as calculated by the online carbon calculator, as shown in **Table 2.4.1**, summarises the following information:
 - Losses due to turbine life: Embodied/lifecycle emissions from manufacture, transport, construction, operation, and decommissioning;
 - Losses due to backup: Fossil-generation used to balance wind variability. It is assumed that back up capacity is derived from conventional fossil fuel generation;
 - Losses due to reduced carbon fixing potential: Lower CO₂ uptake where vegetation is covered or affected by drainage;
 - Losses from soil organic matter: CO₂ released as disturbed/drained peat oxidises;
 - Losses from Dissolved Organic Carbon (DOC) and Particulate Organic Carbon (POC) leaching: Carbon washed into watercourses that later oxidises to CO₂; and
 - Losses due to forestry felling: Emissions and foregone sequestration from tree removal.
- 2.4.3.2 The carbon losses calculated are independent of the generation mix used to calculate the overall carbon balance.
- 2.4.3.3 The Expected CO₂ Losses scenario presents anticipated carbon losses based on the mean input parameters detailed in **Section 2.4.2**. The Minimum Value Losses scenario shows expected carbon losses using minimum input parameters, while the Maximum Value CO₂ Losses scenario reflects expected carbon losses based on maximum input parameters.

| Source | Expected CO ₂ Losses (tCO ₂) | Minimum Value CO ₂ Losses (tCO ₂) | Maximum Value CO ₂ Losses (tCO ₂) |
|---|---|--|--|
| Losses due to turbine life | 78,948 | 78,948 | 78,948 |
| Losses due to backup | 67,599 | 0 | 67,599 |
| Losses due to reduced carbon fixing potential | 2,203 | 661 | 11,702 |
| Losses from soil organic matter | 8,513 | -8,054 | 118,454 |
| Losses from DOC and PCO leaching | 10 | 13 | 32,293 |
| Losses due to forestry felling | 2,565 | 2,332 | 2,565 |
| Total losses of carbon dioxide | 159,839 | 73,900 | 311,561 |

- 2.4.3.4 The expected total carbon payback time for the Proposed Development, based on the carbon losses compared to electricity generation from traditional sources such as coal, mixed generation, and fossil fuel mixed generation, as determined by the online carbon calculator, is shown in **Table 2.4.2**.
- 2.4.3.5 The Minimum Value 0% Balancing Capacity indicates no additional balancing is required, with generation perfectly matching demand. The Maximum Value 5% Balancing Capacity accounts for up to 5% additional capacity to manage variability, including mechanisms like energy storage or backup generators.

| Source | Counterfactual Emission Factors (tCO ₂ MWh ⁻¹) | Carbon Payback Period (years) | | |
|----------------------------|---|-------------------------------|-------------------------------------|-------------------------------------|
| | | Expected Value | Minimum Value 0% Balancing Capacity | Maximum Value 5% Balancing Capacity |
| Coal fired generation | 0.945 | 0.4 | 0.1 | 0.8 |
| Grid mix generation | 0.207 | 1.9 | 0.4 | 3.6 |
| Fossil fuel mix generation | 0.424 | 0.9 | 0.2 | 1.8 |

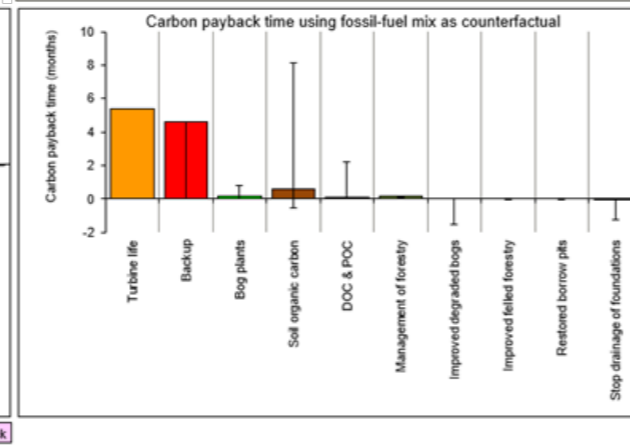
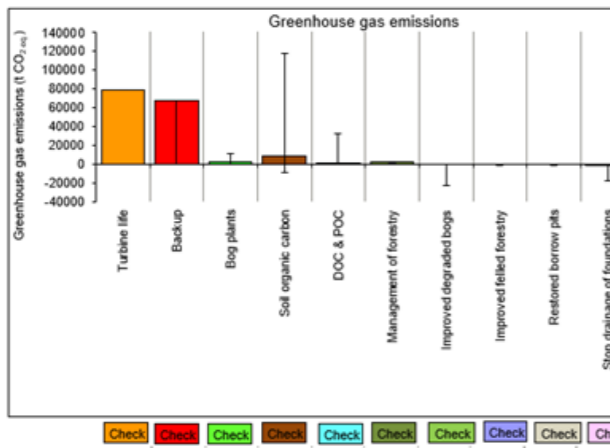
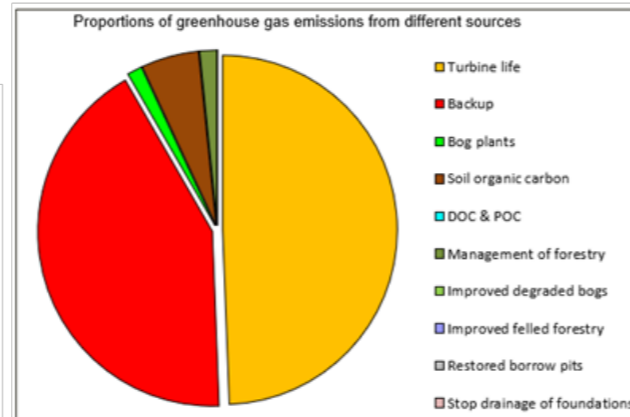
2.4.4 Summary

- 2.4.4.1 The carbon assessment indicates that the carbon emission payback time for the Proposed Development would be:
 - Between 0.2 and 1.8 years, if compared against a fossil fuel mix generation, with an expected value of 0.9 years; and
 - Between 0.4 and 3.6 years based on a grid mix generation, with an expected value of 1.9 years.
- 2.4.4.2 In conclusion, the Proposed Development would deliver a significant net beneficial impact in terms of the total CO₂ emissions offset given the expected operational life of 40 years.

Annex 1: Carbon Calculator Assessment Results and Charts

| | Exp. | Min. | Max. |
|--|----------|----------|----------|
| 1. Windfarm CO₂ emission saving over... | | | |
| ...coal-fired electricity generation (tCO ₂ yr ⁻¹) | 390670 | 390670 | 390670 |
| ...grid-mix of electricity generation (tCO ₂ yr ⁻¹) | 85575 | 85575 | 85575 |
| ...fossil fuel - mix of electricity generation (tCO ₂ yr ⁻¹) | 175285 | 175285 | 175285 |
| Energy output from windfarm over lifetime (MWh) | 16536287 | 16536287 | 16536287 |
| Total CO₂ losses due to wind farm (t CO₂ eq.) | | | |
| 2. Losses due to turbine life (eg. manufacture, construction, decommissioning) | 78948 | 78948 | 78948 |
| 3. Losses due to backup | 67599 | 0 | 67599 |
| 4. Losses due to reduced carbon fixing potential | 2203 | 661 | 11702 |
| 5. Losses from soil organic matter | 8513 | -8054 | 118454 |
| 6. Losses due to DOC & POC leaching | 10 | 13 | 32293 |
| 7. Losses due to felling forestry | 2565 | 2332 | 2565 |
| Total losses of carbon dioxide | 159839 | 73900 | 311561 |
| 8. Total CO₂ gains due to improvement of site (t CO₂ eq.) | | | |
| 8a. Change in emissions due to improvement of degraded bogs | 0 | 0 | -22086 |
| 8b. Change in emissions due to improvement of felled forestry | 0 | 0 | -144 |
| 8c. Change in emissions due to restoration of peat from borrow pits | 0 | 0 | 151 |
| 8d. Change in emissions due to removal of drainage from foundations & hardstanding | -1050 | 576 | -17813 |
| Total change in emissions due to improvements | -1050 | 576 | -39892 |

| RESULTS | | | |
|---|-----------|-------|-----------|
| | Exp. | Min. | Max. |
| Net emissions of carbon dioxide (t CO₂ eq.) | | | |
| | 158789 | 34008 | 312137 |
| Carbon Payback Time | | | |
| ...coal-fired electricity generation (years) | 0.4 | 0.1 | 0.8 |
| ...grid-mix of electricity generation (years) | 1.9 | 0.4 | 3.6 |
| ...fossil fuel - mix of electricity generation (years) | 0.9 | 0.2 | 1.8 |
| Ratio of soil carbon loss to gain by restoration (TARGET ratio (Natural Resources Wales) < 1.0) | No gains! | 0.2 | No gains! |
| Ratio of CO ₂ eq. emissions to power generation (g / kWh) (TARGET ratio by 2030 (electricity generation) < 50 g / kWh) | 10 | 2 | 19 |



Check Check Check Check Check Check Check Check Check Check

Results
 PAYBACK TIME AND CO₂ 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 | 78948 | 0 | 0 |
| Backup | 67599 | 67599 | 0 |
| Bog plants | 2203 | 1542 | 9498 |
| Soil organic carbon | 8513 | 16567 | 109941 |
| DOC & POC | 10 | 0 | 32283 |
| Management of forestry | 2565 | 233 | 0 |
| Improved degraded bogs | 0 | 0 | 0 |
| Improved felled forestry | 0 | 0 | 0 |
| Restored borrow pits | 0 | 0 | 151 |
| Stop drainage of foundations | 0 | 0 | 0 |

Data used in barchart of carbon payback time using fossil-fuel mix as counterfactual

| Greenhouse gas emissions | Exp. | Min. | Max. | Exp. | Min. | Max. |
|------------------------------|--------|-------|--------|------|------|------|
| Turbine life | 78948 | 0 | 0 | 5 | 0 | 0 |
| Backup | 67599 | 67599 | 0 | 5 | 5 | 0 |
| Bog plants | 2203 | 1542 | 9498 | 0 | 0 | 1 |
| Soil organic carbon | 8513 | 16567 | 109941 | 1 | 1 | 8 |
| DOC & POC | 10 | -3 | 32283 | 0 | 0 | 2 |
| Management of forestry | 2565 | 233 | 0 | 0 | 0 | 0 |
| Improved degraded bogs | 0 | 0 | -22086 | 0 | 0 | -2 |
| Improved felled forestry | 0 | 0 | -144 | 0 | 0 | 0 |
| Restored borrow pits | 0 | 0 | 151 | 0 | 0 | 0 |
| Stop drainage of foundations | -1050 | -1626 | -16763 | 0 | 0 | -1 |
| | 158789 | | | 11 | | |